PAS Essential

INFO PACKET

PAS EIP-18 February 2008

Planning and Zoning for Renewable Energy

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American Planning Association

Making Great Communities Happen

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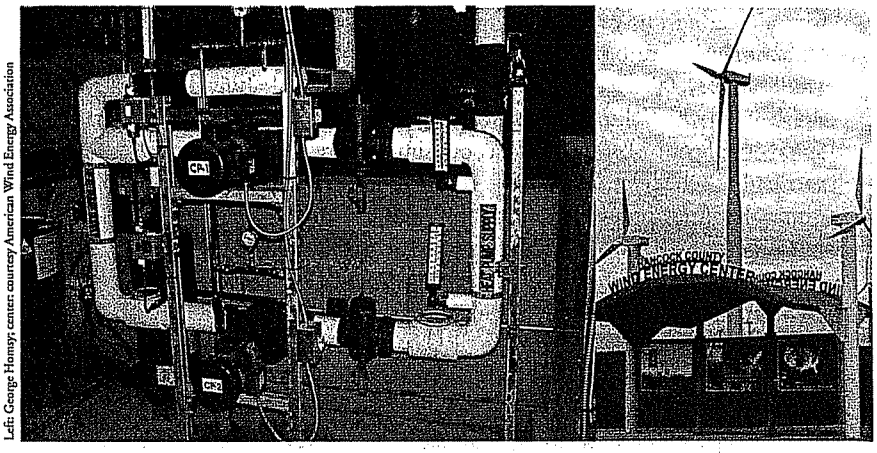
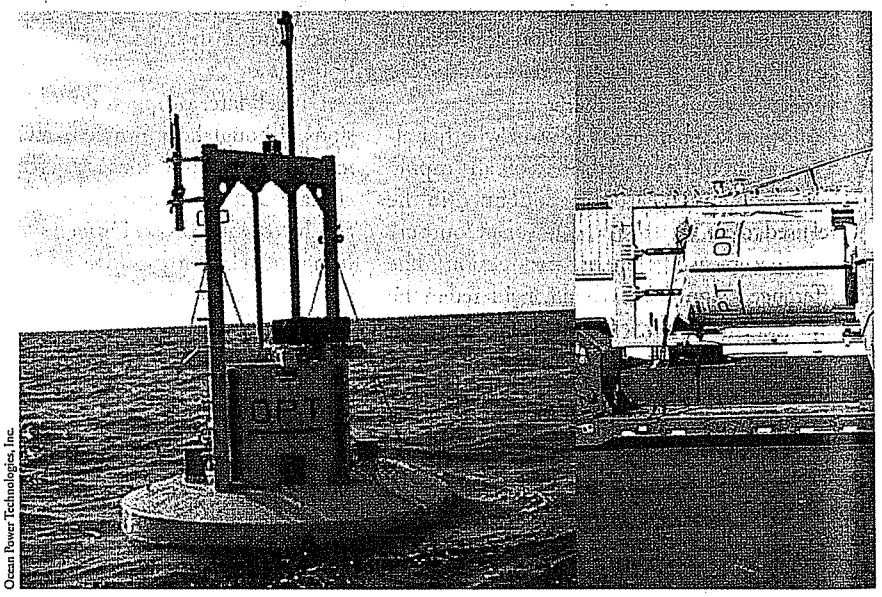
Earth, Wind

Even the threat of global warming could not help Al Gore get around some inconvenient zoning.



Left: George Hornyi; center courtesy American Wind Energy Association

Renewable energy sources still have a long w



Ocean Power Technologies, Inc.

The former vice president and author of *An Inconvenient Truth* wanted to install 33 solar panels on his home in upscale Belle Meade, Tennessee. A zoning prohibition against rooftop power generating equipment delayed him for months.

The city finally rewrote the code to allow solar panels in April, according to Gore spokesman Chris Song. However, the city placed restrictions on the location and color of the panels, reducing their efficiency.

Gore's hurdles symbolize the state of renewable energy in the U.S. today. Its use is growing, but it is far from reaching its full potential. From 1994 to 2005, the nation's appetite for electricity grew by almost 25 percent, according to the U.S. Energy Department's Energy Information Administration. Most of that growth was accommodated by new natural gas power plants. The renewable energy sector grew by 24 percent, but its share of the market remained fixed at just over two percent. That is a problem when it comes to global warming.

Today 40 percent of greenhouse gas emissions produced by the U.S. comes from electricity generation, according to the U.S. Environmental Protection Agency, while coal burning accounts for half of the nation's electricity, according to the Department of Energy. Coal also produces the most carbon dioxide, the biggest manmade contributor to global warming. For every million BTUs of energy produced from coal, 205 to 213 pounds of carbon dioxide are released into the atmosphere. Natural gas emits 117 pounds. Hydroelectric, wind, solar, and geothermal produce none. Neither does nuclear.

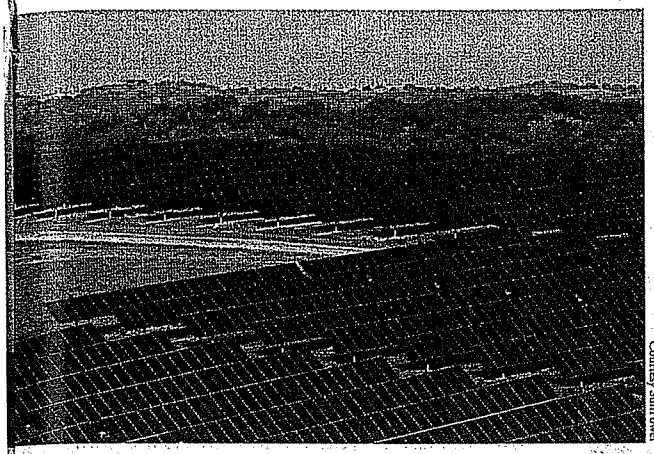
So if everyone, including President George Bush, declares global warming to be a problem, why does renewable energy seem stuck at two percent? The reasons include pricing, overcautious utilities, political favoritism, and good old-fashioned NIMBYism.

From hippie to mainstream

Optimistic renewable energy advocates say that the era of clean power is upon us. "As business people take a look at the long-term costs of energy, they continue to seek out alternatives," says Mark Culpepper, vice president of strategic marketing for SunEdison, which harnesses the

and Fire

By George Homsy, AICP



Courtesy SunPower

Left to right: A geothermal system at the Association for the Protection of the Adirondacks in Niskayuna, New York. Turbines at the Hancock County Wind Energy Center in Garner, Iowa. The 11-megawatt Serpa Solar Power Plant in Serpa, Portugal.

to go in meeting our energy needs.

Ocean Power Technologies' PowerBuoy converts ocean wave energy into electric power. The buoy, most of which is underwater, has undergone testing in the Atlantic and Pacific oceans.

sun for big box stores and distribution centers. "It has moved from a hippie technology to a mainstream technology."

Large companies are making significant investments in renewable power, according to Bentham Paulos, a program officer with the Energy Foundation, a San Francisco-based partnership of major donors that funds renewable energy. Over the long term, Paulos says, renewable energy such as solar or wind power will turn out to be a relatively low-risk investment for the companies "because the technologies are not subject to the fluctuations in the price of fuel, they are not subject to future emission regulations—which are going to be a big deal as concern over global warming increases—and you get your money back sooner."

Wind farms typically start generating power and bringing in revenue within the first six months after construction begins, Paulos points out. In contrast, coal and nuclear plants take five to seven years to build after the permitting process is complete.

Of the many different kinds of renewable power in the marketplace, hydroelectric is the biggest, producing three-quarters of the nation's renewable power, and solar and wind have matured and are slowly making headway. Biomass and geothermal are finding a growing niche. Even nuclear power boasts environmental credentials in a world worried about global warming. And then there are the experimental technologies that harness tides and waves.

Afternoon delight

The biggest sticking point in the growth of renewable energy is (and always has been) price. When you do not take the costs of pollution into account, electricity generated by coal (and we have a lot of coal in the U.S.) is pretty cheap. In coal-rich states such as West Virginia, the average retail price for power is only 5.14 cents per kilowatt hour. (This February, the national average retail electricity rate was 8.73 cents per kilowatt hour.)

The California Energy Commission estimated that in 2004, the cost to produce power from a new electricity generating facility would be 3.3 to 4.1 cents per kilowatt hour for coal, 6.0 cents for hydroelectric, 5.2 to 15.9 for natural gas, 4.6 for wind, and 13.5 to 42.7 cents for solar.

The price of wind power is now competitive, but solar seems less so. Is that true? To answer the question, it's important to remember that average prices tell only part of the story. A study of California pricing in 2001 found that peak power could reach $1.09 per kilowatt hour during a June afternoon—the very time when free solar energy shines.

Fuel prices sparked and then snuffed out the first modern attempt to harness the sun's power, according to energy historian Charles Smith, writing in *Technology Review*. In 1860, Auguste Mouchout started his solar research in response to France's dependence on coal. In 1878 he displayed a machine that concentrated the heat of the sun to make steam and power a refrigerator. "In spite of the seeming paradox," Mouchout wrote, "it was possible to utilize the rays of the sun to make ice."

By 1881, coal prices had dropped worldwide, Mouchout's backers disappeared, and his solar-powered engine faded into the sunset. However, his basic concept is still used today. In the southwestern U.S., nine concentrated solar plants produce about 354 megawatts of power by using mirrors to focus the sun's energy to produce steam, which spins a turbine and creates electricity.

More popular today are photovoltaic cells, which generate electricity directly from sunlight. Despite the higher cost of solar power, the annual number of solar cells in use grew tenfold from 1996 to 2005, according to the Energy Department. Further, more and more of them may soon be used on the rooftops of commercial and institutional buildings.

"If you think about it," says Culpepper, "a

Growing Gasoline

Courtesy Montana State University Extension Water Quality Program, waterquality@montana.edu

Ethanol comes from more than just corn. Sugar beets are an important raw material in France, which leads the European Union in ethanol production.

We've got to be aggressive about finding alternative sources of fuel. And one such source is ethanol. . . . Ethanol helps our farmers find new markets and helps us replace foreign crude oil.—President George Bush, June 15, 2005

Thanks in part to heavy government subsidies, homegrown ethanol now accounts for as much as 20 percent of the nation's transportation fuel.

Certainly, ethanol fever is catching on in the U.S. According to the ethanol lobbying group, the Renewable Fuels Association, 3.9 billion gallons of ethanol were produced in 2005—a 139 percent jump since 2000. As of June, 119 ethanol refineries were operating in the U.S. and another 77 were planned or under construction. Today, virtually all vehicles can use fuel mixes with up to 10 percent ethanol and an increasing number of flex fuel vehicles run on E85, which is 85 percent ethanol.

For years, the debate has centered on whether ethanol is worth the environmental cost of its production. A Cornell University study measured how much energy was needed to produce it, including inputs such as fertilizers (to grow the corn feedstock), trucking (because ethanol does not travel well in pipes), and refining. The researchers concluded that ethanol was not worth the cost to the environment because it took 30 percent more fossil fuel energy to produce than the fuel contains.

That finding set off a flurry of research. Many scientists now believe that the carbon equation is really in ethanol's favor. One study from the Argonne National Laboratory for Transportation Research found that the production of ethanol uses 26 percent less fossil fuel energy than the ethanol will ultimately yield. (The study found that it takes 23 percent more fossil fuel energy to produce gasoline than the gasoline eventually yields.) Large environmental organizations such as the Natural Resources Defense Council and Environmental Defense now support ethanol.

Another issue: In the U.S., ethanol is produced from corn, but other raw materials can be used. Studies show that sugar (used in Brazil) and other ingredients, such as switchgrass, wood chips, or agricultural residue, could raise the efficiency of ethanol production three to five times. Many people want the federal government to push subsidies in that direction, but that suggestion faces resistance from large agribusiness companies, which make money from corn and from the billions of dollars in subsidies that corn has received over the years.

Staples or a Wal-Mart can beat up its vendors and get a good price on just about anything. The only place that isn't the case is energy."

Culpepper's firm helps Wal-Mart, Staples, and Kohls, among other companies, to stabilize energy costs through solar power. SunEdison installs and maintains its own photovoltaic panels on the vast rooftops of the big box stores and their distribution centers and sells the power back to the building owner at prices that are fixed for 10 or 20 years. Culpepper says solar power helps control costs and smoothes out peak power prices.

Don't blow in my backyard

Wind power is also growing in popularity. According to the Department of Energy, the costs of wind power have plummeted 85 percent over the last 20 years. Wind towers are going up in record numbers, according to the 2007 annual report of the American Wind Energy Association: 2,400 megawatts of power were installed in 2006 and over 3,000 megawatts will go up during 2007. Enough electricity is produced by wind nationwide to power nearly three million homes.

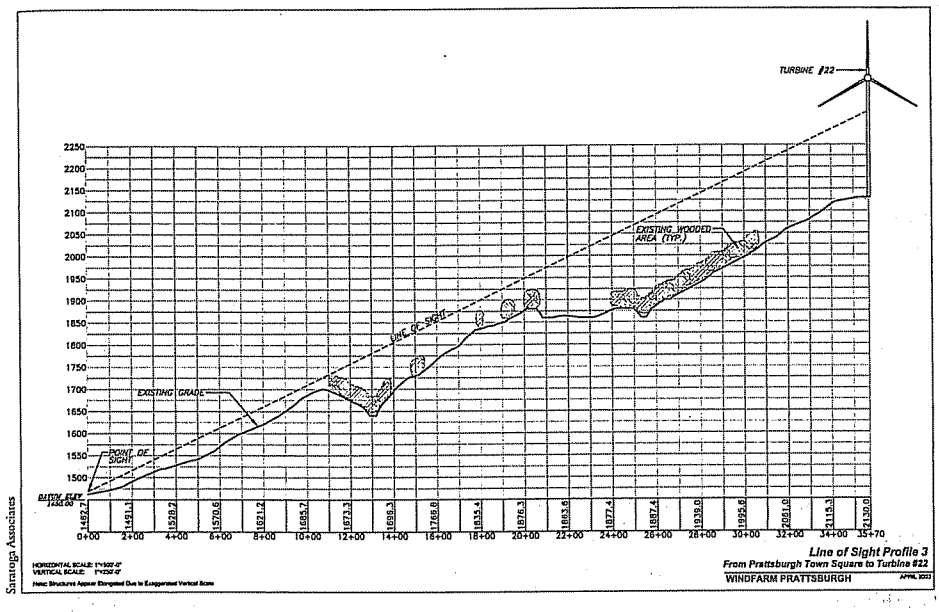
With a more mature industry have come investments by bigger companies and the mergers of many smaller ones, says Dan Albano, director of environmental and regulatory affairs of Global Winds Harvest, Inc.

Further, advances in tower siting science and turbine technology have mitigated many of the common worries about wind power: turbine noise and shadow flicker as well the effects on bird and bat migration. Still, the spread of wind power has been hampered in a couple of important ways.

"There's no way to get around it. At 300 feet tall, wind turbines tower over everything else," says Matt Allen, a visual assessment expert at Saratoga Associates, which helped New York State develop guidelines for assessing and mitigating the visual impacts of towers. Allen helps wind developers simulate what their towers will look like from different vantage points—a factor in environmental reviews.

"Some people think wind towers are majestic, almost like artistic sculptures. Others find them too industrial in rural settings. It's very subjective," says Allen.

Dan Albano says that concern about visual impact is the biggest hurdle to using wind power in some locations and that resistance has hardened in places where people have summer homes—in New York State and Colorado, for example. It's different in North Dakota, he says, because "most people there are still trying to make money from the land; it's more an issue



Line-of-sight profile studies help overcome potential community objections to the negative visual impact of wind towers.

of making sure you're getting as many turbines as your neighbor."

However, wind power has other problems in North Dakota, according to Albano. The price of power is relatively cheap there, making wind power less competitive, and the transmission grid is not as extensive as it could be. "Many areas with a good wind resource do not have easy access to the grid," he says, "and, since deregulation, you don't know who is going to take responsibility for upgrading and maintaining the transmission system."

Most wind farms are located in rural areas, where one landowner can host multiple turbines. An exception is the urban wind farm established recently in Lackawanna, New York, outside of Buffalo. Steel Winds, a project of BQ Energy and UPC Wind, produces 20 megawatts of power, enough electricity for 7,000 homes. The eight 310-foot towers rise next to the shell of an old Bethlehem Steel plant. Eventually 32 turbines could go up on the former Superfund site.

"It's a great reuse of the land," says Matt Allen. "Unfortunately, many urban or industrial areas do not have such a good wind resource."

High-tech turbines catch more than wind these days. A handful of companies are trying to plant turbines on the bottom of the ocean in order to harvest water power. Rather than rely on the flows of rivers or dammed-up water, these projects are tapping the energy of the tides and waves.

Projects are in the development stage in Massachusetts, Rhode Island, New York, Massachusetts, Hawaii, California, and Washington. Already one company, Verdant Power, is tapping the tidal energy near New York City to power a grocery store and a garage. This year the company is installing six more turbines to generate a total of 200 kilowatts of power. The company's president told EnergyBulletin.net that if all goes well, Verdant would expand the system to 200 to 300 turbines, generating 10 megawatts of power by 2010.

The long view

When the Association for the Protection of the Adirondacks designed a new building in 2004, its goal was to reflect the group's position as one of New York's premier conservation organizations. "We wanted to be on the leading edge of being green," says Ken Rimany, director of operations.

The organization examined many options for its new offices, which were attached to the founder's historic home in Niskayuna, New York. It settled on a geothermal system despite heavy upfront costs. Operating costs are significantly lower—because the cost of fuel is zero.

Rimany says the annual bill to heat and cool the group's offices dropped from $3.90 per square foot to the current $1.84 per square foot, although some of that savings comes from using other technology, such as programmable thermostats to manage the building's environment.

Another geothermal benefit: "You don't hear a thing," Rimany says, "and everything is out of sight." That is crucial in the organization's largely residential neighborhood.

Geothermal heat pumps work by using the earth as a source of both heat and cooling. Just a few feet underground, the temperature remains a steady 45 to 75 degrees Fahrenheit, depending on latitude. In the winter, geothermal heat pumps pull heat out of the ground through a heat exchanger connected to fluid-filled tubing that runs through boreholes in a backyard or under a parking lot. In the summer, the system pulls heat out of a building and dumps it back into the earth.

Lake source cooling is a variation on geothermal. Here the chilly waters at the bottom of a lake are pumped to a heat exchanger, and the cold is transferred to a chilled water supply loop that helps cool buildings. Cornell University uses the waters of Cayuga Lake to cool campus buildings. The $55 million project allowed the university to decommission several large chillers filled with chlorofluorocarbon and reduce cooling costs by 80 percent. The system is designed to last 75 to 100 years, and the university estimates it will save enough energy to power 2,500 homes annually.

In 2004, several downtown Toronto office buildings began to be cooled with a system that draws its cold water from deep in Lake Ontario, where the temperature is 39 degrees Fahrenheit. The system can cool 100 office towers and reduces cooling electricity usage by 90 percent, eliminating the need to produce 61 megawatts of power.

Deeper into the earth the temperatures start to rise dramatically because our planet has a molten core, which transmits its heat to the rocks above it. In the West, the earth's crust is thin enough to allow power plants to pump water through this superheated rock to create steam, which is brought to the surface to turn turbines. Other operations create power by tapping reservoirs of steam already trapped beneath the earth's surface.

In 2005, data compiled by the Geothermal Energy Association showed that 0.37 percent of U.S. electricity comes from geothermal plants, but in some places, such as California, geothermal accounts for five percent of electricity production. There are also geothermal power plants in Alaska, Hawaii, Nevada, and Utah. Another seven states have plants in various stages of development.

The organization estimates that geothermal energy plants can produce electricity in the western U.S. for about five cents per kilowatt hour. As with solar and wind power, the fuel for geothermal energy is free and inexhaustible. Unlike solar and wind, geothermal energy is available 24/7.

Biopower, a pre-fossil fuel

The name says it all. Fossil fuels are the remains of long dead plants and animals transformed over millions of years by the heat and pressure of the earth into coal, oil, and natural gas.

Biopower uses the biomass of today (i.e.

The Charge of the Biodiesel Brigade

In Washington State, the Cascade Mountains are a political dividing line: more rural and conservative on the east side, more urban and liberal on the west. Biofuels have turned out to be a rare unifying issue.

Once considered a cottage industry for home-brewing eco-hippies, biodiesel has become the focus of state efforts to develop a biofuels industry. That is largely because studies of air quality done in 2003 showed that over 70 percent of the cancer risks from toxic air pollutants in the Puget Sound region are caused by particulate matter from diesel emissions. Biodiesel dramatically reduces particulate and carbon emissions, even at a blend of just 20 percent biodiesel and 80 percent petrodiesel (a blend level known as B20).

With a need to improve air quality, the Washington State legislature passed the Clean School Bus Program in 2003. The program helped pay for retrofits of school bus fleets, but it also subsidized the purchase of biodiesel, with school districts like Spokane's Central Valley leading the way in implementation.

Since then, many school districts have started using biodiesel in blends up to B20. Darrell Clute, fleet manager for the Ferndale School District's buses, will test blends up to B50 this summer. After a few years of running B20, his buses are experiencing higher fuel efficiency and lower maintenance costs, he says. Clute adds that he convinced his supervisors to use biodiesel by showing them the clouds of white petrodiesel smoke from the bus corral in the morning, then taking them for lunch behind a bus idling on biodiesel: no smoke, no particulates, and no diesel odor.

Cost has been a neutral factor. Washington's five regional clean air agencies receive funding for a variety of programs aimed at reducing on-road diesel emissions. One program run by the Northwest Clean Air Agency, overseer of three counties north of Seattle, subsidizes any price differences between petrodiesel and biodiesel, and will continue to do so for another year. For buses manufactured after 1992, the only retrofit necessary was a filter-swap regimen that protected the engines from fuel line deposits flushed out by biodiesel's detergent qualities.

It's not easy to use biodiesel in all state fleets. In 2004, the Washington State Ferries—the largest public ferry fleet in the country—started a biodiesel test program but discontinued it in May 2005 after repeated problems with fuel filter clogging and engine failure. The ferry system is now seeking ways to adapt large engines to biodiesel uses.

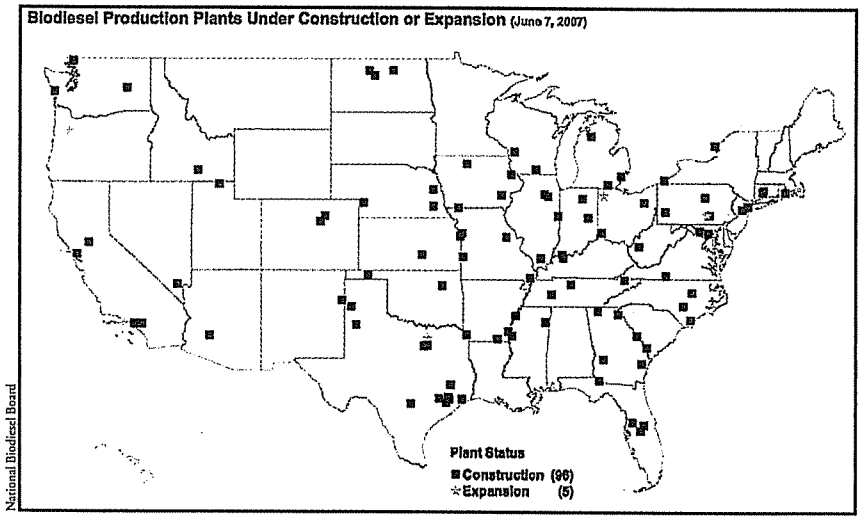
Over and over again, fleet managers say the reliability of biodiesel—in terms of both fuel quality and its impacts on equipment performance—is their number one concern. However, fire departments and other emergency responders are starting to put biodiesel in their vehicles, and North Whatcom Fire Rescue expects to convert its entire diesel fleet to biodiesel by the end of this year.

Supply and demand

In the spring of 2006, Washington became the second state after Minnesota to pass a renewable fuel standard. Like the federal renewable fuel standard, Washington's law requires a certain amount of biofuel to be distributed statewide, with a richer mixture required for use by state agencies. State and local agencies will be required to use B5 by the year 2008, provided that regional production infrastructure is in place, while public pumps statewide will dispense B2. This requirement immediately created a new 25 million gallon potential market for biodiesel, well above the three million gallons of annual sales at the time, and more than a dozen new biodiesel producers have gone into business in the last year.

The state's 2006 Energy Freedom Act addressed the core reason for Washington's limited ability to produce biodiesel locally: Unlike the Midwest, where soybeans and corn are major crops, Washington currently has no large source of crops useful as feedstock. The law authorized a $25 million loan fund for joint ventures involving local governments, public port authorities, and biofuel companies. Biodiesel is produced from a variety of organic materials—such as canola oil, yellow grease, and mustard oil—that the joint ventures will encourage by funding seed crushers at collection terminals.

Biofuels also help bridge political and geographic divides. Perhaps the best example is Metro King County's program, which exchanges biosolids for fuel. The agency has developed a pilot program to ship treated fecal matter as free fertilizer to farmers east of the Cascades in return for enough crop-based feedstock to produce almost two million gallons of biodiesel annually. That biodiesel will go straight into public buses, all of which run on biodiesel blends.



Biodiesel is not the only biofuel out there. Ethanol plays a large role nationally, and compressed natural gas is used in scattered locations. In Washington, concerns about the ability of the Puget Sound area to meet clean air standards for ozone pollution have kept higher ethanol requirements on the back burner. At the end of 2008, when full biodiesel requirements go into effect for B2 for public consumption, a similar requirement will mandate that two percent of all gasoline sold must include ethanol, with the possibility of an increase to 10 percent if air quality isn't compromised. The two percent requirement is fairly low, however, compared to widespread use of E10 and E85 nationally.

Washington residents have been discussing climate change for some years. In 2001, Seattle City Light resolved to become one of the first carbon-neutral ("net zero emitter") utilities in the country.

Wide public support has helped, but without government agencies leading the charge, Washington wouldn't be on its current fast track to energy independence through renewable fuels.

Matt Krogh

Matt Krogh is a freelance writer in Bellingham, Washington.

plants) to help generate electricity. Most biopower facilities simply burn plants to produce steam. The key is to locate the plants near an abundant fuel supply. An example: Tamarack Energy plans three facilities in heavily forested parts of New England.

The Natural Resources Defense Council estimates that 39 million tons of crop residues go unused each year in the U.S.—enough to produce 7,500 megawatts of electricity. Another option is switchgrass, which is native to the American prairie, grows quickly, and produces little nitrogen runoff pollution.

Burning wood or other crops may not sound environmentally friendly, but today's high-efficiency burners release far fewer pollutants and greenhouse gases than coal plants do. Any greenhouse gases that are emitted can be offset by replanting fields with a new round of fuel crops, creating a closed loop of carbon.

In fact, one of the fastest ways to make a dent in our greenhouse gas emissions may be by co-firing—that is, getting traditional coal-fired plants to use biomass as well. The Department of Energy estimates that mixing coal with 15 percent biomass can cut greenhouse gas emissions by 18 percent.

Another biopower technology, called gasification, uses high temperatures and a low-oxygen environment to convert biomass into a gas that can be converted into other products or burned to produce power. Methane, produced by the natural decay of organic matter, is a source of biopower as well as a potent greenhouse gas. Instead of allowing it to escape from landfills, in some places it is captured and piped to a central point, where it is filtered and cleaned before burning.

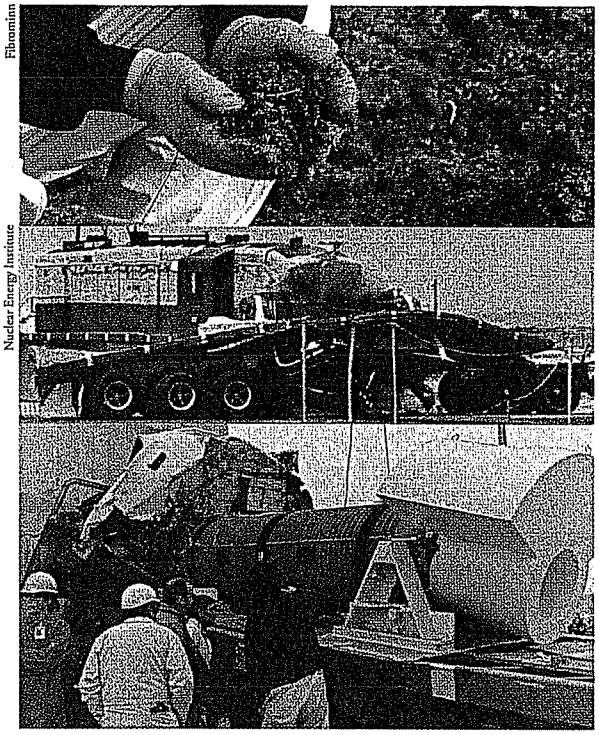
Pig manure is yet another source of biopower. In ecologically sensitive environments, especially near water bodies, hog farmers cannot spread the manure as fertilizer. Frank Miller's company, Innovative Environmental Products, offers a technology that removes so much water from hog waste that the remaining solids can be burned to produce electricity. He touts this as a safe way to manage wastes and allow farmers to sell power back to the utility.

Greening nuclear power

Although it has been 11 years since a new nuclear reactor has come online in the U.S., this nation is the largest producer of nuclear power in the world. About 20 percent of U.S. electricity comes from nuclear plants. France, with a smaller overall energy appetite, gets 78 percent of its power from this source.

Concern over global warming has allowed the nuclear power industry to set itself up as an alternative energy because nuclear energy produces no greenhouse gas emissions. The Nuclear Energy Institute, an industry lobbying group, says that nuclear power has substituted for the production of over 680 million metric tons of carbon and is responsible for almost three-quarters of all emissions-free electricity produced in the nation. Utility and energy companies have told the federal Nuclear Regulatory Commission, which approves new reactors, to expect 28 applications for new reactors between 2007 and 2009.

To help smooth the resurgence, the commission has pre-approved four reactor designs, which are simpler and safer than the reactors of the 1970s, according to David McIntyre, a public affairs officer for the commission. He says the commission has the approval process down to just 42 months. In addition, for the past two years the Energy and Treasury departments have offered tax benefits to encourage the first handful of reactors to push forward.



Fibrominn

Nuclear Energy Institute

A Minnesota company burns poultry litter, a mixture of manure and bedding materials (top), to produce electricity. In a safety test, a canister for storing nuclear waste (shown here on a flatbed truck) held up against the force of a 120-ton locomotive going 80 miles per hour.

A recurring problem is the disposal of high-level radioactive waste, especially spent nuclear fuel rods, which will stay toxic for tens of thousands of years. Today's nuclear plants must store their waste on-site until a central repository is completed.

The Energy Department has spent 20 years studying Nevada's Yucca Mountain as just such a repository. Nuclear waste would be stored underground in layered steel canisters for the next 10,000 years. Under its most optimistic timetable, the department hopes to begin receiving waste in 2018. However, the nuclear industry estimates that 78 nuclear plants will run out of room to store waste by 2010.

Government push

Even as renewable power prices come down, many utilities have barely tiptoed into the sector. Mark Culpepper says utilities prefer to stay with traditional generation techniques until pushed by fuel prices or government regulation.

For their part, governments are pushing renewable portfolio standards. Some 20 states have set deadlines for utilities to buy a certain amount of their power from renewable power sources. The sources, required amounts, and deadlines vary from state to state.

Many alternative energy advocates would like to see a national renewable portfolio standard. Bentham Paulos of the Energy Foundation says the most popular suggestions floating around Capitol Hill would require utilities to buy 15 or 20 percent of their power from renewable energy suppliers by 2020.

The other interesting trend is the increasingly distributed nature of the nation's power production. One vision for a distributed energy future can be seen in California's Million Roofs Initiative. Signed into law in August 2006 by Gov. Arnold Schwarzenegger, the program raises the cap on net metering—how much solar power households can sell back to a utility.

The program also requires home builders to offer solar panels as a standard option. It is estimated that the program will produce 3,000 megawatts of clean power and reduce the output of greenhouse gases by three million tons over the next 10 years.

A CBS-*New York Times* poll conducted in April found that 87 percent of Americans support the use of renewable energy sources, even with the caveat that they are more expensive and may be less reliable than other sources. Clearly renewable power has a long way to go in this country. But just as clearly, people want to push in that direction.

George Homsy is a city and regional planner for Saratoga Associates in Saratoga Springs, New York.

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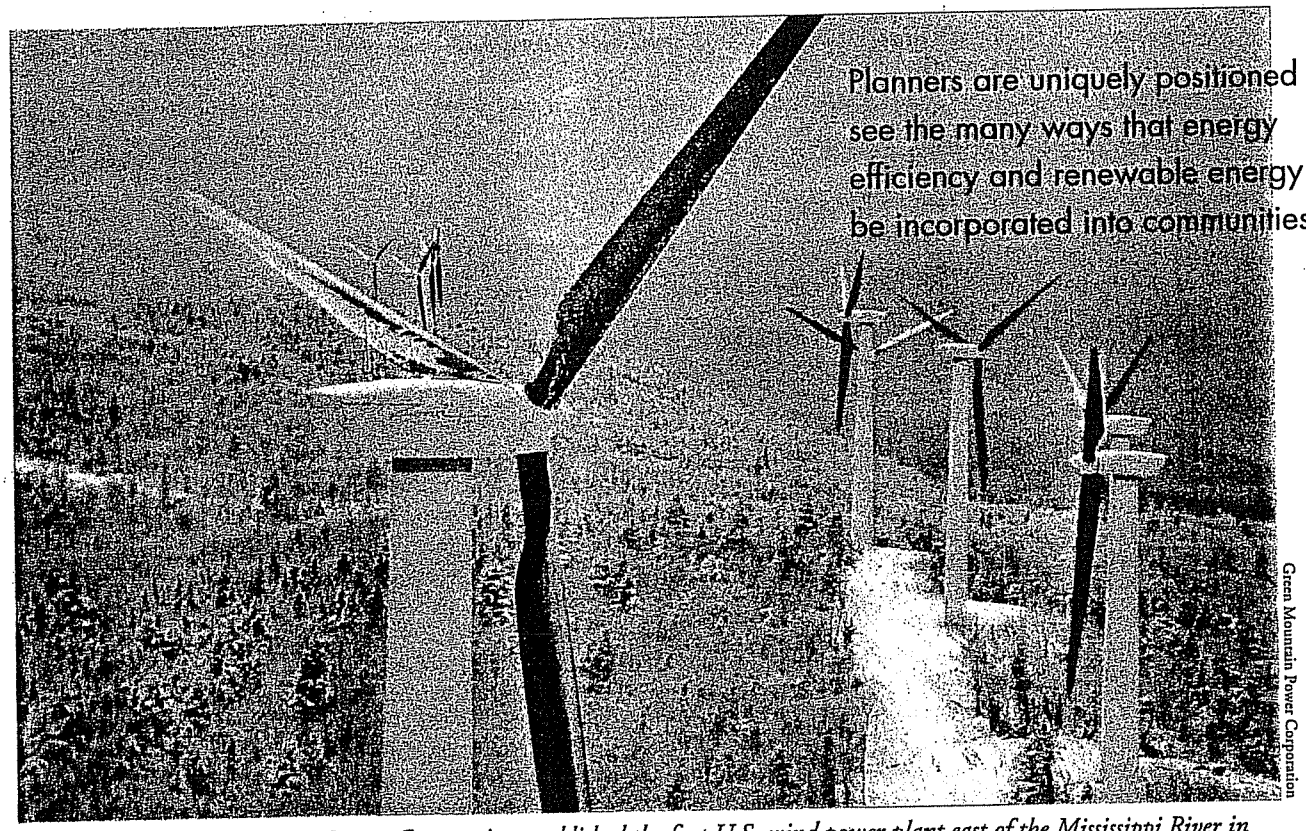
Renewable Energy and Energy Efficiency Incentives for Local Governments

By Megan Lewis, AICP



Planners are uniquely positioned to see the many ways that energy efficiency and renewable energy can be incorporated into communities.

Green Mountain Power Corporation

In 1997, the Green Mountain Power Corporation established the first U.S. wind power plant east of the Mississippi River in Searsburg, Vermont. The eleven 150 kW wind turbines were acquired under the U.S. DOE Turbine Development Program.

Much has been written and said in the past year about drafting national energy legislation. While one of the overall goals of the Bush administration's National Energy Policy is to reduce the U.S.'s dependence on foreign oil supplies, several of the proposed means of realizing this goal are controversial, especially the proposal to open a portion of Alaska's Arctic National Wildlife Refuge (ANWR) to oil exploration. Included in the House of Representatives energy bill (H.R. 4), the ANWR element proved to be unacceptable to the Senate, and both houses reached a stalemate in adopting a mutually acceptable national energy bill before the current congressional session ended. (At the time of publication, the ANWR item appeared to have been withdrawn from further consideration, but may be reconsidered when the 108th Congress convenes in January).

A promising element of the Senate's bill (S. 517), however, has been the pursuit of a national renewable energy portfolio standard—many states adopted such a standard following restructuring of their electric utilities in the late 1990s. The proposed national standard would require utilities to generate 10 percent of the electricity they sell from renewable energy sources (e.g., sources that cannot be fully depleted, like solar and wind) by 2020, with the potential for incremental increases each year until 2030. Some organizations, such as the Sierra Club, believe it is feasible to require that this standard be increased initially to 20 percent and are encouraging Congress to do so. Whatever the final national portfolio standard, the underlying message is that the U.S. must reduce its dependence on both nationally and internationally produced crude oil.

The importance of this policy shift has been made clear by many energy experts who believe that crude oil will not be a viable energy resource in the very near future. Specifically, in May 2002 experts who convened at the International Workshop on Oil Depletion in Upsala, Sweden, stated that, based on all available information on oil reserves and estimates of oil reserves yet to be found, world oil production will reach a peak around 2010 and decline thereafter.

For the U.S., this decline in production has the potential to radically change our energy supply system. According to the U.S. Census Bureau's *Statistical Abstract of the United States: 2001*, in 1999 petroleum fueled 40 percent of U.S. energy demands, followed by natural gas (23 percent), coal (21 percent), nuclear (8 percent), and hydroelectric (4 percent). In total, mined, nonrenewable fuels (petroleum, natural gas, and coal) provided 84 percent of the U.S. energy needs in 1999. Of the total energy consumed in the U.S. in 1999, the largest proportion was consumed by the industrial sector (38 percent), followed by transportation (28 percent), residential (19 percent), and commercial (16 percent).

APA on Energy Efficiency

Energy efficiency is and has been an important topic for planners and APA. In 1976, APA's research department published a trio of PAS Reports on energy efficiency, which followed on the heels of the early 1970s energy crisis. This was also the infancy of the U.S. Department of Energy, created in 1977 under the Carter administration.

The first report, *Energy-Efficient Planning: An Annotated Bibliography* (PAS Report No. 315), provides an overview of policy statements, zoning and subdivision controls, transportation/land-use planning processes, regional planning processes, and building and site designs that all promote energy efficiency. In the introduction, the author notes, "planning decisions have in the past profoundly affected the nation's energy requirements and that they will continue to do so in the future."

The bibliography was followed by reports on land use (*Energy-Efficient Land Use*, PAS Report No. 341) and regulations (*Energy-conserving Development Regulations: Current Practice*, PAS Report No. 352). While the statistics and documents included in these reports are dated, the concepts and approaches are still quite current, and continue to be promoted by planners in many communities, specifically plans that address orientation of buildings and streets for solar access, clustered housing, integration of land uses (commonly referred to today as "mixed use"), bike and footpath systems, and mass transportation.

These reports indicate that the conventional wisdom of the time regarding energy use was focused primarily on conservation and ways to reduce the consumption of traditional energy sources, in the event that another crisis were to happen, rather than promoting the use of alternative energy. The alternative energy technology, at least that which was commercially available and known to communities, appears to

Issues of both supply and cost suggest the importance of a policy shift that places greater emphasis on replacing nonrenewable energy resources with renewable resources, and on promoting energy efficiency in machines that depend on nonrenewable energy sources.

While the industrial sector consumes the most energy, it is the transportation sector that spends the most money on energy, the majority of which is likely to be petroleum. Also according to the *Statistical Abstract*, of the approximately $5.7 billion spent on energy in the U.S. in 1997, the transportation sector spent 37 percent, followed by residential (24 percent), industrial (21 percent), and commercial (18 percent). When looking at expenditures by energy sources, petroleum products are at the top (44 percent), followed by electricity sales from various fuel sources, (36 percent), natural gas (15 percent), and coal (5 percent).

In other words, issues of both supply and cost suggest the importance of a policy shift that places greater emphasis on replacing nonrenewable energy resources with renewable resources, and on promoting energy efficiency in machines that depend on nonrenewable energy sources. While this is often discussed on the national level, local governments are in a strong position to encourage better energy policy through setting a good example themselves. (For more on local energy planning, see the sidebar.)

In times of scarce financial resources, however, local governments may consider such a change to be a financial and logistical burden. This issue of *Public Investment* provides a snapshot of various programs that help local governments offset the financing aspect of good energy policy. It also discusses the important role that planners play in pursuing this goal.

Megan Lewis is an APA senior research associate who focuses on environmental planning issues.

ENERGY PLANNING ON THE LOCAL LEVEL

While there may be a stalemate with the national energy plan, it is recognized at the federal level that energy conservation has to start from local initiatives. The U.S. Department of Energy recently sponsored a competition for the best metropolitan energy plans, called Energizing America's Cities. The winner of that competition, the San Diego Regional Energy Office's regional energy plan, presented a comprehensive look at the energy issues facing the region and offered solutions that included distributed generation, energy efficiency, and renewables. (For more about the San Diego plan and the other recognized plans, see "Who's Got the Energy?" *Planning*, October 2002; see the list of Resources for more on Energizing America's Cities.)

have been limited to solar, in both building and street design, and in solar heating and cooling equipment. Alternative energy options have expanded greatly beyond solar to include wind, biomass, geothermal, and alternative vehicle fuels (see the glossary of terms for definitions of alternative energy sources).

As these reports make clear, planners are uniquely positioned to see the many ways that energy efficiency and renewable energy can be incorporated into communities. There are strategic points in the planning process where consideration of emerging energy sources and their increased use can be encouraged. (APA policy staff are drafting an APA policy guide on energy for ratification at the 2003 national conference in Denver).

While there have been some vanguard projects, such as Village Homes in Davis, California, regrettably there has yet to be significant widespread change in the planning and design of communities to support the use of alternative energy sources. Developers and citizens often cite the financial barriers to such change. The initial capital costs for the equipment, the payback time frame on that investment, the per unit cost compared to conventional alternatives, or the difficulty in retrofitting existing structures are all offered as barriers. While there are incentive programs available to the private sector to overcome these barriers, unless there is a regulatory mechanism requiring energy efficiency or establishing a benefit, it is often up to the individual to pursue them voluntarily. For planners, adopting anything stronger than a bonus system for developers who incorporate renewable energy into their projects, especially in the current economic climate, would be difficult for fear of discouraging development.

Planners, city managers, and others involved in community development can take heart about facing their own financial barriers in implementing better energy policy. A number of financial incentive programs are available to help offset the initial investment needed to implement renewable energy systems in buildings and transportation systems. There are several programs available on the federal level through U.S. EPA (Green Power Partnership), U.S. DOE (Clean Cities, Rebuild America), U.S. Department of Transportation (Congestion Mitigation and Air Quality Improvement Program), and others (see Resources, page 4). There are also funding programs on the state level that provide financial incentives for adopting energy efficiency and renewable energy. The focus here is on these latter programs.

State-Level Energy Programs

The Database of State Incentives for Renewable Energy (DSIRE), an ongoing project of the Interstate Renewable Energy Council, is sponsored by U.S. DOE's Office of Power Technologies and managed by the North Carolina Solar Center at North Carolina State University. DSIRE provides links to state and local programs that help promote the use of renewable energy sources, including financial incentives, investment and awareness programs, and language for rules, regulations, and policies.

Included here are samples of different types of state-level financial incentive programs, the majority of which are noted in the DSIRE database. The financial tools listed here include grants, rebates, and loans. This listing is not meant to be a comprehensive presentation of all programs, but rather a starting point for understanding the financial tools available. All of the programs are available to local governments.

Grants. In *Illinois*, the Department of Commerce and Community Affairs's Renewable Energy Resources Program provides grants for large systems to ease the development and

GLOSSARY OF ALTERNATIVE FUEL TERMS

biodiesel A cleaner-burning diesel replacement fuel made from natural, renewable sources such as new and used vegetable oils and animal fats.

bioethanol Produced from cellulose-based biomass such as trees and grasses.

biogas A combustible gas created by anaerobic decomposition of organic material, composed primarily of methane, carbon dioxide, and hydrogen sulfide.

biomass Plant material, either raw or processed that can be converted to electricity or fuel.

cogeneration The sequential production of power and thermal energy from a single fuel source. Also called combined heat and power (CHP). Uses heat that is otherwise discarded from conventional power generation to produce thermal energy, resulting in efficiencies of 50 to 70 percent (average efficiency of conventional fossil-fueled power plants is 33 percent).

distributed generation On-site source for power and heat, either primary or as a backup source. Can include CHP technology.

ethanol Alcohol-based, produced by fermenting and distilling starch crops such as corn, barley, and wheat that have been converted into simple sugars.

geothermal energy Produced by the internal heat of the earth. Geothermal energy can be used directly for heating or to produce electric power.

hydroelectric Electricity that is produced by the force of water falling through a hydro turbine that spins a generator.

landfill gas (LFG) Created when organic waste in a landfill naturally decomposes. Consists of nearly 50 percent methane, nearly 50 percent carbon dioxide, and a small amount of non-methane organic compounds.

methanol Also known as wood alcohol, methanol is an alcohol fuel produced primarily from natural gas. As M85, a combination of 85 percent methanol and 15 percent gasoline, it has been used as an alternative fuel in flexible fuel vehicles.

natural gas A mixture of hydrocarbons, mainly methane, produced either from gas wells or in conjunction with crude oil production. Because of gaseous nature, it must be stored in either a compressed state (CNG) or a liquefied state (LNG).

propane Produced as a by-product of natural gas processing and petroleum refining.

photovoltaic (PV) cell Treated semiconductor material that converts solar irradiance to electricity.

renewable energy Energy derived from resources that are regenerative or for all practical purposes cannot be depleted. Includes moving water (hydro, tidal, and wave power), thermal gradients in ocean water, biomass, geothermal energy, solar energy, wind energy, and municipal solid waste.

solar Energy technologies that use sunlight to produce heat and electricity. Energy is captured through photovoltaic (PV) cells.

wind power Process by which the wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power.

Sources: Alternative Fuels Data Center, U.S. DOE; Energizing America's Cities Symposium, Gas Technology Institute; U.S. EPA; American Biomass Association. For a more extensive glossary of terms, go to www.eren.doe.gov/power/consumer/energyglossary.html.

use of renewable energy resources. Grant funds are for single projects, may be used only for actual equipment and installation expenses, and require matching funds. They are also energy-source specific in their payout amounts. For example, photovoltaic (PV) device funding is available for up to 60 percent of project cost, with a maximum of $6/watt and $300,000. The City of Chicago has received several PV grants for installations on schools and museums. One of the most innovative grants was awarded to Antioch High School in Antioch, Illinois, for a landfill gas (LFG) project that captures this resource from a nearby landfill and powers 12 micro turbines, enough to provide both power and heat for the school. This program is effective until December 2007.

Indiana has a grant program that assists in purchasing alternative fuel vehicles (not including hybrid vehicles), converting conventionally fueled vehicles to run on alternative fuels, installing refueling facilities for alternative fuels, and purchasing and using renewable transportation fuels. The Alternative Fuel Transportation Grant Program, operated by the Energy Policy Division of the Indiana Department of Commerce, provides grants from between $2,000 and $30,000. Eligible costs are determined by a series of formulas; generally the amount covered ranges from 30 percent to 80 percent of the purchase price.

Alternative fuels here include electric, ethanol, propane, hydrogen, and natural gas. Entities required to purchase alternative fuel vehicles under the federal Energy Policy Act of 1992 are not eligible for this grant. Projects are evaluated and scored based on four criteria: project soundness and feasibility, petroleum fuel savings, environmental effects and benefits, and economic development benefits to Indiana.

Through a joint agreement, the City of Indianapolis recently received $70,000 for an 85 percent ethanol (E-85) refueling facility, which will provide them with ready access to fuel for both city and nearby state fleet vehicles. "Our goal is for more municipalities to take advantage of this and other alternative energy grant programs," says Phil Powlick, the program administrator. (To learn more about how to "green" your fleet, see the Internet site in the Resources list.)

Massachusetts offers the Green Building Initiative, a competitive grant program that funds the planning and construction of renewable technologies in all types of green buildings as defined under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. This program is operated by the Massachusetts Technology Collaborative, the state's development agency for renewable energy and the innovation economy. Started in March 2002, the program will have a total of six grant rounds (two are already completed) and will end in September 2004. It offers three types of grants:

- Early Stage Feasibility Study Grants, which award up to $20,000 to support the costs of studies to evaluate and assess

RESOURCES

Alliance to Save Energy *www.ase.org*

American Bioenergy Association *www.biomass.org*

Coming Global Oil Crisis *www.oilcrisis.com*

Database of State Incentives for Renewable Energy (DSIRE), North Carolina State University *www.dsireusa.org*

Energizing America's Cities, Gas Technology Institute *www.gastechnology.org/energizeamerica*

Green Fleets *www.greenfleets.org/greenfleets_us.html*

International Council for Local Environmental Initiatives *www.iclei.org*

Local Government Commission *www.lgc.org*

Rocky Mountain Institute *www.rmi.org*

Sierra Club *www.sierraclub.org*

U.S. Department of Energy, Clean Cities Initiative *www.ccities.doe.gov*

U.S. Department of Energy, National Renewable Energy Laboratory *www.nrel.gov*

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy *www.eren.doe.gov*

U.S. Department of Energy, Rebuild America *www.rebuild.org/index.asp*

U.S. Department of Transportation, Congestion Mitigation and Air Quality Improvement Program *www.fhwa.dot.gov/environment/cmaq*

U.S. Energy Information Administration *www.eia.doe.gov/oiaf/servicerpt/rps/pdf/sroiaf(2002)03.pdf)*

U.S. Environmental Protection Agency *www.epa.gov*

U.S. Green Building Council *www.usgbc.org*

Case Study Resources:

Alaska Energy Authority. *www.aidea.org/powerloan.htm*

California's Stimulating Public-sector Implementation of Renewable Energy program (SPIRE), Local Government Commission. *www.lgc.org/techserve/spire/index.html*

Illinois Renewable Energy Resources Program. *www.commerce.state.il.us/bus/gri/grants_energy.html.* Rex Buhrmester, Illinois Department of Commerce and Community Affairs (DCCA), Bureau of Energy and Recycling, 217-557-1925; *rbuhrmes@commerce.state.il.us*

Indiana Alternative Fuel Transportation Grant Program. *www.in.gov/doc/businesses/EP_transportation.html.* Philip Powlick, Indiana Department of Commerce Energy Policy Division, 317-232-8970; *ppowlick@commerce.state.in.us*

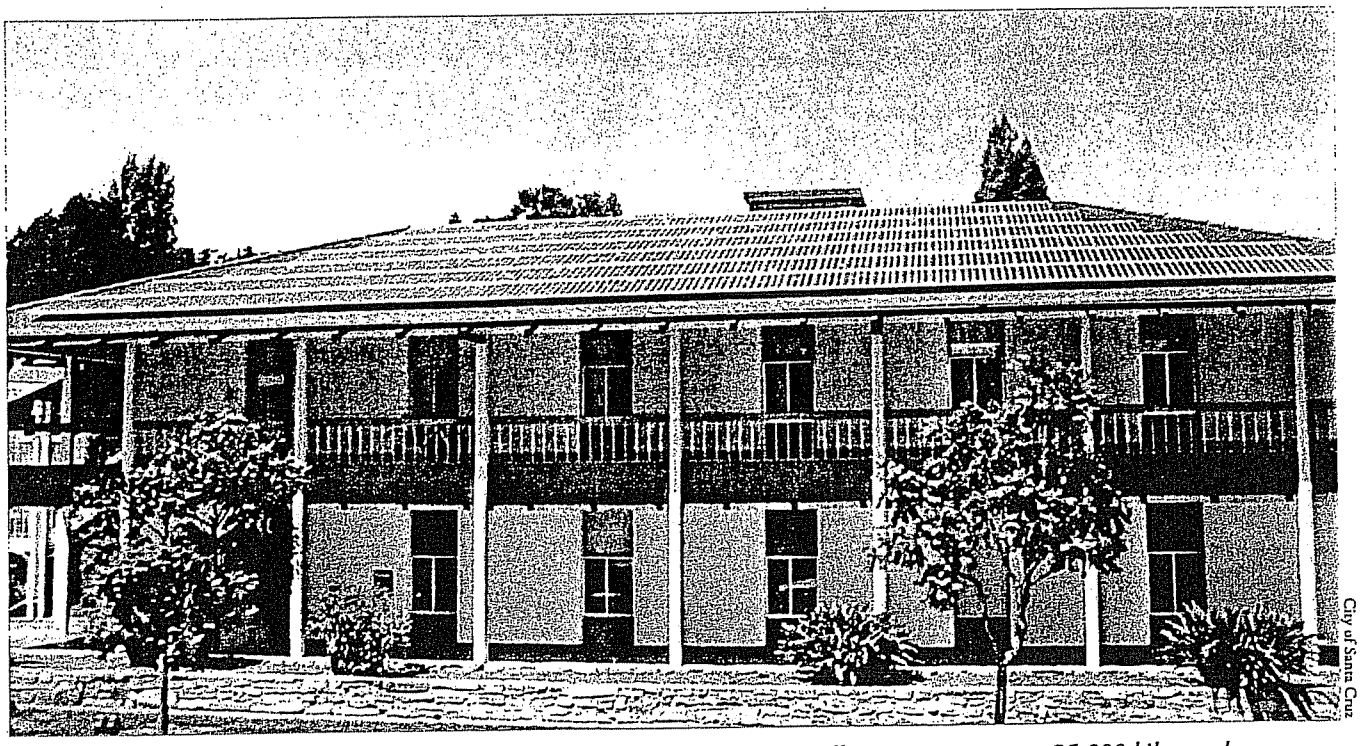
Massachusetts Green Building Initiative. *www.mtpc.org/RenewableEnergy/Green_Buildings.htm.* Project Manager, Quincy Vale, 508-870-0312, ext. 243; *vale@masstech.org*

Minnesota Solar Electric Rebate Program. *www.commerce.state.mn.us* and follow the energy links. Energy Information Center, 651-296-5175.

Missouri Energy Loan Program. *www.dnr.state.mo.us/energy/financial/loan.htm.* David L. Harrison, Missouri Energy Center, Schools and Local Governments, 573-751-7057; nrharrd@mail.dnr.state.mo.us.

New York State Energy Research and Development Authority (NYSERDA) Energy Smart program. *www.nyserda.org/593pon.html.* For further information on other programs, call 866-697-3762.

Washington Plug and Play. *www.energy.wsu.edu/renewables/pv/plugplay.htm*



The City of Santa Cruz installed a 14 kW PV system on its city hall annex that will generate on average 25,000 kilowatt hours (kWh) of electricity annually, or enough electricity for about 7 percent of the power used in the annex.

the feasibility of including eligible renewable energy technologies and related renewable energy and energy-efficiency features in new green building construction, major renovation, or rehabilitation projects. The Town of Brookline received $20,000 to explore energy-efficiency options in renovating its public health department headquarters and to assist the town in promoting green design in local government buildings.

- Design and Construction Grants, which award up to $500,000 to support the costs of eligible renewable energy technologies, and related renewable energy and energy efficiency features, in new green building construction or major renovation or rehabilitation projects. The City of Cambridge received $337,500 to renovate its unused City Hall annex as a green building.
- Public Education and Awareness Grants, which award up to $30,000 to support education and demonstration projects that show the benefits of and things involved in completed green building projects.

Rebates. In June 2002 *Minnesota*'s Department of Commerce established the Solar Electric Rebate Program, which offsets the upfront costs of installing PV systems connected to the grid. The rebate amount is $2,000 per kilowatt (kW), with a maximum of $8,000 paid per system. Applicants must submit a rebate application form to reserve the rebate before doing any work; it also allows the agency to determine whether the site is suitable for solar before work starts. Once the rebate is confirmed, applicants have six months to complete the work, which must be approved by the electric utility officials and pass any local code requirements.

This program is funded by Xcel Energy, an electricity and natural gas utility company that supplies approximately 70 percent of Minnesota's electricity consumption. Currently only Xcel electricity customers can obtain rebates. Beginning in 2004, if funds are still available, the program will be open to any grid-connected electricity customer in Minnesota.

Also in the solar energy arena, *Washington* has a solar rebate program made possible by Solar Works for Washington, a collaborative of Washington State University, Western Sun Cooperative, and Washington State Department of Community, Trade, and Economic Development. This program provides rebates of up to 20 percent of the purchase price of four different pre-packaged and pre-engineered "Plug and Play" modular systems. Rebates will be awarded to up to 100 purchasers of these systems, and after the system has been successfully installed. The intent of the program is to encourage solar to offset fossil fuel use. Modular systems are available from any Washington Solar Energy Association dealer.

For new construction or substantial renovation projects, *New York State* has a rebate program, operated through the New York State Energy Research and Development Authority (NYSERDA), that provides funds for building-integrated PV (BIPV) and advanced solar and daylighting technologies. BIPV systems perform more than one function, such as window awnings (for shading and cooling) that contain PV panels (to capture sunlight). Up to $300,000 is available per project for BIPV design and installation, with a cap of either $5 per watt of alternating current (AC) or 70 percent of the incremental cost of the BIPV, whichever is less. For advance solar and daylighting, up to $100,000 per project is available, with a cap of 70 percent of the incremental cost. Funds are paid out after installation and after the applicant submits required documentation after project completion. For BIPV projects, projected energy savings from other energy-efficiency installations must meet or exceed the projected energy produced by the PV system. The program is available to customers of one

of six utility companies, and the funds are available on a first-come, first-served basis until December 31, 2003, as funds remain available. For projects that are not new construction or substantial renovation, NYSERDA has other programs that provide funding for PV systems.

Loans. In *Alaska*, the Power Project Loan Fund, administered by the Alaska Energy Authority (AEA), provides low-interest revolving loans for developing or upgrading facilities for small-scale electricity production, including waste energy conservation facilities that depend on wind, tidal, geothermal, biomass, hydroelectric, or solar energy. Loan funds also may be used to pay for related costs, such as feasibility studies, license and permit applications, and preconstruction engineering. Loan term is related to the life of the project, and interest rates are either the average weekly yield of municipal bonds for the 12 months preceding the loan date or a rate determined by AEA. Loans for more than $500,000 must be approved by the loan committee, and loans for $5 million or more must be funded by appropriation. According to the Alaska Industrial Development and Export Authority, the agency that oversees AEA, approximately $3 million has been made available annually for loans. To date loans for hydroelectric projects have been the primary focus of the renewable energy segment.

Since 1989, local governments in *Missouri* have had a low-cost loan program available for energy efficiency and renewable energy projects, with the goal of saving taxpayer dollars on energy costs. The Energy Loan Program is administered by the Energy Center of Missouri, under the Department of Natural Resources. Interest rates are fixed and are at or below market value. Generally loan amounts are the lower of eight times either the estimated savings or estimated project cost. Since the program started, local governments have received loans for more than $11 million and have saved more than $2 million annually in energy costs. The savings generated by the projects repay the loans, and the projects must pay back the loans in eight years or less; the average payback has been 5.2 years. The majority of the projects in Missouri focus on energy efficiency modifications. For example, both St. Louis and Kansas City converted their street signal lights from conventional 100 to 160 watt bulbs to light emitting diode (LED) systems that require only 11 watts and last 10 times longer. These systems had a four- to five-year payback.

Other programs. Of all the states, *California* may the one most identified with experiencing energy crises. The Local Government Commission, in partnership with the League of California Cities and the California State Association of Counties, has created Stimulating Public-sector Implementation of Renewable Energy (SPIRE), specifically designed to "help local governments overcome barriers to implementation of municipal energy systems." Launched with a grant from the California Energy Commission's Renewable Energy Consumer Education Program, SPIRE is a technical assistance program that brings local government representatives together with financing and industry resources to help develop a package of tools that includes low interest loans, bulk purchases of PV systems, and rebates of up to 50 percent of system cost.

The program focuses on PV systems, which are considered to be "the most widely applicable technology currently available to the public sector." To date approximately 100 local government entities have taken advantage of the SPIRE program. Among them are the City of Santa Cruz, which installed a 14 kW PV system on its city hall annex that will generate on average 25,000 kilowatt hours (kWh) of electricity annually, or enough electricity for about 7 percent of the power used in the annex. Santa Monica currently powers all of its municipal facilities with "green" electricity; the city purchases approximately 5 megawatts of renewables, which is equal to the electricity used by between 5,000 and 6,000 homes.

"The beauty of the state rebates is that renewable energy is now a cost-effective option for local governments," says Alison Pernell of the Local Government Commission. "When combined with low-interest financing or revenue bonds, the rebates make solar photovotaics and energy efficiency financially competitive with conventional energy sources. In a volatile energy market, being able to budget for fixed energy costs for the 25 to 30 years gives local governments a fiscal advantage."

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March/April 2006

The Role of Planning in the New Energy Era:

Results of a Survey

By Megan Lewis, AICP, Naomi Friedman, and Lynn Ross, AICP

Introduction

Not since the early 1970s have energy issues consumed as much national attention as today. Americans are living with rising gasoline prices, electricity blackouts, and soaring heating and cooling costs. Our over-dependence on petroleum and other fossil fuels threatens our national security, exacerbates the U.S. trade deficit, affects our global climate, and harms the health of our most vulnerable populations — low-income residents, the elderly, and children. The manner in which our communities are sited and developed has an impact on both energy demand and the type of energy resources available to use in the future.

Planners can encourage efficient energy use and diversification of energy supply through their influence over the built and natural environments, including both where and how we build. Increasingly planners will be called upon to help communities reduce fuel bills and lessen the use of traditional energy sources. However, planners typically lack experience with energy-efficient community design or with the range of renewable energy options now available.

For more cities and towns to implement efficient and clean energy strategies, planners must be aware of the energy implications of what they do and have the knowledge and tools to incorporate energy considerations in all aspects of planning. They need to be aware of how energy issues are connected to planning and what resources they can call upon to assist their task. In their strategic role within town, city, county, regional, and state government, professional planners have a unique opportunity to put energy efficiency into practice. This job, however, will require proper support, assistance, and training.

APA and the Environmental and Energy Study Institute (EESI) have come together to prepare planners for this important role. APA and EESI are creating a partnership whose initiatives will lead to better integration of energy sustainability with planning. In August 2005, the partnership launched a national survey to assess the current state of planners' capacity, knowledge, and educational needs concerning the integration of energy issues and community planning. The survey results are presented here with the goal of identifying the areas where planners can still make significant progress toward creating more energy-efficient and independent communities.

Survey Background

The APA/EESI survey, conducted online, was sent via an electronic postcard to 4,798 APA members. It was also accessible through APA's website home page. Our target audience was public sector planners working on the local level, but we designed the survey also to gather information from planners working in the private sector, nonprofits, academia, and other related areas.

We received 377 responses (a 7.9 percent return rate), from public sector planners (62.9 percent), private sector planners (26.8 percent), planning academics (6.1 percent), planners working for nonprofits (2.4 percent), and planners working in other planning areas (1.9 percent).

Of those who said they worked for the public sector, 62.2 percent said they worked for local government, 16.0 percent for county government, 10.9 percent for regional government, 4.6 percent for state government, 2.9 percent for the federal government, and 3.4 percent for another governmental agency (such as a metropolitan planning organization (MPO), school district, or finance authority).

For the sections below on attitudes about energy and energy awareness in communities, we had a +/-5 margin of error and a 95 percent confidence level, which makes these results statistically significant; the remaining questions, which were for public sector planners only, did not have a response rate that achieved this same confidence level and therefore should be treated only as anecdotal.

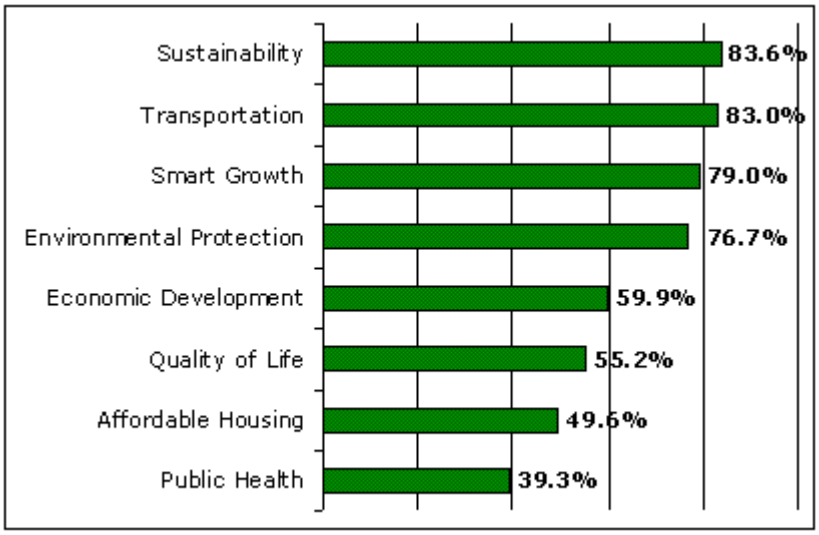
Planners' Attitudes about Energy

The first section of the survey presented questions to gauge the personal attitudes respondents had about energy issues. Nearly all respondents indicated they believed energy issues are connected to their jobs as planners. Of the total population, nearly 65 percent (243) indicated that energy issues were "very connected" to planning, and 30 percent (113) indicated these issues were "somewhat connected."

To better understand in what way respondents believed energy was connected to their roles as planners, we asked how connected they felt *specific* planning issues were to energy efficiency and renewable energy (see figure 1). Respondents ranked specific planning issues as being "very connected" to energy efficiency and renewable energy as follows (multiple selections were allowed):

- Sustainability: 83.6%
- Transportation: 83.0%
- Smart Growth: 79.0%
- Environmental Protection: 76.7%
- Economic Development: 59.9%
- Quality of Life: 55.2%
- Affordable Housing: 49.6%
- Public Health: 39.3%

Figure 1: Energy Issues "Very Connected" to Planning Issues



Source: American Planning Association

Transportation, sustainability, smart growth, and environmental protection appear to be the planning issues most readily connected to energy, and economic development, quality of life, affordable housing, and public health are not seen as strongly connected.

It is worth noting that nearly 80 percent of responding planners indicated that smart growth is very connected to energy, despite the fact that traditional smart growth advocates do not discuss energy on a regular basis. Also of importance is that just less than 50 percent of respondents see a connection between energy and affordable housing, yet high heating bills continue to threaten to dislocate low-income residents from their homes. One area we further pursued in the survey was the connection between economic

development and planning. Those results are covered later in this *PAS Memo*.

Familiarity with Energy Generation Technologies

To gauge the general level of knowledge about various energy generation alternatives, we asked respondents about their familiarity with specific energy technologies:

- wind
- passive solar
- solar thermal (hot water)
- photovoltaics
- geothermal (heat pumps)
- biomass
- landfill methane gas recovery
- cogeneration (or combined heat and power)
- distributed generation
- fuel cells
- anaerobic digestion (methane recovery)
- transportation biofuels
- hydropower

For the entire population, most were "very familiar" with passive solar (31.6 percent) and hydropower (31.3 percent), followed by wind and solar thermal (hot water) (both at 21.5 percent) (see figures 2 through 5). Those who indicated planning is "very connected" to energy issues also produced this same ranking.

Figure 2: Passive Solar: Virginia Polytechnic Institute and State University House Entranceway

Credit: Chris Gunn Photography

Figure 3: Hydropower: Ice Harbor Dam

Credit: U.S. Army Corps of Engineers

Figure 4: Wind Turbines: Martinsdale Hutterite Colony

Credit: Two Dot Wind

Figure 5: Solar Thermal Hot Water: Earth Smart solar hot water tank

Credit: Greg Christman

However, the majority of respondents overwhelmingly indicated they were just "somewhat familiar" or "not familiar" with most of the technologies listed, led by distributed generation (66.6 percent), followed by anaerobic digestion (50.4 percent), and biomass (48.5 percent) (see figures 6 through 8).

Figure 6: Distributed Energy: Distributed Energy Resources Hybrid Test Facility

Credit: Jim Yost

Figure 7: Landfill Methane Gas Recovery: Reclaiming postconsumer wastes

Credit: Argonne National Lab

Figure 8: Biomass: McNeil Generating Station in Burlington, Vermont

Credit: Dave Parsons

For an extensive glossary of these and other energy technology and alternative fuel terms, see www.eere.energy.gov/afdc/resources/glossary.html.

Familiarity with Energy-Related Planning Resources

Most respondents (55.4 percent) were "somewhat familiar" with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System® from the U.S. Green Building Council (http://www.usgbc.org/). Only 21.8 percent said they were "very familiar," and 22.8 percent were "not familiar" with the LEED Green Building Rating System®. Of those who felt planning and energy were "very connected," only 22.6 percent were very familiar with LEED, almost identical to the portion of the entire sample that was very familiar (21.8 percent).

Most respondents (76.4 percent) were not familiar with APA's policy guide on energy (www.planning.org/policyguides/energy.htm), ratified in April 2004. However, it was heartening that nearly all respondents (93.9 percent) felt that there is a role for planners in helping communities with energy conservation. Of those who felt planning and energy were "very connected," the proportion was slightly higher, at 98.8 percent.

Factors Driving Energy Awareness in Communities

We next wanted to learn what was motivating planners' interest in energy. We first asked all the respondents about their community's priorities, focusing on those priorities with a connection to energy. We

then asked them to rank these goals as high, moderate, low, or not a priority (see table 1).

Table 1: Priority Levels for Energy Motivators in Communities

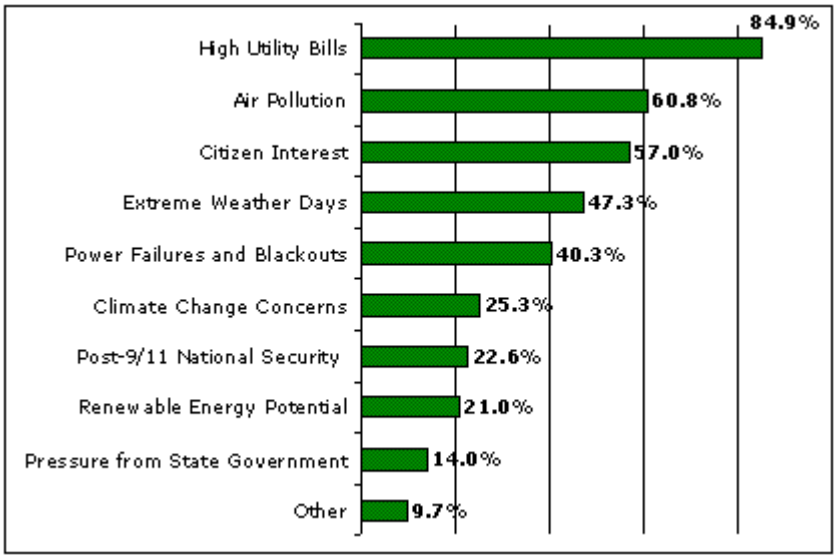
	High	Moderate	Low	Not a Priority
Increase energy efficiency	18.3%	48.4%	25.8%	7.5%
Reduce oil consumption	15.6%	45.7%	28.5%	10.2%
Reduce sprawl	34.9%	37.6%	17.2%	10.2%
Incorporate renewable energy options	10.8%	37.1%	34.9%	17.2%
Develop backup energy sources	9.7%	26.9%	40.3%	23.1%
Reduce dependence on automobiles	20.4%	38.2%	29.6%	11.8%
Reduce energy bills	28.5%	42.5%	22.0%	7.0%
Reduce overall energy demand	12.9%	46.8%	29.0%	11.3%
Limit greenhouse gas emissions	10.8%	21.5%	44.6%	23.1%
Promote alternative modes of transportation	31.7%	37.1%	21.0%	10.2%
Reduce urban heat island	6.5%	20.4%	30.6%	42.5%

The results indicate that reducing sprawl and promoting alternative modes of transportation are the highest priorities directly or indirectly related to energy. Increasing energy efficiency and reducing overall energy demand were the top items with moderate priority, with reducing oil consumption and reducing energy bills close behind. While a notable proportion also indicated that *all* the issues were of low priority, limiting greenhouse gas emissions and developing backup energy sources were the lowest priorities. A large percent (42.5) felt that reducing the urban heat island was not a priority at all. (For a status report on the role that states are taking in addressing climate change and energy, see "Rebooting State Planning: Climate Change and the Energy Challenge," *Planning & Environmental Law*, Vol. 57, Issue 11.)

Next, we provided a list of possible motivations for a community to care about energy, to determine which were the most influential (see figure 9):

High utility bills	84.9%
Air pollution	60.8%
Citizen interest	57.0%
Extreme weather days (hot or cold)	47.3%
Power failures and blackouts	40.3%
Climate change concerns	25.3%
National security (post 9/11)	22.6%
Renewable energy potential	21.0%
Pressure from state government	14.0%
Other	9.7%

Figure 9: Community Motivations for Concerns about Energy Issues



Source: American Planning Association

High utility bills, air pollution, and citizen interests appear to be the top reasons communities are becoming involved in energy, with an overwhelming majority indicating high utility bills is the key energy issue driver. Also worth noting is that more than 50 percent of respondents indicated that citizen interest is pushing their communities to care about energy. While it fell lower on the list, approximately 25 percent of respondents indicated that concern about climate change was motivating their community to pay attention to energy. This is encouraging, as perhaps nearly none would have cited this as a factor a decade ago.

"Other" responses included high gas prices at the pump (most common answer), cost savings over a building's lifetime, economic incentives for energy efficiency improvements, and local Agenda 21 initiatives. (For more information on Agenda 21, see www.un.org/esa/sustdev/documents/agenda21/.)

Energy Reduction Goals or Targets

We wanted to know if their communities had stated goals or targets to reduce energy use, greenhouse gases, heat island, ozone, or particulate matter (PM) (See table 2).

Table 2: Energy Reduction Goals or Targets, by Reason

	Yes	No	Do not know
Energy use	34.4%	60.8%	4.8%
Greenhouse gases	11.3%	84.4%	4.3%
Heat island	7.5%	87.1%	5.4%
Ozone	28.5%	66.1%	5.4%
PM	30.6%	62.4%	7.0%

While the most popular responses were goals to reduce energy use, PM, or ozone, for the most part the respondents' communities do not have stated reduction goals or targets for any of the items listed. However, we wanted to know the motivations of those who said they did have targets or goals. These affirmative answers were cross-tabulated with the "motivations" question (See table 3).

Table 3: Reasons for Energy Reduction Goals or Targets, by Motivating Factor

	Energy Use	Greenhouse Gases	Heat Island	Ozone	PM

High utility bills	87.5%	81.0%	92.9%	86.8%	82.5%
National security (post 9/11)	20.3%	42.9%	35.7%	28.3%	24.6%
Power failures and blackouts	43.8%	42.9%	71.4%	50.9%	50.9%
Extreme weather days hot or cold)	54.7%	66.7%	71.4%	50.9%	63.2%
Air pollution	67.2%	85.7%	100%	88.7%	77.2%
Climate change concerns	29.7%	47.6%	28.6%	20.2%	21.1%
Citizen interest	59.4%	57.1%	50.0%	54.7%	56.1%
Pressure from state government	14.1%	19.1%	28.6%	17.0%	17.5%
Renewable energy potential	28.1%	38.1%	28.6%	22.6%	26.3%
Other	10.9%	19.1%	14.3%	7.6%	10.5%

For those with targets to reduce energy use or PM, high utility bills were the greatest motivating factor; for those with greenhouse gas, heat island, or ozone reduction targets or goals, air pollution was the strongest influence. Other than "other" responses, pressure from state government seemed to be the least motivating factor.

Policy Statement and Issues

We asked respondents if they worked in a community with an adopted policy statement on energy: 28.0 percent said yes, 55.4 percent said no, 6.5 percent said in development, and 10.2 percent did not know. Of those who said yes, they indicated that their energy policy statement addresses the following issues (multiple selections were allowed):

Encouraging pedestrian and bicycle travel	85.2%
Increasing energy efficiency	81.5%
Supporting renewable energy	59.3%
Decreasing vehicle miles traveled	57.4%
Reducing petroleum use	37.0%
Decreasing fossil fuel use	31.5%
Incorporating energy efficiency into affordable housing	29.6%
Reducing peak energy demand	24.1%
Reducing the urban heat island	16.7%
Siting policies for alternative energy facilities	14.8%
Encouraging stability in energy costs	5.6%
Encouraging stability in fuel costs	3.7%

Also, of those who said their community had an energy policy statement, 25 percent said that their comprehensive plan has an energy element. (Comprehensive plans are discussed in more depth elsewhere in this article.)

Energy Plan and Issues

When asked if their community had an energy plan (separate from the comprehensive plan or other land-use plans), only 3.8 percent said they had such a plan; 85.5 percent said they did not, 2.2 percent said

such a plan was in development, and 8.6 percent did not know the status of such a plan. For those who said they did have an energy plan, respondents said the following issues were addressed by the plan (multiple selections were allowed):

Increasing energy efficiency	66.7%
Reducing peak energy demand	55.6%
Supporting renewable energy	44.4%
Encouraging stability in energy costs	44.4%
Decreasing vehicle miles traveled	33.3%
Incorporating energy efficiency into affordable housing	33.3%
Siting policies for alternative energy facilities	33.3%
Decreasing fossil fuel use	33.3%
Reducing petroleum use	22.2%
Encouraging pedestrian and bike travel	22.2%
Encouraging stability in fuel costs	11.1%
Reducing the urban heat island	0.0%

Providing Information to Developers on Improving Energy Efficiency

Asked if their community offered developers or builders any information on how to improve energy efficiency in new construction, 45.2 percent said yes, 43.5 percent said no, and 11.3 percent did not know.

Policy on Public Buildings and Energy Efficiency

Asked if their community had a policy for public buildings to be energy efficient, 32.3 percent said yes, 52.2 percent said no, and 15.6 percent did not know.

Alternative Energy Use: Technology Types and Sector Use

When asked if they were aware of any alternative energy technologies being used in any sector of their communities, 53.8 percent of respondents said alternative technologies were being used, 20.4 percent said they were not, and 25.8 percent did not know. Those who said they were being used listed the following specific technologies:

Solar	80.2%
Cogeneration	30.7%
Wind	29.7%
Hydropower	23.8%
Geothermal	23.8%
Biomass	12.9%

We then asked the same sub-sample in which sectors the above technologies were being used: private, local government, institutional, utilities, or not known (see table 4).

Table 4: Sector Use of Energy Technologies, by Technology Type

	Private	Local Government	Institutional	Utilities	Not Known

Solar	20.4%	6.1%	5.6%	3.2%	0.0%
Wind	5.3%	0.8%	0.8%	4.8%	0.3%
Geothermal	5.3%	0.5%	1.9%	0.8%	0.3%
Biomass	1.9%	1.6%	0.8%	0.5%	0.3%
Cogeneration	3.7%	2.4%	2.1%	4.0%	0.5%
Hydropower	1.1%	1.9%	0.3%	5.6%	0.5%

With the exception of cogeneration and hydropower, most alternative energy technology is used by the private sector. Solar is the most popular option for the private sector, followed by local government and institutional uses, and wind and hydropower are used more frequently by utilities.

Private Sector, Academia, and Nonprofits

We did a brief survey of those respondents not from the public sector to gauge their professional involvement in energy issues. For the private sector, 26.7 percent work with energy issues as a core element of their practice. For those planners in academia, 45.8 percent currently teach a class that addresses energy issues and planning. In addition, 47.8 percent teach in a program that offers a class that addresses energy issues and planning. For those working for nonprofits, 40 percent address energy issues as a core element of their professional practice.

Comprehensive Plans

While the data received for comprehensive plans are not as accurate as others in the survey, due to survey structural issues, the general trend observed seems accurate: Most responses indicate that energy is addressed primarily in the transportation element of the comprehensive plan, followed by the environment or natural resources element. The housing and community facilities elements address it much less frequently, and it is the least common in economic development and as a stand-alone element. Energy is sometimes mentioned in the goals and objectives, and in the implementation strategies, but much less frequently as a specific policy statement, or in the current or future land-use map.

Unless there is sweeping legislative reform, it is unlikely that a separate energy element will appear more frequently in future comprehensive plans: only 20.4 percent said that any update would have such an element; 31.7 percent said no, and 47.8 percent said they didn't know if such an element was planned.

Zoning Regulation and Enforcement

The responses received indicate that communities overall are not yet specifically addressing alternative technologies in zoning ordinances. The overwhelming majority said that none of the technologies was addressed. The specific ranking of the technologies that received "not addressed" responses was:

Geothermal	91.9%
Wind Farms	91.4%
Biomass Facilities	89.8%
Distributed Generation Energy Systems	86.0%
Green Roofs	84.9%
Solar and Wind Easements	81.2%
Relief from Restrictions for Renewable Energy Devices (i.e. height restrictions)	79.6%

The last response includes an approach that is a part of existing planning practice and may include energy devices along with other building variations, so it is understandable that it had the least "no" responses.

The specific ranking of the technologies that received "addressed" responses was:

Solar and Wind Easements	10.2%
Relief from Restrictions	10.2%
Green Roofs	5.9%
Wind Farms	4.3%
Distributed Generation Energy Systems	2.7%
Biomass Facilities	1.1%
Geothermal	0.5%

Overlay Zones

Overlay zones are often used to impose additional restrictions or controls on a specific area beyond those required by the underlying zoning. This tool is commonly applied to protect historic districts, environmental features, and neighborhood character, among other goals. However, 95.7 percent said their zoning ordinance does not include overlay zones for renewable energy.

Power Facility Siting Standards

We asked about siting standards for power generation and distribution facilities, and whether "fair share" siting approaches were available for different energy technologies: 72.6 percent said they do not have such siting standards; 20.4 percent said they did, and the remainder did not know. Regarding fair share siting, 87.6 percent do not have a fair share siting approach for different energy technologies, 11.3 percent did not know, and only 1.1 percent said they did. (For a discussion on regulatory issues related to wind turbines, see "Planning and Zoning for Wind Power Facilities," *Zoning News,* February 2003.)

Subdivision Regulation and Enforcement

This series of questions aimed to understand whether certain innovations in subdivision regulations were being connected to energy issues. Note that one respondent indicated that not all communities address these innovations in the same manner; some approaches are controlled by a community's subdivision regulations and not zoning regulations, and for others the reverse is true. Therefore the responses received here may give only part of the picture.

Cluster Development

One common subdivision variation is cluster development, which allows for lot size reduction in exchange for increased common open space, often to achieve local or regional open space or conservation goals. As noted by Susan Owens in her book *Energy Planning and Urban Form,* "[T]he single most important factor affecting the relationship between urban form and transport energy requirements is the physical separation of activities, determined by both density and the interspersion of land uses (Friedman, Naomi. 2004. "Energy and Smart Growth: It's about How and Where We Build," page 11.) The encouragement of cluster development allows residents to reduce automobile use and, if located adjacent to transit, increase their transit ridership. Also, smaller structures, which are often features of cluster development, consume less energy.

The responses received here reflected the common understanding of cluster's overall popularity: 93 percent said their subdivision regulations allow for cluster development; only 6.5 percent said they did not.

Density Bonuses

Another tool often used is density bonuses, where the density of a development may increase if the developer provides specific elements in the project, the most common being a certain percentage of the total project as affordable housing (for projects that include a residential component). Survey results indicated that 60.8 percent have subdivision regulations that provide for density bonuses, and 37.6 percent do not.

We also wanted to know if density bonuses were possibly being used as an incentive for developers to incorporate energy elements into their projects. Only 5.9 percent said they were. Of those who said their subdivision regulations allowed for density bonuses, only 8.9 percent said they used density bonuses to encourage energy elements.

Solar Access Orientation

It was common in the 1970s during the energy crisis to add solar access orientation requirements to subdivision regulations. It is not clear if these have been taken out of current regulations or simply are not enforced: Only 19.9 percent said subdivision regulations required consideration of solar access or orientation; 72 percent said they did not.

Project Rejection and Renewable Energy

Finally, we wanted to know how much power communities have to reject projects that in effect prohibit reasonably sited and designed renewable resource devices. Only 1.3 percent said they had such power; 90.3 percent said they did not.

Transportation

As mentioned earlier, transportation is often seen as the main connection that planning has to energy issues. The "transportation/land-use connection" is a perennial topic in planning literature. By directing development toward already developed areas, such as urban centers, planners can help to reduce vehicle miles traveled, reduce petroleum use for transportation, and support public transportation ridership. With that last point in mind, we wanted to gain an understanding of the current state of transit.

Among those surveyed, 85.5 percent said they did have public transit. Overwhelmingly the most popular form of public transit is bus: 96.9 percent said they have a bus system of some kind. This is consistent with data from the American Public Transit Association (APTA) 2005 *Public Transportation Fact Book* (http://www.apta.com/research/stats/factbook/) showing that "(i)n all but about 50 metropolitan areas and small cities, bus service is the only fixed-route transit service available."

A growing area of bus transit is bus rapid transit (BRT), where buses operate in dedicated lanes and function like light rail; 12.5 percent said their communities have BRT. Following bus systems, 18.8 percent said they have commuter or regional rail; 13.1 percent have light rail; and 7.5 percent have heavy rail (elevated or in subway). The remaining 6.9 percent of transit included primarily "dial-a-ride" systems, but some mentioned paratransit, subsidized taxis, and car and vanpools.

When asked about whether their community's current transportation plan actively promoted any of three alternative transportation systems — bicycle commuting, pedestrian pathways, or transit — the most affirmative answers were for pedestrian pathways (88.7 percent), followed by bicycle commuting (78.5 percent) and then transit (71.0 percent). However, 26 percent said their transportation plan did not actively promote transit, and 19.4 percent said their plan did not actively promote bicycle commuting. Only 10.2 percent said their plan did not actively promote pedestrian pathways.

Housing

It is often said that energy efficiency and conservation are "personal choices" that start at home. Thus it is useful to know if communities are promoting energy efficiency in the residential sector. When asked if their community had energy efficiency guidelines for new housing developments, 65.6 percent said no, 25.8 percent said yes, and 8.6 percent did not know. Of those who indicated at the beginning of the survey that housing was very connected to energy, 27.5 percent said they had energy efficiency guidelines for new housing developments, slightly higher than the total population.

Many in the affordable housing community support the idea that housing should be affordable to own and to "operate," or live in. When asked if their community had a program to provide energy efficient affordable housing, 71.0 percent of survey respondents said no, 14.5 percent said yes, and another 14.5 percent said they did not know. For those who felt that housing was very connected to energy, 20.9 percent said they had such a program, which was slightly higher than the total population. (APA is currently part of the Green

Communities Initiative, a coalition headed by Enterprise Community Partners (formerly the Enterprise Foundation) to build more than 8,500 environmentally healthy homes for low-income families. See greencommunitiesonline for more information.)

Economic Development

According to the summer 2005 issue of the APA's Environment, Natural Resources, and Energy Division journal, "Economic opportunities such as producing and selling alternative fuels, exporting renewable energy, attracting high-tech businesses, or selling carbon emission reduction credits needs (sic) to be further considered."

Asked if the economic development element of their community's comprehensive plan encouraged energy technology business development as part of the goals and objectives, only 12.4 percent said yes; an overwhelming 73.7 percent said no. For those who felt that economic development was very connected to energy, 12.8 percent said yes, which was not notably different from the total population.

When asked if their community used energy efficiency as part of an economic development strategy (i.e., provided incentives for businesses that use energy efficient technology), only 6.5 percent said yes; 81.2 percent said no. For those who felt that economic development was very connected to energy, 10.8 percent said yes, slightly higher than the total population.

Environment and Open Space

Greenhouse gas reduction is becoming a much higher profile item for communities, and many elected officials are now taking a leadership role on this issue. As recently as December 2005, mayors and municipal leaders from around the world gathered in Montreal and signed off on a global declaration on climate change, which noted, "local governments play a critical role to effectively reduce human induced greenhouse gas emissions." (www.iclei.org/index.php?id=2447).

However, only 14.5 percent of the communities we surveyed had developed goals to reduce greenhouse gas emissions. Of those who said they had such goals, we asked what tools were used to reduce emissions. The most popular tool used was tree planting (79.3 percent), followed by tree preservation (75.9 percent), and reducing vehicle miles traveled (VMT) (58.6 percent). Much less popular were reducing power plant emissions (17.2 percent) and other techniques (17.2 percent), which included converting city fleets to alternative fuels over time, reducing impervious surfaces, using geothermal pumps, creating a green building program, and reducing point and non-point source pollution.

Of those who selected reducing VMT as their technique for reducing greenhouse gases, they indicated that their communities had transit as follows:

Bus:	94.1%
Light Rail (including streetcars):	35.3%
Bus Rapid Transit:	29.4%
Commuter Rail (also called regional rail):	29.4%
Heavy Rail (elevated or in subway):	11.8%
Other:	23.5%

To expand on the idea of reducing impervious surfaces and increasing the inventory of "green infrastructure" in communities, we asked whether their community had a park development goal (but we did not ask what the specific goal was or how it was measured); 90.3 percent said they did have a goal.

To address heat island reduction initiatives, we asked about green roofs and cool roofs. (A green roof system is an extension of the existing roof that involves a high quality waterproofing and root repellant system, a drainage system, filter cloth, a lightweight growing medium, and plants. See www.greenroofs.org/ for more information. Cool roof materials have two important surface properties: a high solar reflectance — or albedo — and a high thermal emittance. See www.epa.gov/heatisland/strategies/coolroofs.html for more

information.)

Only 1.1 percent said they had a green roofs program, and 2.2 percent said they had a cool roofs program. With roofscapes covering 22 percent of the urban landscape, roofscapes are increasingly seen as the last urban frontier and an overlooked opportunity to address various environmental issues, including energy consumption.

Figure 10: Green Roof: Chicago City Hall

Credit: Katrin Scholz-Barth

Other Regulations

We wanted to find out about certain other regulations that have a relationship to energy, namely for transit-oriented development, parking management, and infill.

Transit-Oriented Development

Transit-oriented development (TOD) is often touted as a desirable development option to reduce VMT and increase transit use. We wanted to know if communities had TOD regulations on the books: 26.9 percent of respondents said yes; 69.4 percent said no. Of those who said yes, 64.7 percent said they had at least one built TOD project.

As noted earlier, the majority (96.9 percent) of respondents who indicated they had public transit said it was in the form of bus service. However, among those who said they had bus service, only 31.0 percent said they had TOD regulations. Below are the percentages for other transit types given by those who said they had TOD regulations:

Bus rapid transit:	60.0%
Heavy rail:	33.3%
Commuter rail:	56.7%
Light rail:	90.5%
Other:	27.3%

Thus TOD seems to be most strongly correlated with light rail transit, followed by bus rapid transit and commuter rail.

Parking

One technique for reducing impervious surface is to allow for shared parking, where more than one use share a common parking area. Asked if their communities have a shared parking program to reduce the amount of parking provided, 67.2 percent said they did; 32.8 percent did not.

A relatively new idea from Donald Shoup, professor of urban planning at UCLA, is maximum parking standards (rather than the typical minimum standards), to reduce the supply of parking that communities provide and in turn achieve other goals (for more information, see Shoup's recent Planners Press book, *The*

High Cost of Free Parking.) We wanted to know if this approach was entering the mainstream yet, especially as part of a VMT reduction strategy. The survey results provide evidence that this is a new concept but not absent from parking management — 23.7 percent said they had a maximum parking standard.

Infill

One technique that is considered part of an energy-efficient development strategy is promoting infill development, to use existing infrastructure and reap the benefits of more compact development. For our survey, 60.8 percent of respondents said their community has a mechanism to encourage infill development; 39.2 percent do not.

Incentives

Various incentive programs are often used to encourage desired planning and development practices. Among the incentives that we were interested in exploring in connection to energy were voluntary, financial, and non-financial incentive programs.

Voluntary Incentives

When asked if their community had any voluntary incentives to construct energy-efficient buildings, only 15.6 percent said yes; 67.7 percent said no, and 16.7 percent said they did not know.

We also wanted to know if financial institutions in their community currently offered either of two relatively new mortgage tools: location-efficient mortgages and energy-efficient mortgages. The former, which has been available for approximately 10 years in certain markets, was slightly more popular: 6.5 percent of respondents said their community had location-efficient mortgages available. Only 3.8 percent said they had energy-efficient mortgages available. Most (67.7 percent and 70.4 percent, respectively), said they did not know if these mechanisms were available. (For more information on location efficient mortgages, see www.locationefficiency.com/. For more information on energy efficient mortgages, see www.hud.gov/offices/hsg/sfh/eem/energy-r.cfm.)

Financial Programs

We asked if their community took advantage of any state-provided financial incentives to encourage the adoption of alternative energy. Only 11.3 percent said yes; 58.1 percent said no. Of those who said yes, the most popular incentives used were grants for equipment purchase (65.2 percent), followed by rebates for equipment installation (52.2 percent), loans (30.4 percent), and recruitment incentives for renewable energy equipment manufacturers (17.4 percent). (Note that we did not ask who was using these incentives, so these results may reflect both public and private use). (For a greater overview of state financial incentive programs, see "Renewable Energy and Energy Efficiency Incentives for Local Governments," *Public Investment News*, December 2002.)

Non-Financial Programs

We also wanted to know if any non-financial programs — either mandates or voluntary programs — were underway. We asked about mandated alternative fuel use, equipment use ("clean fleets"), or energy efficiency in government buildings; special exceptions or waivers for clean energy projects; or demonstration programs. For all the programs, more than 60 percent of respondents said they did not have any of the programs listed underway. For those that did participate in any of the programs listed, demonstration projects were used the most (16.1 percent), followed by mandated energy efficiency in government buildings (14.5 percent). Five percent or fewer of the respondents said their communities were using the other three options. Between 10.8 and 18.8 percent of respondents did not know if a particular incentive was being used.

Only 12.4 percent have a program that makes homeowners eligible for property tax credits or waivers if they install renewable energy devices, and only 4.3 percent offer incentives for private-sector renewable energy technology business development.

Barriers

APA has conducted projects to find ways to reduce regulatory and other barriers to advancing certain

planning goals, such as smart growth or affordable housing. This goal also extends to energy issues.

We wanted to know if local regulations have prohibited the inclusion of PV/solar panels, wind turbines, or other renewable energy technologies in new or existing construction, looking at four specific regulatory tools: zoning, subdivision, PUD/PRD, and private development covenants or restrictions (see table 5).

Table 5: Renewable Energy Technologies Excluded in Communities, by Excluding Factor

	PV/Solar Panels			Wind Turbines			Other Renewables		
	Yes	No	Do Not Know	Yes	No	Do Not Know	Yes	No	Do Not Know
Zoning Regulations	4.3%	79.0%	16.7%	13.4%	62.9%	23.7%	2.2%	63.4%	34.4%
Subdivision Regulations	2.7%	80.6%	16.7%	5.9%	70.0%	24.2%	1.6%	66.1%	32.3%
PUD/PRD	1.6%	82.3%	16.1%	7.0%	68.8%	24.2%	1.6%	66.7%	31.7%
Covenants	8.1%	46.8%	45.2%	10.8%	41.9%	47.3%	3.8%	43.0%	53.2%

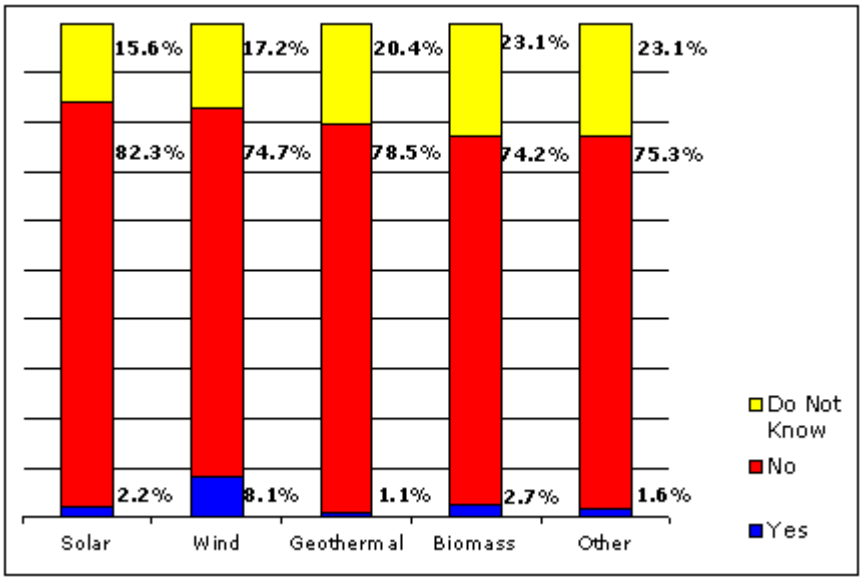
Private covenants or deed restrictions seem to be the most frequent barriers to technologies, followed by zoning regulations. Subdivision regulations and PUD/PRD seem to have the least impact.

We also wanted to know if the public had ever attempted to block efforts to include the following renewable energy technologies in new or existing construction (see table 6 and figure 11).

Table 6: Public Efforts to Block Renewable Energy Technologies, by Technology

	Yes	No	Do Not Know
Solar	2.2%	82.3%	15.6%
Wind	8.1%	74.7%	17.2%
Geothermal	1.1%	78.5%	20.4%
Biomass	2.7%	74.2%	23.1%
Other	1.6%	75.3%	23.1%

Figure 11: Public Efforts to Block Renewable Energy Technologies



Source: American Planning Association

For the most part, the public has not acted to block these renewable energy technologies, which is encouraging. While efforts to halt the construction of wind turbines are perhaps the most commonly reported, and are the highest affirmative answers here, turbines are not overwhelmingly being blocked.

Training and Other Educational Initiatives

Our concluding survey questions asked how respondents would like to receive further information and education on planning and energy issues. The APA/EESI partnership will develop a program to provide planners with the necessary resources to move forward the integration of planning and energy issues. Among the elements that the team intends to include in the program are:

- Workshops or training programs on the connection between land-use planning and energy, and land-use practices that encourage energy efficiency
- How comprehensive plans, design guidelines, site plan review, and zoning and subdivision regulations can better address energy issues
- Written materials (manuals, articles, and reports, for example) that address energy issues and integration with planning.

Conclusion

In reviewing the survey results, the APA/EESI team noted the following key issue points.

- Nearly 65 percent indicated that energy issues were very connected to planning, and 30 percent indicated they were somewhat connected. Also, 79 percent felt that smart growth and energy are very connected. Energy is still seeking a place within smart growth discussions, so evidence that the planning community recognizes this connection is a positive sign.
- While sustainability, transportation, and smart growth are the areas where most planners see a connection between energy and planning, the connection to affordable housing is not seen as strongly. In addition, of those who stated that they did have an energy policy in their community, only 30 percent indicated it mentions affordable housing. This suggests a significant need to provide planners, particularly housing experts, with further information on the relationship between energy and affordability, and ways to increase housing affordability through better energy management.
- Most respondents indicated they were only somewhat familiar or not familiar with most alternative energy-generating technologies. Educational resources need to be developed to allow planners to plan for and regulate these systems.
- States currently play only a minor role in supporting local energy initiatives. There is tremendous

opportunity for states to play a greater role in this area. Indeed, opportunities exist for state legislation reform to require more deliberate inclusion of energy in comprehensive plans, both as a separate element and as incorporated into typical elements. According to research conducted for APA's Growing Smart Legislative Guidebook (www.planning.org/growingsmart/), only Oregon currently has legislation that makes energy a mandatory comprehensive plan element. It is an optional element in Connecticut, Iowa, Pennsylvania, and Utah, and it is mandatory in Arizona, Tennessee, and Vermont only if a particular precondition is met (such as forming a planning commission). Except for the Oregon legislation, all the other states' legislative language provides only little or moderate detail on the element. In our research to date, the best example of a municipal comprehensive plan with an energy element is Burlington, Vermont: www.ci.burlington.vt.us/planning/mdp/mdp.html. It is likely that several states have a voluntary energy element; two examples are South Carolina (http://www.energy.sc.gov/PDFs/Planning_Guide.pdf) and California (http://www.opr.ca.gov/planning/PlanningPubs.html#2KGPL).

- While almost 50 percent of respondents indicated their communities provided developers with information on energy efficiency, the public sector could take an even stronger leadership role to motivate the private sector in embracing energy efficiency. For example, fewer than one-third of respondents' communities have a policy for public buildings to be energy efficient. It is anticipated that in the future, as states continue to adopt legislation and pass executive orders requiring green construction methods for public buildings, more communities will have such a policy. Current examples include California's Green Building Initiative (www.energy.ca.gov/greenbuilding/) and Arizona's energy conservation legislation (www.azleg.state.az.us/FormatDocument.asp?inDoc=/legtext/46leg/1r/laws/0114.htm).
- While most respondents indicated there was some level of renewable energy being used in their communities, most often this meant solar energy. However, wind and co-generation were noted as being used by approximately one-third of the communities. With 20 states adopting renewable portfolio standards, it is likely this number will continue to rise. There is significant room to increase public sector use of renewable energy.
- In general, planners are not yet using standard planning regulatory tools to increase energy efficiency and the use of renewable energy. Zoning ordinances, subdivision ordinances, siting standards for power generation facilities, density bonuses, solar access orientation requirements are all missed opportunities for planning to address energy issues. Also, energy efficiency and new energy businesses need to be more clearly seen as economic development drivers.
- There is high interest in certain smart growth initiatives that indirectly conserve energy, including pedestrian and bicycle programs and infill development. A new report from ULI and Pricewaterhouse Coopers, *Emerging Trends in Real Estate 2006*, indicates that the increase in gasoline and home heating costs over the 2005-2006 winter might lead to an increase in apartment rentals at infill sites closer to work. While this is likely to be a gradual change, the report notes, "skyrocketing energy costs could affect where people live."
- On the local level there is a lack of financial incentives to encourage renewable energy use. Because the capital costs of renewable energy installation can often be prohibitive to homeowners, in many instances financial incentives are key to their adoption. Yet only 12 percent of respondents indicated they have a program that makes homeowners eligible for tax credits or waivers for the installation of renewable energy devices. There is a great potential to increase local and state tax incentives, and a critical need for strong federal tax incentives that can help to compensate for reduced state or local tax revenues. The recently passed federal energy bill does contain some stronger tax incentives: for existing homes, a 10 percent tax credit for improvements to the building envelope, up $500 per taxpayer; for new homes, a $2,000 tax credit for builders if they meet a 50 percent improvement in energy consumption or meet Energy Star requirements. However, these incentives are for only two years. See www.aceee.org/press/Tax_incentive05.pdf.

Overall, the survey found high interest and growing awareness among the planning community regarding energy issues, and there has been some local energy policy action, but opportunities still exist to integrate energy into the implementation tools of planning. Without the development and adoption of such tools, our nation's energy efficiency and greenhouse gas reduction goals will not be successfully implemented. Because fuel prices will remain volatile, and our traditional non-renewable energy supplies will begin to diminish in the not so distant future, it is essential that we do not rely on current market forces as the agents of change, but rather prepare our communities to use energy more efficiently now.

Authors

Megan Lewis is an APA senior research associate and is leading the APA portion of the partnership. Naomi

Friedman is a consultant to EESI and is leading their part of the program. Lynn Ross is an APA research associate and was the lead on survey deployment and analysis. For more information on EESI, see http://www.eesi.org/; for more information on the APA/EESI partnership, see www.planning.org/energy/index.htm.

Note: All photographs are from the National Renewable Energy Laboratory Photographic Information Exchange, www.nrel.gov/data/pix/.

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A Local Official's Guide to Zoning and Land Use for Renewable Energy

An overview of how zoning and land use controls may impact renewable energy development

Produced by the Pioneer Valley Planning Commission with funding from the Renewable Energy Trust of the Massachusetts Technology Collaborative

How to Use This Guide

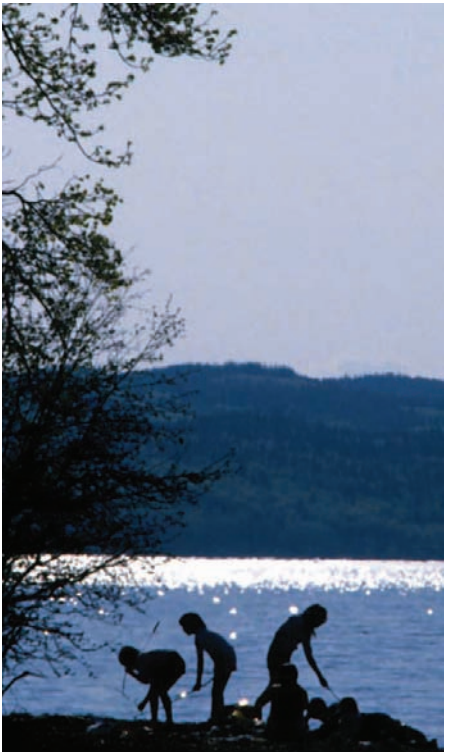
The following is an overview of how zoning and land use controls may impact renewable energy development, combined with recommendations to guide local officials in promoting renewable energy. Ultimately, a range of local considerations will determine the form and scope of a town's renewable energy efforts. These recommendations are meant to provide a general framework for analyzing your town's zoning environment and identifying beginning points, as well as longer-term strategies, for the regulatory reform process. Each town should undertake an individualized assessment of factors that will influence the development of land use policies to address renewable energy.

Local Attitudes

Attitudes of residents and landowners will be critical in the development and adoption of any regulatory changes needed to accommodate renewable energy operations. Local planning documents may shed some light on community attitudes toward this kind of land use.

Existing Plans

Review the most recent Master or Comprehensive Plan completed in your municipality. Most master planning documents feature a list of goals and strategies that could include references to renewable energy, energy production, energy infrastructure, or sustainable growth. Although most plans will not specifically mention renewable energy development, these municipal land use policy documents are the most likely place to begin a search for recently documented resident attitudes toward general sustainability.



Surveys & Visioning

Many strategic plans begin with a 'visioning process' during which local residents and employers are able to voice their opinions on a range of growth and development topics. If

your community has completed a visioning process in recent years you may find that a community-wide survey was conducted to measure residents' attitudes toward a range of subjects. Study these survey results for any indication of popular opinion regarding local or regional renewable energy. If no recent citizen surveying has been completed in your community, you should consider some sort of limited survey to be a useful tool in determining how local residents might respond to the development of renewable energy resources in their backyards. A mailed survey sent to a random sampling of households could serve to establish the general attitude of residents and help you to shape any proposal for regulatory change.

Public Outreach

Working with a local newspaper to highlight the issue of renewable energy is an alternative to the survey tool in helping to identify citizen attitudes. A letter to the editor from an elected or appointed official outlining the issue could be an effective way to begin the discussion. Alternatively, a brief "white paper" highlighting the pros and cons of various alternative energy technologies could establish an informed dialogue in the community and set the stage for additional discussion regarding local land use options. If a local paper is not willing to provide a forum for this discussion, your community might consider producing a local access TV program centered around the issue of renewable energy. An increasing number of municipalities are using local

Community Planning Workshop - Palmer, MA

access TV as a dynamic forum for locally important issues. A "call-in" segment of the program can be used to solicit immediate input from viewers and offer the opportunity for a less static and very watchable affair.

Anemometry Installation - Northfield, MA

The Internet also provides an excellent way to distribute information regarding specific projects or more general issues and opportunities related to renewable energy development. This tool becomes most effective when visitors to the web site are given the option to respond or comment on the information presented.

Existing Community Resources

An honest review of local resources is an important part of any municipal renewable energy assessment. Given the limits of the natural energy resources and the current technologies for harnessing these resources it is clear that not all communities will be viable hosts for all renewable energy operations. Communities with highland areas may be well situated for wind power while forested communities may discover that tree trimmings or nursery cuttings can provide a source of sustainable local energy. Solar access on a community level is typically site dependent with some hillsides or heavily urbanized sites being less suitable for these systems. A mapping of local waterways may indicate local potential for micro-hydro applications. GIS (Geographic Information Systems) mapping analysis is an extremely useful tool for determining the gross, and site-specific, viability of renewable energy operations. Information regarding geographical appropriateness for various technologies is available from organizations involved in developing sustainable energy. (see Resource List on back page)

SODAR Operation - Mt. Tom, MA

Physical Appropriateness

Physical appropriateness is a factor that must be assessed locally. In part, the appropriateness of a generating facility or distribution system is linked directly to attitudes in your community regarding the acceptability of non-residential uses. Several attributes should be considered as critical characteristics in seeking acceptance from the community through its land use regulations. These include scale, bulk, height, visual presence (size, construction materials used), human environmental impact (noise, glare, smell, lighting), and performance (level of activity on site, motion and movement, vehicle traffic, emissions). Although the development of sustainable, renewable sources of energy is in the best interest of the larger human community, it cannot be forgotten that at the neighborhood level, any land use that threatens to change the local built and natural environment must be introduced and discussed with care and sensitivity toward those residents who will be asked live with it.

LAND USE CODE REVIEW

We encourage municipalities to review their own land use codes in light of the information provided below. Areas for attention include:

- Purpose Statements: both general and district-specific
- Use Provisions: definitions, type of approval, and availability of variances
- Incentives: including review waivers and dimensional/density bonuses
- Subdivision and Planned Unit Development Regulations

PURPOSE STATEMENTS

The General Purpose provision typically is the first section in a Zoning Bylaw. It sets the tone of the bylaw by making a visionary statement about what the bylaw is meant to accomplish. Similar purpose statements should accompany each zoning district delineated within a town. Purpose statements are not just window-dressing: these statements contain the overarching statutory framework that can guide boards' zoning decisions and thus give the town control over development. Well-tailored and considerate purpose statements can serve two crucial functions for a town. First, they can induce desirable changes by sending clear, receptive messages to property owners and developers regarding certain uses and structures. Just as importantly, purpose statements can control undesired development by making strong, legally-enforceable statements about the character and priorities of the town and its districts.

A town seeking to encourage renewable energy development can do so by incorporating positive language in its general and district-specific purpose statements.

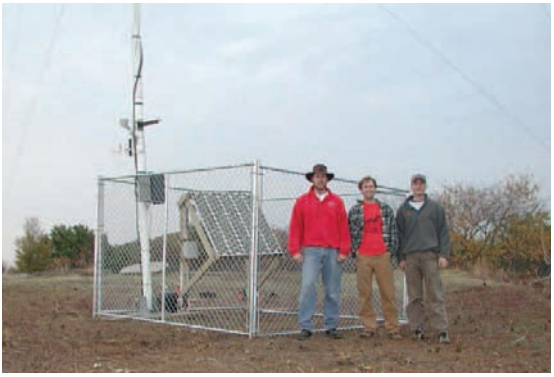
General Purpose Statement

To be inserted in standard statement adopted from SZEA (Mass. General Laws, Chapter 40A): "...to encourage the development and use of renewable energy resources including, but not limited to, solar, wind, biomass, methane (landfill gas), micro-hydro, and other similar sources..."

District-Specific Purpose Statement

To be inserted in district-specific statements:

- After explicit statements regarding discouraged uses: "...such provision should not be read to discourage the development and use of renewable energy facilities where such facilities meet the specific criteria outlined [below]"
- Standing alone or as part of an explicit statement regarding encouraged uses: "...[in addition to/complementing] the predominant use in the district, uses related to energy generation from renewable resources are encouraged."



Resource Monitoring Site with PV Power - Thompson Island, MA

USES and VARIANCES

Use Definitions

A zoning by-law may prohibit a use simply by excluding it from the table (or list) of uses allowed in a given zoning district. In standard zoning enforcement practice, when a zoning by-law does not mention a specific use and the use does not fit within the definition of any other use in the bylaw, the use is considered specifically prohibited. When a use is specifically prohibited, a developer proposing such a use may not obtain a building permit unless the municipality has a provision for a use variance—and one is granted by the local Zoning Board of Appeals. Since the enactment of the updated state enabling legislation in 1975, the concept of the use variance has fallen into severe disfavor making this an extremely unlikely path for an applicant seeking approval of an application under a local zoning bylaw. A final recourse for a proponent of an omitted or prohibited use is to petition the town for an amendment to the local zoning by-law so as to permit the desired use.

Most zoning codes do not contain use definitions that would clearly apply to a renewable energy project. Thus, local officials reviewing such projects are likely to face difficulties regarding the interpretation of local land use codes, and applicants will encounter great uncertainty in the zoning process. To avoid these difficulties, a town can pass provisions explicitly defining desired (and undesired) energy generation facilities. Special attention should be paid to:

1. distinguishing small scale, renewable energy facilities from "power plants," and
2. differentiating among different types of energy generation facilities based on fuel sources, scale, technology, and neighborhood impact.

Two enclosed methane flares at the I-95 Landfill in Michigan

A bioreactor constructed on a landfill in Yolo County, California

Definition of Energy Generation Facility

"Energy Generation Facility" means a generator unit that may use a variety of sources and/or products for the production of power either

1. for use on-site [and/or by non-commercial users],
2. for sale to the grid, accessory to on-site use of power, or
3. for sale to the grid as a primary use.

Fossil Fuel Generation Facility

"Fossil fuel generation facility" means an energy generation facility that uses petroleum, coal and/or natural gas products as sources for the production of power as a primary use or that is intended to run for a length of time exceeding [7] days. This definition does not include a facility that provides on-going support power to other stationary energy facilities, such as fuel cells, or that provides temporary emergency power.

Distributed Generation Facility

"Distributed generation facility" means a small- or mid-scale energy generation facility located at or near the customer site. The broad term encompasses advanced combustion technologies such as microturbines, reciprocating engines and fuel cells, as well as non-combustion options like photovoltaic cells and wind turbines. Types of energy sources may include, but are not limited to, petroleum, methane, ethanol, thermal, wind, solar, hydro, and other sources as determined by the reviewing official.

From left to right, Kristen Burke, Sally D. Wright and Nancy Nylen at the windmill meeting in Lenox, MA

TYPE OF APPROVAL

There are several methods for permitting renewable projects in land use codes:

By-Right

Renewable energy projects can be allowed "by-right" in a zoning bylaw. In order to accomplish this, a municipality would have to include the specific use categories in the table (or list) of uses as being permitted or allowed. Although a permitted use does not require additional zoning oversight, the specific project would still require a building permit and would be subject to any environmental and health regulations that apply.

This solar home, constructed by Maine Solar House, generated 2,051 kW hrs of electricity from its integrated roof array in 6 months.

Administrative Review

This form of local zoning oversight is often overlooked by Massachusetts communities. Administrative Review of a site plan for a renewable energy project would require a planning board to review the site plan and allow the board to set reasonable standards for the project. This is done at a regular meeting of the board and does not require the public hearing process that is a necessary part of the special permitting process. The project applicant must meet any reasonable standards set by the board, however, the planning board cannot deny the proposed use. This differs fundamentally from the special permit process in which a board may simply reject a proposed use should its character be found to be inappropriate for the neighborhood in which it is being located. The administrative review and approval process is best used for categories of land use that are basically appropriate within a zoning district but that may require some board oversight as to how they appear and function on a specific property.

Special Permit

The special permit process provides for the greatest amount of control by a municipality seeking renewable energy projects. The primary benefit of this process is that special permitting allows the reviewing board to reject a proposed use if it does not meet the standards established in the zoning bylaws. The ability to say 'no' to a proposal gives the board much leverage in the review process while forcing the applicant to prepare a comprehensive response to any likely criticisms of the development. The review criteria, or performance criteria, for projects can also be used to provide incentives for preferred uses by reducing the application or review burden or by waiving certain conditions and requirements for a project. It must also be stated that the special permitting process can be a daunting obstacle for some applicants. Often an applicant must spend considerable sums of money in order to prepare an adequate special permit application. Without the assurance that the project

Vestas 660 kW Wind Turbine - Hull, MA

will ultimately move forward, this can discourage the development of projects in a community. If a municipality wishes to encourage development of renewable energy projects, the special permit process should be applied carefully so as not to create unnecessary regulatory burdens for applicants.

Variances

Even well-drafted definitions and appropriate types of approval will not cover every desirable proposed use in every district. Thus, a town may also consider adopting a provision for a 'use variance' that would allow individual applicants to seek approval of renewable energy projects that the table of uses would otherwise not allow. However, given the fact that state courts may look unfavorably upon a use variance in Massachusetts, it is recommended that municipalities seeking discretionary review power over renewal energy projects instead use the Special Permit process.

INCENTIVES

A town looking to encourage development of renewable energy resources may do so through creation of an overlay district and/or incentives, both of which must be provided for in the zoning by-law. These two zoning tools allow a town to signal to developers that the community values and prefers certain uses. Towns have discretion in deciding which uses will receive special treatment. For example, overlay districts and incentive provisions that encourage creation of art and civic space, as well as affordable housing and green space preservation, have enjoyed recent popularity with towns seeking to revitalize their towns and town centers. The same approach may be taken for renewable energy projects.

Dimensional Incentive

One form of incentive is the dimensional or density bonus, e.g., the allowance for extra square footage of commercial space, additional residential units or height allowances above those permitted by right, awarded to developers who propose projects that incorporate a renewable energy component. This incentive may work very well in a mixed use setting such as in a Planned Unit Development and, in the case of a density bonus, may serve to increase the number of potential users of a renewable energy source.

Solar Sensor Installation - Mt. Tom, MA

Expedited Review and Waiver of Application Requirements

This technique is particularly effective when combined with conventional special permitting as these incentives may help to reduce the pre-construction costs of a proposed project. The waiver of fees or some application requirements can also serve to reduce the time and effort needed to take a project from the conceptual phase to the final ribbon cutting – another cost savings for the developer.

Overlay Districts

An overlay district is a simple way to take these incentives and make them available either (1) in a specific geographic area within the town (which can encompass several districts) or (2) in the town as a whole. The overlay district may supplement or trump the underlying district zoning. Additionally, as the town decides the boundaries of the overlay district, it exercises some control over the location of renewable energy projects.

SUBDIVISION REGULATIONS AND PLANNED UNIT DEVELOPMENT

The Subdivision Control Law, a separate enabling statute from the Zoning Act, grants authority to municipalities to adopt regulations governing the subdivision of land. Essentially, these regulations dictate the process for creating new roads. However, subdivision regulations also guide the process for ensuring that development is orderly and safe and include standards for lot layout, road construction, provision of amenities like street trees, vehicular and pedestrian access, the provision of development infrastructure, and other discretionary topics which a planning board may regulate.

Subdivision regulations are developed and adopted by local planning boards and do not require legislative adoption by Town Meeting or City Council.

General Guidance

Subdivision regulations can encourage residential subdivision design that facilitates distributed generation and the use of renewable energy sources. For example, communities may require that Development Impact Statements address distributed generation and renewable energy technologies. Perhaps the most significant way in which subdivision regulations can reduce the barriers to renewable energy is through encouraging street and lot layouts that take advantage of solar orientation. By laying streets out on a west to east axis and by orienting buildings so that their longest sides face within 30 degrees of south, solar access can be optimized. This has advantages for maximizing solar heat gain during the winter months, as well as providing a potential for utilizing photovoltaic technology. Other measures might include requiring siting of street trees so as to avoid blocking solar access.

Open Space Provisions

In communities where Open Space Subdivision (also known as Cluster or Conservation Development) may occur, the opportunity exists for allowing some power generation in the otherwise permanently protected open areas of the development. Communities that allow this type of residential development currently would likely require an amendment to their zoning regulations specifically allowing the production of renewable energy in the open areas of the subdivision while establishing clear guidance as to the scope and scale of such facilities.

Planned Unit Development (PUD)

State legislation gives Massachusetts municipalities the explicit authority to issue special permits for planned unit development (PUD) – a mixed-use development project that may include single- and multifamily dwellings as well as office and commercial space. The goal of planned unit development regulations is to provide a set of standards for the approval of a PUD development through an administrative review process. Although PUD regulation is similar to site plan and subdivision review, it typically grants more discretion to the reviewing authority. Reviewing the project as a single entity allows improved, comprehensive siting, higher development densities, and protected open space. Thus, PUD developments may be well-suited to the deployment of renewable energy generation. Higher densities in these developments mean that economies of scale may be achieved while open space set-asides and comprehensive siting allow installation of these energy facilities in an appropriate on-site location. In addition, the Planned Unit Development process allows the seamless integration of dimensional and density bonus incentives.

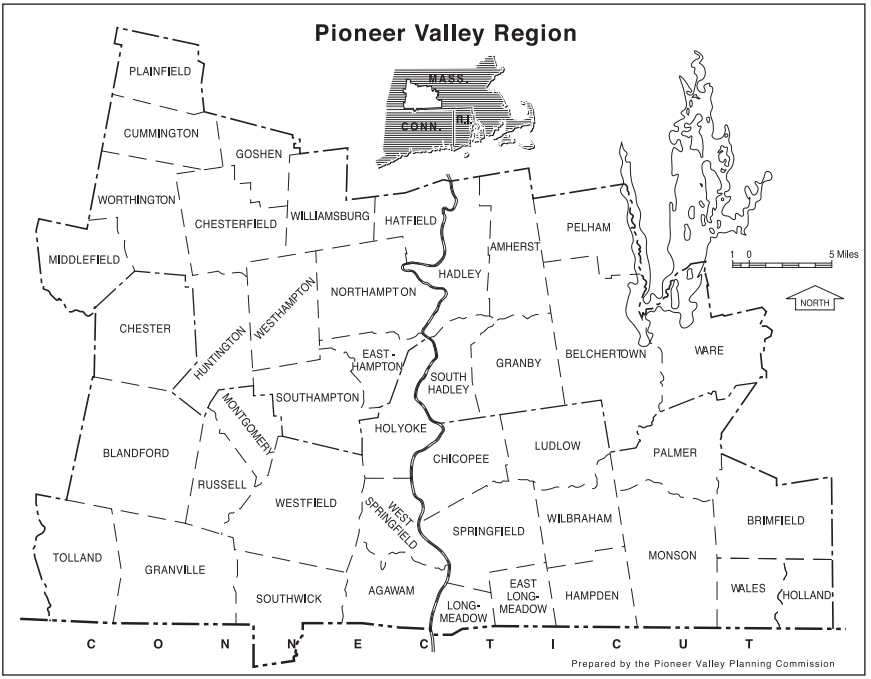
CONCLUSION

Encouraging the development of renewable energy or distributed generation projects in your municipality is not only a smart way to protect our environment, it also lays the groundwork for ushering in a more sustainable future for the generations to follow. These new – and sometimes ancient – technologies for harnessing the power of our planet can be developed throughout the Pioneer Valley. Modest changes to our local land use laws will tell the developers of renewable energy sources that this region is ready for sustainable projects that improve our quality of life and reduce our dependence on outside sources of energy.

If your community would like assistance in developing land use regulations that encourage renewable energy projects, contact the Pioneer Valley Planning Commission (PVPC) at:

Pioneer Valley Planning Commission
26 Central Street, West Springfield, MA 01089-2787
Phone: (413)781-6045 • Email: cmiller@pvpc.org
Web Site: www.pvpc.org

PVPC's Local Technical Assistance program provides technical support to the 43 municipalities in the Pioneer Valley including the development of zoning bylaws, zoning and resource maps, and subdivision regulations.



For more information:

Pioneer Valley Planning Commission
www.pvpc.org and www.pvsustain.com

Massachusetts Technology Collaborative
www.MassTech.org

Massachusetts Department of Energy Resources
www.mass.gov/doer

Northeast Sustainable Energy Association
www.nesea.org

United States Department of Energy -Energy Efficiency and Renewable Energy
www.go.doe.gov

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Sun, Wind, Water, Earth

Communities are taking another look at alternative energy systems.

By Barbara Wolcott

Interest in alternative energy has had its ups and downs since the 1970s, eagerly pursued when oil prices zoom and easily forgotten when they drop again. In the last decade, local governments have been taking a hard look at solar, wind, geothermal, and hydroelectric technologies in an effort to reduce maintenance costs and keep public services running smoothly.

Many of the facilities now in use are located in university towns or those with active environmental groups. In many places, the motivation for exploring alternative energy systems is economic, and by that measure, alternative energy competes well with traditional fossil fuel systems, according to John Thornton and Cecile Warner of the U.S. Department of Energy Laboratory in Golden, Colorado.

That is the case in places as different as San Luis Obispo, California, and Bowling Green, Ohio — and in fast-growing Las Vegas, where Nevada Power can no longer install utilities quickly enough to keep pace with new development. To cope, the company is putting in solar street lights, and in the process is finding that it can save on infrastructure costs upfront.

Alternative energy has also caught the eye of Wisconsin state senator Robert Cowles, who has introduced a number of bills to promote it, especially in state-owned office buildings, educational, and correctional institutions. His goal is to meet at least 10 percent of usage with alternative energy systems by January 2006 and 20 percent by January 2010. He has also drafted a bill directing the state's Department of Administration to prescribe energy-efficiency standards for equipment installed in connection with state construction projects.

The federal government is in the act as well. Jessica Commins at the Geothermal Heat Pump Consortium, in Columbia, Maryland — an industry group — says that as the single largest user of electricity, the U.S. government mandates government energy conservation. Executive Order 12902, dated March 1992, and a June 1999 energy policy require audits of all government facilities with the goal of lowering electricity use by 30 percent by the year 2005.

One federal facility answering the call for economy is the Army airfield at the Fort Polk Joint Readiness Training Center in Louisiana. In 1994, the Army retrofitted all of the 4,003 family housing units on the base with a geothermal heat pump for heating and cooling. The $18 million project was the first of its kind and size for this technology. A study later conducted by the Oak Ridge National Laboratory found that the heat pumps cut electrical consumption in half in some buildings.

Do alternative energy systems actually cut energy costs? That is a matter of some debate, but Thornton says that the traditional comparisons of fossil fuel systems to alternative energy are often inaccurate. For one thing, wind, sun, water, and earth technologies do not have continuing fuel costs.

Synergy in San Luis Obispo

Several county and municipal energy projects have turned a lightly populated region of Central California into a showcase for cutting local government power bills. The coastal city of San Luis Obispo (pop. 50,000) is installing a geothermal heat pump climate control system in a building now under construction and, elsewhere, is planning to

use hydroelectric, solar, and cogeneration systems.

The city's primary water source is an impoundment lake above La Cuesta Summit, which rises more than 1,500 feet in the Santa Lucia Mountain Range. The water falls 740 feet from the source to the city's old water treatment plant. It was relatively easy, as well as profitable, to put in a small hydroelectric system at the time. The city sold power to the grid, offsetting some of the water department's electricity costs.

Until 1984, water flowed freely through an eight-foot-high tunnel bored through the mountains. That changed when the California State Water Project ran piping through the same tunnel and covered the pipe with concrete. While the new piping did not impede the flow of water to San Luis Obispo, it did change the system's hydraulics. In 1985, the single turbine and generator that had been installed next to the water treatment plant was shut down.

In 2000, the city decided to explore the idea of retrofitting its small system. It hired Dean Rubinson, an engineer with Black & Veach Consultants in Concord, California, to study the feasibility of restarting the hydroelectric plant. He reported that the city's best option was to use the plant as is, but with new electronic controls.

Rubinson said the alternative "takes full advantage of the hydroelectric generation potential of the raw water system at a minimum of capital expense." San Luis Obispo city engineers agreed.

According to the city's water division manager, Gary Henderson, the city spends $260,000 a year to run the water treatment facility. "We estimate that with the hydro plant we can sell $52,000 worth of electricity to the grid during that same period," he says. "That's an attractive payback, especially since the system is expandable for future growth."

This is not the only project where the city expects to save on power bills. Copeland Sports Corporation, a sports equipment retailer, is building a downtown parking garage that the city plans to buy when construction is complete. One floor of the garage will contain offices heated and cooled entirely by geothermal technology. Tap water will circulate through a system of looped piping placed in 50 boreholes that are 300 feet deep.

The pipe and fittings are made of high-density polyethylene plastic, which local subcontractor Steve Best says is more flexible, corrosion resistant, and expandable than steel. During the 1994 Northridge earthquake near Los Angeles, not one polyethylene line broke in hundreds of miles of underground piping, while there were hundreds of breaks in steel lines.

Piping is sealed in each borehole with a thermally enhanced bentonite grout for full contact between the pipe and the surrounding surface. The circulating water, moderated by a constant 62 degree underground temperature, will keep temperatures consistent in the offices of the new building year round. The new system will use power, but for every Btu equivalent of electricity consumed, it will draw four to five BTUs out of the ground, according to the contractor.

Nearby, the San Luis Obispo County offices illustrate another energy makeover. When the county decided to air condition its old courthouse, design engineer Allen Crosby of Aircon Energy in Sacramento suggested it also look at long-term energy savings by replacing lamps and by adding motion sensors to turn lights on and off.

In addition, Aircon recommended the old boilers and chillers at the library and courthouse annex be retrofitted or replaced with new, more efficient ones. According to the county capital projects coordinator, Greg MacDougall, less electricity is needed for heating and cooling now, even with the additional 42,000 square feet of area in the old courthouse.

Aircon also suggested a new cogeneration system to create electricity and cut power costs at the county government campus. The system serves the old courthouse, the annex, and the library, and will also serve a county building now under construction across the street.

The system, designed by consulting engineer Ron Blue of List Engineering in Monterey, involves three cogeneration units fueled by natural gas. Exhaust heat will be recycled for hot water and to maintain comfortable temperatures during the winter. The system will cool the buildings in summer through an

absorption chiller.

The on-site production of power is expected to provide up to 55 percent of all electricity needs for the county building complex. An incentive program offered through the Public Utilities Commission has already brought the county a $500,000 rebate, and its capital expenditure is expected to be paid off in seven to nine years even with fluctuating gas prices. Under the commission's program, all solar projects qualify for rebates, whether on residences, commercial buildings, or manufacturing plants.

In addition, floors in the county's newest building are built with an air space sandwiched between two concrete slabs. A blower system cools the floors by drawing in air at night, when temperatures typically drop to the mid-50s during the warm months of the year.

Now San Luis Obispo's city engineering staff is considering putting solar electric power cells on the roofs of two buildings. Also in the design stage is a plan to offset the cost of electricity at the city sewage treatment plant with byproduct methane produced on site.

More savings in the Midwest

Alternative energy systems are notable in the Rust Belt as well. American Municipal Power-Ohio, a joint agency that provides power and related services to municipal electric systems in Ohio, West Virginia, Pennsylvania, and Michigan, is promoting a hydro plant on the Ohio River built as an adjunct to the existing dam in Belleville, West Virginia.

"This is a joint venture with 42 of our members, and it's not our only hydro project," says Kent Carson, director of member relations at at AMP-Ohio. The $160 million system has no dam but uses the flow of the river itself to produce power.

Recently AMP-Ohio built Ohio's first wind farm outside the town of Bowling Green (pop. 30,000). Ten communities are involved in this joint venture. The system started out with a 3.6 megawatt capacity from two units, but is in the process of adding two more units to the site.

Carson notes that the area is only marginal in its ability to harvest wind power. "It was the partnerships that made it feasible for us to go forward," he says. In addition to helping members unite behind the project, this time AMP-Ohio also connected with Green Mountain Energy to buy the Green Tags for the facility. "When something is generated using renewable resources, that power has an extra value called a green attribute, which is bought and sold in the [energy] market," Carson explains.

Municipalities that are part of the project have retail customers for whom the Green Tags are a decided asset. Buying AMP-Ohio tags helped to make the project economically feasible because the revenue is rolled back into the project and reduces the cost of generating the power. Green Tags are available throughout the nation's energy market.

Cost reduction is especially important with a wind farm because the capital costs do not compare well with systems using traditional fossil fuels. However, the fuel is free, and maintenance costs are low.

One of AMP-Ohio's most unusual projects involves the city of Westerville, Ohio (pop. 36,000). AMP-Ohio received a state grant to extend the city's electric utility using fuel cell technology.

Carson says hydrogen fuel cells are already well beyond the experimentation phase, and that AMP-Ohio decided to use them after President Bush mentioned this technology during his State of the Union address last January. Using fuel cells to generate electricity is considered environmentally friendly because hydrogen is extracted from natural gas. The only emissions are usable super-clean water and heat. The plant went online in October

Taking the lead

AMP-Ohio often relies on local utilities to get the ball rolling on alternative energy projects. The West

Virginia utility in New Martinsville (pop. 6,000) held a license to develop a hydroelectric plant on the Ohio River. In Bowling Green, the impetus for a wind farm came from the city's utility director.

"From our point of view, the leadership stems from a need," says Carson. "It's not just a need for power because you can secure power from a variety of sources, but it's also a need for environmental stewardship."

Sometimes that need makes alternative energy especially palatable to the public. Bowling Green's new wind farm is an example. It was dedicated in November 2003, when the weather in northwest Ohio can be brutal. It was very cold and windy on dedication day, but a steady stream of people came to the ceremony. "It might not be as visible as a wind farm," says Carson, "but it is still something that people support with enthusiasm."

Barbara Wolcott writes about technical subjects for Mechanical Engineering *and other publications.*

Resources

Images: Top — The Geysers at Calistoga, California, where the Energy Department is doing research on geothermal energy production. Middle — Russian scientists test an accelerated solar concentrator at the National Renewable Energy Laboratoryin Golden, Colorado. Bottom — Wind farm in Montezuma, Kansas. Photos National Renewable Energy Laboratory.

Something new. Alexander Gorlov, professor emeritus of mechanical engineering at Northeastern University in Boston, has developed a device that can generate hydroelectric power without a dam. His helical turbine can be used in rivers, tidal areas, and open ocean currents. Gorlov was an engineer on Egypt's Aswan Dam. His patented systems are installed or under construction in Korea, Brazil, Ireland, and on the Merrimack River in Massachusetts.

In print. A National Renewable Energy Laboratory booklet called *Photovoltaics for Municipal Planners* is available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

On the web

National Renewable Energy Laboratory: http://www.nrel.gov/.

Geothermal Heat Pump Consortium: http://www.geoexchange.org/

American Municipal Power-Ohio: http://www.amp-ohio.org/

San Luis Obispo County: http://www.co.slo.ca.us/

For information on the Merrimack River hydropower system: Verdant Power, Arlington, Virginia, http://www.verdantpower.com/

New program. The Connecticut Clean Energy Fund is offering state residents up to $25,000 in rebates for installing solar energy systems. The fund — a state-run program — is financed by a surcharge on electricity bills statewide. See http://www.ctcleanenergy.com/.

Energy policy. New York is the latest state to make a major commitment to renewable energy. In late September, the state's Public Service Commission adopted a policy aimed at increasing the amount of electricity in the state that comes from renewable resources — to 25 percent of the total by 2013. More than a dozen other states have adopted so-called "renewable portfolio standards" of this sort. Details are at http://www.dps.state.ny.us/. For general information on these standards, see the website of the Union of Concerned Scientists: http://www.ucsusa.org/.

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Energy Plans and Policies

Legislative File Number R-05-329 (version 3)

CITY of ALBUQUERQUE
SIXTEENTH COUNCIL

COUNCIL BILL NO. F/S R-05-329 ENACTMENT NO.

_____

SPONSORED BY: **ERIC GRIEGO**

F/S Adopting Policies to Establish and Implement a City Renewable Energy
Initiative; Calling for Progress Reports by City Departments (Griego)

CITY of ALBUQUERQUE
SIXTEENTH COUNCIL

COUNCIL BILL NO. F/S R-05-329 ENACTMENT NO.

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SPONSORED BY: **ERIC GRIEGO**

ADOPTING POLICIES TO ESTABLISH AND IMPLEMENT A CITY RENEWABLE ENERGY INITIATIVE; CALLING FOR PROGRESS REPORTS BY CITY DEPARTMENTS AND THE ENERGY CONSERVATION COUNCIL.

WHEREAS, the development and use of renewable energy sources and investments in energy efficiency will enhance energy productivity and security; offer clean, reliable and affordable energy technologies; and increase choices available to Albuquerque's residents; and

WHEREAS, the City should participate with the State in advancing the development of hydrogen, fuel cell, renewable energy and energy efficiency technologies to protect the public health of its citizens and its economic future and energy stability; and

WHEREAS, the Legislature has found that New Mexico is ideally positioned to stimulate advanced energy technology economic development due in part to its abundance of natural and renewable energy sources, the presence of national

laboratories and research universities that are leaders in energy research; and

WHEREAS, the State is providing funds to stimulate the market for and promote the statewide use of advanced energy technologies; and

WHEREAS, the City has initiated a number of energy initiatives including, using methane gas generated at the liquid waste plant to provide electricity to the plant, designing buildings for energy conservation, converting traffic warning signals to photovotaic cells, using LED traffic signals, and blending conventional fuels with biomass related alternative fuels, setting aside 1% of the CIP for the purposes of energy conservation, designing a LEED certified Police Substation, the New Mexico Chapter of the United States Green Building Council to sponsor the State's first LEED Training Program, and beginning planning and engineering to use methane gas from closed land fields and to acquire digester technology to convert a portion of the City's current solid waste stream into electricity; and

WHEREAS, 14-8-5-4 ROA 1994 of the City Code of Ordinance authorizes the Energy Conservation Council to study energy use and loss and methods of reducing consumption, work with businesses, citizens, city employees, community organizations, educators and elected officials, to develop and implement energy conservation goals, programs and educational efforts and promote cooperation and coordination amongst these groups and provide for evaluation of energy conservation programs which have been implemented; and

WHEREAS, 14-8-5-4 ROA 1994 Paragraph (F) states that Energy Conservation Council shall advise the Mayor and Council on legislation, programs and policies which would contribute to energy conservation; and

WHEREAS, the City of Albuquerque should continue and expand upon these efforts and adopt a renewable energy policy that offers incentives and rebates to developers and users of renewable energy and that demonstrates to public and private entities how to build new or retrofit existing facilities with the technologies to use renewable energy.

BE IT RESOLVED BY THE COUNCIL, THE GOVERNING BODY OF THE CITY OF ALBUQUERQUE:

Section 1. Renewable Energy - Any energy resource that is naturally regenerated over a short time scale and is:

A. Generated by use of low- or zero-emissions generation technology with substantial long-term production potential; and

B. Generated by use of renewable energy resources that may include:

(1) Solar, wind, hydropower and geothermal resources;
(2) Fuel cells that are not fossil fueled; and
(3) Biomass resources, such as agriculture or animal waste, small diameter timber, salt cedar and other phreatophyte or woody vegetation removed from river basins or watersheds in New Mexico, landfill gas and anaerobically digested waste biomass; but

C. Does not include electric energy generated by use of fossil fuel, waste products from fossil sources, waste products from inorganic sources or nuclear energy.

Section 2. A renewable energy policy is hereby adopted for the City and shall include the following elements:

A. Solar Energy Incentives. The City Office of Economic Development and the Energy Conservation Council shall develop within 9 months from the effective date of this Resolution a program for providing incentives and tax credits for entities located within the city that manufacture solar energy products or that create solar energy technology. Upon approval of the program, the Council's intent is that up to $1,000,000 will initially be appropriated to fund the program from the City's CIP Decade Plan and clean energy grants.

B. City-Owned and Constructed Buildings. The City Department of Municipal Development, in consultation with the Energy Conservation Council, shall equip or retrofit all City-owned buildings and develop energy procurement policies to achieve the goal of securing 15% of the power for City owned

facilities from renewable sources, solar energy, in particular, within 7 years from the effective date of this Resolution. A minimum of 33% of the power acquired from renewable sources shall come from on-site renewable energy. The on-site power generation may be funded through third party financing, City funds, Federal and State Grants and sources as available.

C. New City-Owned and Constructed Buildings and Additions over 50,000 Square Feet. All new buildings and additions built for or by the City that are over 50,000 square feet shall have 15% of the power to the building generated by on-site renewable energy.

D. Energy Efficiency Upgrades. The Department of Municipal Development and the Energy Conservation Council, shall report back within 6 months of the enactment of this legislation on the progress of the 1% for Energy Conservation bond program, and make recommendations to extend the program beyond the 2007 bond cycle and for expansion of the program to increase energy efficiency and add investment in renewable technologies, pursuant to subsection B of this Section.

E. Energy Efficient Design Standards for City Owned Buildings. The Department of Municipal Development in consultation with the Energy Conservation Council shall within 2 years of the effective date of this Resolution adopt energy efficient design standards for new City buildings, additions to City buildings and remodels of City buildings that reduce energy consumption 10% below that required by the State Building Code.

F. Renewable Fleet Fuels. The City fleet shall be fueled with a minimum of 20% non-petroleum based fuels within 5 years.

G. Rebate Program. The City, through the Finance Department, the Municipal Development Department and the Energy Conservation Council, shall develop a rebate program, similar to that of the City's water conservation program, to encourage the use of renewable energy, including solar panels, by city residents. The report to Council should identify funding sources.

H. Natural Design Energy Management. The City Department of Environmental Health, Parks and Recreation Department and

the Planning Department shall within 12 months of the effective date of this resolution, develop landscape design guidelines, and a program to disseminate these guidelines, that promote the use of natural plants and material to enhance energy conservation and quality of life.

I. The Energy Conservation Council, by March 30, 2006, shall submit to the Administration and to the City Council a 5 year education plan that includes a budget component, to fulfill the education mandate set forth in 14-8-5-4 ROA 1994.

J. IRB Scoring for Renewable Energy and Demand Side Supply via Energy Efficiency. The City shall amend the scoring criteria for approving Industrial Revenue Bond applications to provide added points for creating, producing or using renewable energy and renewable energy technology.

K. Development Standards and Incentives. The City, Planning Department and the Energy Conservation Council in cooperation with the New Mexico Chapter of the United States Green Building Council and Rebuild New Mexico shall propose to the Council within 9 months of the enactment of this legislation revised development standards or incentives for new residential developments based on energy efficiency.

L. Application for State Funds. The City, through the Department of Municipal Development and the Energy Conservation Council, shall apply for a “Clean Energy Grant” pursuant to the Advanced Energy Technologies Economic Development Act, Sections 71-7-1 et seq. NMSA 1978, to obtain unding to develop efficiency technology for the City.

M. Purchase of Environmentally Safe Products. The City, through the Department of Finance and Administration, in consultation with the Energy Conservation Council shall propose to the Council within one year of the enactment date of this Resolution amendments to the Purchasing Ordinance which develop specifications for City purchases that reduce exposure of city residents and visitors to potentially toxic chemicals, reduce greenhouse gas emissions and other air pollutants, protect the ground and surface waters, maximize water and energy efficiency, favor renewable energy sources, maximize post consumer recycled content and readily recyclable or compostable

materials, favor long-term use through product durability, repairability, and reuse, and consider life cycle economics of a product including its manufacture, transportation, use and disposal.

N. Net Metering. The City, as part of its legislative priorities for the 2006 state legislature, shall lobby for adoption of the Public Regulation Commission's net-metering measure that will provide the City with opportunities to sell back to utility companies any excess renewable energy and renewable energy credits produced by installations on City-owned facilities.

Section 3. The Administration and the Energy Conservation Council in the development of the policies and programs established in this Resolution shall consult with, and when possible, include the participation of, other interested parties.

Section 4. The Administration shall provide a report to the Council within 6 months of the effective date of this Resolution regarding the status of the development of the policies and programs set forth herein and shall continue to provide reports every 6 months until the policies and programs set forth in this Resolution are implemented.

AMERICAN PLANNING ASSOCIATION
POLICY GUIDE ON
ENERGY

Adopted by the Legislative and Policy Committee, December 11, 2003
Adopted by the Chapter Delegate Assembly, April 24, 2004
Ratified by the Board of Directors, April 25, 2004

I. INTRODUCTION

The planning profession already recognizes the urgency of such issues as urban sprawl, the degeneration of inner ring suburbs, the disappearance of agricultural and green space land resources, and the proliferation of pavement. We can easily see the need to design ways to reduce our ecological footprint.

What is less obvious but equally important is that in order to create the sustainable communities we desire, we must also plan to first increase energy conservation and renewable energy production while significantly reducing use of non-renewable energy sources as well. Most Americans are unaware of the large role energy plays in their everyday lives, and particularly how today's energy production and consumption are directly connected to the condition of the environment, the health of the economy, and the quality of life that will be experienced by future generations.

The planning profession is well positioned to contribute to this aspect of sustainability planning for two primary reasons. First, the planner's role now includes a broad range of community-based planning functions. Second, as communities adopt the concept of sustainability and "smart growth," their expectations of traditional comprehensive planning and zoning processes become more complex. In response, planners are striving to keep pace with the environmental, social, and economic interconnections in their communities in order to provide the leadership comprehensive planning demands.

The power to shift energy habits and priorities is within reach of every individual American. Where we exercise the most control over our energy future is in our personal actions and professional practice. Thus, the most effective energy policy recommendations that planners develop will be those that guide and facilitate progressive citizen-level actions, decisions, regulations, and land-use policies that lead to energy market shifts towards competitive, healthy, and safe energy alternatives.

II. POLICY RATIONALE AND FINDINGS

This energy policy guideline addresses primarily non-transportation energy issues. APA's transportation-related energy policies are set forth in the APA *Policy on Surface Transportation* (adopted 1997), which is incorporated by reference in this policy guide. Smart growth planning initiatives generally address transportation energy use, but non-transportation energy issues such as clean energy and energy efficiency tend to be applied somewhat anecdotally to individual projects. The advantages of anticipating and managing other community energy needs are less obvious but no less important to "smart growth." For example, if a community chooses to promote renewable energy to increase self-reliance, a comprehensive set of energy efficiency goals will be needed to make this practical. Energy efficiency can also be an effective tool for designing economic development strategies (see Appendix A).

While planners can exert only minimal influence on the selection of energy sources, planners are in a position to greatly affect the demand, location, and mitigation of energy production. Through legislation that encourages and accommodates localized power production, sets standards for extraction and pollution, and establishes criteria for building and site design, planners can greatly affect energy choices and consumption.

At the same time, with the help of land-use and transportation planning, planners can influence their communities to reduce the need for energy and reduce the environmental impacts of electric generation and consumption and other energy resource use. In some instances, planners can also influence local energy decisions through the use of local subsidies and education.

Energy consumption becomes a significant land-use issue from a number of perspectives. These include the siting of energy generation and transmission facilities, renewable energy, natural resource extraction, transportation policy, resource conservation, industrial development, waste management, and site design. The planning profession is uniquely well placed to advance the adoption of resource sustainability principles through its comprehensive planning processes. The creation of "green buildings and infrastructure," such as LEED™ (Leadership in Energy & Environmental Design) standards for building design, will enhance our ability to reduce energy dependence and promote the conservation of resources.

POLICY FINDINGS:

1. **A safe, reliable energy supply is important to every community's health, safety, and commerce.**
    a. Energy is not only a critical component to the functioning of our communities (both urban and rural) but also a major trade commodity and determinant of the country's foreign policies and strategies.
    b. Utilities have historically made little substantive investment in transmission system improvements especially since deregulation appeared on the horizon. The August 2003 blackout brought this issue to public attention. It was not lack of power but rather the inability of the stressed transmission system to deliver on the demand. This triggered automatic controls to shut down plants and substations. These automatic shutdown controls are there for safety purposes.

2. **The urbanization that has occurred over the past few decades has created a demand for energy that is quickly surpassing its current rate of production.**
    a. Continued population growth and technological advances are generating higher demands for reliable energy supply sources. Right now, consumption patterns show that a tremendous amount of energy will be needed in the future to keep the national economy running. While capacity varies from place to place, this is where, with the proper guidance, community-based planning can begin to have some impact. Greater energy efficiency can be achieved through community commitment beyond individual efforts. Even with the advances made with alternative energy sources and conservation efforts employed, the need for new and upgraded electric generation and transmission facilities has continued.
    b. Due, in part, to the country's increasingly electronics-based economy, electricity is the fastest growing segment in the American energy mix.[1]
    c. Americans now are spending 90 percent of their time indoors, in buildings that consume two-thirds of U.S. electricity.[2] Perhaps the majority of the time that Americans spend outside of buildings is spent in transit between them, generally as single occupants in fossil fuel powered vehicles.

3. **Some of the most useful fossil fuel reserves, particularly petroleum, are not expected to last beyond the year 2050 at current consumption levels.[3]**
    In the past decade from 1990 to 2000, proven oil reserves worldwide increased by only 4 percent. According to Kenneth S. Deffeyes, an acclaimed oil geologist, world production of oil will peak sometime this decade and will then slowly and irreversibly decline. Today the U.S. produces only 38 percent of the oil it consumes. It is now seeking solutions such as drilling in the Arctic National Wildlife Refuge. This will yield only 2 percent of U.S. annual consumption at its peak output, 25 years from now. That is unlikely to make even a small dent in the country's demand for oil.

4. **The alternative energy industry has matured over the past few decades.**
    a. Renewable energy equipment has become more reliable and economical, and installation standards are more professional.
    b. There are a number of promising alternatives for electricity production including solar, wind, and alternative fuels that provide a balance of economic and environmental benefits.

5. **Fair share or other equitable approaches are needed for siting energy generation and distribution facilities, and land-use plans and policies need to provide flexibility and guidance for communities involved in development of new energy sources.**
    a. Potential sites are increasingly difficult to locate and approve due to environmental, land-use, social equity, and operational requirements.
    b. Utility-scale renewable energy development is raising new siting and land-use issues.
    c. The development of both renewable and non-renewable sources of energy presents specific challenges to the communities involved, including permitting

and zoning of facilities and support industries, provision of appropriate infrastructure, and worker housing.

6. **The way we plan urban areas significantly affects the energy usage of individual building sites. Appropriate site design standards and building codes can encourage energy conservation and the use of renewable energy technologies on site.**
    a. Most existing building codes ignore such considerations as latitude, elevation, microclimate, and building proportions, orientation, and size. This frequently results in requirements for excessive use of energy in buildings.
    b. The use of renewable energy equipment such as photovoltaic panels and solar water heaters is frequently discouraged in housing development covenants because people assume they will be unattractive.
    c. Energy professionals have developed a substantial number of technologies, policies, and education programs that promote sustainable use of energy resources. Many local government entities have received grants to incorporate energy efficiency and renewable energy into schools and other government facilities, and to increase public transportation. These projects have helped raise awareness of clean energy alternatives and have made these options visible to the public. In brief, there is evidence to suggest that in the absence of federal leadership, throughout the U.S. resource-efficient energy policy is being envisioned and formulated by consensus at the state, county, and municipal levels.

III. GENERAL POLICY STATEMENTS

Thus, in summary, APA supports the following policy position and specific policy statements:

POLICY POSITION:

APA and its Chapters recognize regional, community, and site planning and design as central and integral determinants of our nation's energy future and overall well-being. In response, APA and its Chapters endorse managing energy consumption and encouraging efficiency by modifying development patterns, architecture, and the design of household, commercial, transportation, and industrial technologies to reduce energy demand, and by forecasting the energy demand of long range land-use plans and strategies, and mitigating the impacts of that demand.

Furthermore, APA and its Chapters endorse supply side investments, subsidies, policies, and education that support clean energy fuels, renewable energy sources, zero-waste distribution systems, and the decommissioning of hazardous energy sources.

IV. SPECIFIC POLICY INITIATIVES

Policy Statement 1: APA and its Chapters encourage planners and decision makers to evaluate the effects of plans, programs, and policies on energy usage, and to determine how to reduce energy impacts by making more efficient use of all energy resources.

Initiative 1:
Reduce energy consumption through comprehensive planning and urban design that incorporates strategies for both mobile and non-mobile energy efficiency.
(Reference: APA *Smart Growth Policy Guide* and APA *Policy Guide on Surface Transportation*)

Reasons to support Initiative 1:
City planning and design that focus on efficient use of land resources for roads and infrastructure and that limit low density areas and segregated land uses can contribute significantly to lower energy consumption. Planners can directly affect the manner in which communities are designed and laid out. Therefore, planners can affect the amount of energy consumed in the construction, maintenance, and operation of their communities, and in the daily lives of community residents and businesses. Comprehensive and general plans should include land-use policies crafted to reduce energy consumption. At the same time energy conservation should be the basis for implementation strategies and programs.

Initiative 2:
Provide technical assistance for the development of guidelines and codes for energy-efficient site planning and building methodologies that take advantage of the energy flows of the natural environment.

Reasons to support Initiative 2:
Even though information about solar energy and other renewable energy sources has been available for decades, and demonstration sites and buildings have shown the potential for significant savings in energy use, these methods are still not part of mainstream design and construction. Buildings continue to be built that rely entirely on mechanical heating, lighting, and cooling systems regardless of environmental conditions. Development of rules and regulations that allow and encourage energy-efficient and environmentally sensitive design of buildings will have the potential to lower energy costs and reduce the country's dependence on foreign energy sources. APA encourages discussion with building code officials to ensure that local land-use standards are consistent with industry-wide construction and safety standards.

Initiative 3
Support programs to increase energy efficiency and reduce life-cycle costs of all construction projects, including public and institutional projects.

Initiative 4:
Support federal, state, and local programs that reward energy savings rather than consumption through incentives, appropriate subsidies, and regulation.

Reasons to support Initiative 4:
Currently tax incentives and sales tax programs promote the consumption of energy rather than lower usage and conservation of energy. By reviewing and revising these current tax incentives with utility providers, planners can play a role in promoting conservation of energy, thereby reducing the associated environmental damages.

Initiative 5:
Continue to support the Low Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program as means towards greater energy conservation.

Reasons to support Initiative 5:
Energy conservation is a top priority and the most important component of a sound energy program. This is particularly important for low- and moderate-income persons, who benefit from both technical *and* financial assistance in implementing low and no-cost methods for conserving energy in their homes. For instance, a full funding of a weatherization program requires a relatively small capital investment yet can go a long way to reducing LIHEAP expenditures in our most energy inefficient homes over the long-term.

Initiative 6:
Support education, incentives, and subsidies that reduce consumption at the individual level.

Reasons to support Initiative 6:
There are many programs aimed at reducing individual energy consumption, such as EnergyStar Rating Programs, home insulation, energy leakage tracking programs, smart technologies, and hybrid or electric vehicles. Incentives or legislation at the local level for more efficient use of energy can greatly promote the awareness and use of these programs. Many states have public benefits programs that direct ratepayer dollars into efficiency and renewable energy incentives programs. At the federal level there are a number of programs that can benefit communities and individuals including Zero-Energy Homes and Million Solar Roofs (DOE), and Fannie Mae energy-efficient mortgages.

Initiative 7:
Increase the corporate average fuel economy (CAFE) standards.

Reasons to support Initiative 7:
Given the high percentage of energy consumption for transportation, it is important to achieve as much fuel economy as possible in that sector. Average fleet fuel efficiency has actually decreased in recent years. The technology exists to increase efficiency. APA

supports efforts that require automobile manufacturers to meet ever-increasing CAFE standards without impacting safety or convenience as it has wide-ranging benefits from less fuel consumption to reduced air pollution.

Policy Statement 2: APA and its Chapters support legislation that will help to reduce dependence on fossil fuels and stimulate the development of renewable energy resources.

Initiative 8:
Develop and encourage appropriate applications of renewable energy.

Reasons to support Initiative 8:
Renewable energy is a means of attaining sustainability because it decreases dependence on fossil fuels and nuclear energy. However, renewable energy comes from a variety of sources, and different technologies are appropriate in different climates and circumstances.

There are a number of promising alternatives for electricity production that include solar and wind power and alternative fuels that promise to provide a balance of economic and environmental benefits. Planners are in a position to work with utility providers to plan for the land-use and infrastructure requirements of renewable energy production such that they only minimally impact the environment.

Initiative 9:
Support utilization of on-site, distributed generation technologies.

Reasons to support Initiative 9:
Some electric utilities are exploring the concept of moving away from large, centralized power stations designed to meet computer-projected demand, toward a diverse system that responds more directly to local needs. Distributed generation systems essentially generate electricity to be used on site, with any surplus power being fed back into the grid. These systems can be large or small and can use either renewable or fossil fuel power. Possible systems range from a set of solar panels on the roof of a home, to a small hydropower plant on a river, to a natural gas-powered micro-turbine at an industrial plant.

One important advantage of a distributed generation system is its close proximity to the user. Transmission requirements are reduced, as are the power losses that occur over long distance lines. Distributed generation is also an important trend, both for generation flexibility and energy security.

a. APA encourages discussion with building code officials to ensure that local land-use standards proactively encourage the installation of renewable energy technologies.
b. Local incentive programs, such as subsidies can also support many of these more environmentally friendly distributed energy resources, at long-term savings for the consumer.

c. Smart growth planning could provide the forum for planners to broker open discussions between utilities and their customers regarding distributed renewable energy generation.

Initiative 10:
Support the adoption of consistent initiatives by state Public Regulatory Commissions nationwide for net metering, renewable energy portfolio standards, and the establishment of public benefits funds that encourage all customer sectors to conserve energy and invest in renewable sources.

Reasons to support Initiative 10:
Utility regulation is a state-level function, and there are currently a wide variety of rules and requirements among states regarding the promotion of renewable energy and distributed generation technologies as part of the nation's energy supply. At present, most states allow net metering,[4] but requirements and guidelines are inconsistent, even within individual states themselves. Ten states have renewable energy portfolio standards in place, but requirements and deadlines vary. Another 10 states have some form of renewable energy power purchase obligations established. Public benefits programs are usually created as part of a utility restructuring effort, and they also vary widely by state. The energy efficiency and renewable energy programs are generally only a small part of the overall restructuring package.

Much could be done. Local and state APA chapters could establish an energy sub-committee to track the renewable energy policies and regulations of their state's utility regulatory commission, and keep abreast of statewide efficiency targets and renewable energy portfolios. Municipal and county planners can work with their state energy office to promote public education programs about green power and distributed generation.

Policy Statement 3: APA and its Chapters support the adoption of legislation and regulations that require the planning and evaluation of decisions regarding energy production, distribution, and use to mitigate associated adverse impacts.

Initiative 11:
Develop procedures and standards to ensure that siting decisions for energy generation, transmission, and distribution facilities will be evaluated to ensure consistency with community and regional development objectives, and the overall protection of public health, safety, and the environment.

Reasons to support Initiative 11:
The environmental impacts and other potential hazards of electricity generation and distribution may take years and huge investments to mitigate. Nevertheless, many energy facility siting and system design decisions are not subjected to the same comprehensive planning process and environmental evaluation that is required for other land-use decisions. Planners should be involved in the development of local and regional public

health, safety, design (particularly in redeveloping areas and scenic corridors), and environmental standards and hazard mitigation planning for power generation and distribution facilities to reduce their potential damage to the environment and achieve local and regional development objectives. These, in addition to the regular safety and maintenance precautions energy companies carry out, can help to reduce energy waste and as well as greatly minimize potential risks and damage to the a community.

Large power plants are often located in or near rural communities that rely heavily upon the taxes they generate to fund local government and schools. Such communities should be targeted for intensive ongoing planning expertise (that their local economies may not be able to afford) to help mitigate known and potential impacts. Additionally, these communities would benefit from economic development expertise to deal with the job losses and brownfields when their fossil or nuclear power plants make way for transition to other more sustainable sources.

Initiative 12:
Recognize that providing transportation options and good urban form design is the first step to changing pollution intensive choices for mobility. Actively promote alternative transportation modes through the planning and implementation of bicycle and pedestrian pathways and transit systems.

Reasons to support Initiative 12:
During the past century, the automobile has raised per capita consumption of both energy and space, thereby altering the form of 21st century American communities more than any other single variable. With cross-generational subsidies further hiding the costs of this technology, other choices for mobility quickly disappeared. Yet over the past few decades, it has been shown that with appropriate subsidization of transit and incentives for pedestrian and bike paths, people have been changing their mobility choices. People have been voluntarily selecting travel modes that are much less energy intensive and pollute less per capita than a single-occupied vehicle.

Initiative 13:
Develop community based lighting design guidelines that promote energy efficiency and safety while reducing light pollution or "sky-glow," light trespass on adjacent properties, and glare.

Reasons to support Initiative 13:
Since lighting in American communities is typically designed to attract attention or to limit safety liability, it is frequently excessive and poorly designed, sending half of the light directly skyward where it is of little use. These excess lumens create light pollution and waste significant amounts of energy. It has been estimated that a community of 100,000 people could save more than $500,000 per year through improved lighting design.

For safety reasons too, light levels need to be maintained within a certain range, as over-lighting creates problems for drivers who pass through brightly lit areas and are blinded

as they pass back into darker areas. Over-lighting creates glare directly from the fixture, temporarily impairing vision. Light trespass, defined as unwanted light shining on adjacent property, clearly is inefficient and has a negative impact on the enjoyment and value of the affected adjacent property.

Community lighting guidelines need to address lighting that promotes "true color" in the physical environment, or the color seen by natural light. True color representation is necessary for efficient and effective crime prevention and detection. Lighting approaching true color also is important to enable EMS personnel to identify blood, oil, and other substances when attending an accident.

APA and its Chapters recommends working with the International Dark-Sky Association (IDA), the Illuminating Engineering Society of North America (IESNA), and the International Crime Prevention Through Environmental Design Association (CPTED) through their respective United States affiliates to recommend/establish community based and energy efficient lighting design options. Planners can also work with the state to establish statewide lighting standards for public spaces and thoroughfares.

Initiative 14:
Continue to reduce the negative environmental impacts of current fossil fuel extraction and electricity generation through research, technology, and community involvement.

Reasons to support Initiative 14:
The United States relies primarily on fossil fuel energy to generate electricity. However, the production and combustion of fossil fuels has tremendous impacts on air, water, and soil quality, which, in turn, can negatively affect the health of humans and other species as well as harming the earth's atmosphere. Despite the fact that stringent regulations have led to an ongoing decrease in pollution levels in the U.S. since the 1970s (with the notable exception of CO_2), pollution levels continue to rise because demand for all levels of energy continues to grow due to both population growth and increasing per capita consumption. The problem is compounded by the complexities of enforcing the Clean Air Act and other regulatory standards.

Transportation, stationary source combustion (primarily fossil fuel power plants), and industrial process emissions compose the bulk of anthropogenic sources of air pollution. Air pollution is implicated in a variety of health and atmospheric problems including respiratory disease and cancer, acid rain, ozone depletion, and global warming.

Pollutants produced when fuel is burned to generate electricity include nitrogen oxides (NO_x), which contribute to ozone (smog), fine-particle soot and acid rain; sulfur dioxide (SO_2), which contributes to fine-particle soot and acid rain; mercury, which is released to the air and deposited on land and water resources, concentrating in edible fish populations; and carbon dioxide (CO_2), which contributes to the greenhouse effect and climate modification.

Initiative 15:
Support the development of new renewable energy technologies and endorse an unbiased evaluation of their environmental impacts.

Reasons to support Initiative 15:
A wide variety of new renewable energy technologies are in development, primarily ways to harness energy from organic or biomass sources. Also, traditional renewable energy sources such as wind, solar, and hydropower continue to be refined. While renewable energy technologies show great promise for sustainable use, it is important that they be objectively evaluated for their impacts on the social and natural environment. Controversial questions have already been raised about the social impacts of siting wind turbines, the health impacts of burning biofuels, or the wisdom of promoting a hydrogen fuel cell future when either fossil or renewable energy must be used to produce the hydrogen.

Initiative 16:
The continued generation of electrical power from nuclear energy is a part of the mix of power sources, and while APA recognizes the benefits offered by nuclear energy, it advocates that the social and environmental concerns applicable to the siting and operating nuclear power plants, as well as the transportation and disposal of nuclear wastes continue to be addressed.

Reason to support Initiative 16:
The nation's 102 nuclear power plants supply 20 percent of all electrical power in the U.S. Nuclear power has a safety record that is better than coal-fired plants per megawatt hour and does not result in the production of greenhouse gases. Reactors can also be designed to "burn" up weapons grade materials left over from the Cold War. Most of the commercial nuclear power plants now operating will likely seek relicensing to allow continued operation for another 20 years. These plants must undergo a rigorous safety and environmental review by the Nuclear Regulatory Commission before being granted a renewal.

These plants are often located in or near rural communities that rely heavily upon the taxes they generate to fund local government and schools. Such communities should be targeted for intensive ongoing planning expertise (that their local economies may not be able to afford) to help mitigate known and potential impacts of nuclear plants.

Additionally, these communities would benefit from economic development expertise to deal with the job losses and brownfields when their nuclear energy plants make way for transition to other more sustainable sources.

Policy Statement 4: APA and its Chapters should work to promote environmental equity and justice with regard to energy production and distribution, and to assist communities with meeting the challenges inherent in the development of new energy resources.

Initiative 17:
Recognize that while energy is a commodity for sale and consumption, it is also a national resource that must be equitably managed.

Reasons to support Initiative 17:
The availability of energy is central to the functioning of our communities, yet the current management and distribution of energy has created great economic vulnerabilities. Making energy resources more affordable, with more stable pricing, and available to everyone in the community will require partnerships — governments, utility companies, private energy enterprises, and interest groups.

Initiative 18:
Integrate community energy efficiency goals into the "Smart Growth" planning process.

Reasons to support Initiative 18:
Planners in both urban and rural communities interested in "smart growth" should recognize the importance of integrating energy efficiency and energy resource management goals into their planning process. A plan for energy efficiency would address energy used for municipal services and infrastructure such as water and sewage treatment and street lighting, public buildings and facilities, and commercial, residential, and industrial uses.

Initiative 19:
Develop a fair share siting process for energy generation and distribution facilities that reflects sound environmental practice and does not place undue environmental justice burdens on any one community.
(Reference: *Policy Guide on Locally Unwanted Land Uses*)

Reasons to support Initiative 19:
There is a need to address environmental justice issues that emerge with the siting or maintenance of electrical generation and transmission facilities, fuel storage facilities, and other potential health hazards related to energy production and use. All stakeholders in the community should be involved in the formulation of appropriate solutions. The location of existing and new energy facilities should be part of a comprehensive planning process, which includes the opportunity for meaningful public participation and public consensus. New facilities should be consistent with local land-use plans and meet the most rigorous standards to protect the environment.

A clearly defined process is needed to establish priorities and requirements and identify participants/stakeholders in siting of new energy facilities. The process should ensure compliance with all applicable local, state, and federal regulations governing such issues as air quality, water/wetlands, land use, noise, cultural and natural resources, public health and safety, and other environmental issues in addition to ensuring that environmental justice issues are addressed. The location of energy facilities should be

part of a comprehensive planning process, which includes the opportunity for meaningful public participation and public consensus, in advance of the "public hearing to announce the new plant" scenario. The process also needs to ensure that a "fair" decision is ultimately made and ensure that energy generation facilities are not being disproportionately placed in low-income and minority communities. Planners should ensure and facilitate the involvement of the entire community, including low-income and minority populations, in the siting of energy facilities

Initiative 20:
Support efforts to include energy efficiency in all affordable housing guidelines.

Reasons to support Initiative 20:
Affordable housing programs make home ownership available to eligible low- and moderate-income families. The cost of owning a home, however, includes both the mortgage and the ongoing operational expenses, primarily the energy costs. Homes that are built for participants in affordable housing programs should be designed and built for energy efficiency to assure affordable energy bills as well.

Energy efficiency is particularly important in keeping affordable housing stock affordable. Particular attention should be placed on upgrading appliances, windows, doors, heating systems, and insulation in those units occupied by households that might not otherwise be able to make these improvements on their own.

The ability to afford heating and cooling is an issue that affects inner cities and rural areas alike. Low- and moderate-income persons pay a disproportionate amount of their annual family budget on heating and/or cooling their homes. Typically, this comes at the sacrifice of other necessary household expenditures. If people forego heating and cooling, substantial health impacts will arise.

Initiative 21:
Recognize that energy generation is also an economic development activity and plan adequately for all aspects of an energy generation and production facility and its workers.

Reasons to support Initiative 21:
Land-use plans and regulations should recognize and accommodate the types of development that support the various stages of energy related growth. For communities that are confronted with energy production, their land-use plans and policies should accommodate new energy growth through mechanisms such as flexible zoning regulations. Land-use plans should also be reviewed for sufficient developed and zoned industrial areas to accommodate support industry. In addition, the community plans and zoning regulations may need to address temporary housing for the facility's construction workers.

NOTES

[1] "U.S. Energy Consumption Patterns," Energy Information Administration, http://www.eia.doe.gov/emeu/iea/wec.html, Internet, accessed July 2002.

[2] Hawken, Paul, Amory B. Lovins, and L. Hunter Lovins. *Natural Capitalism: Creating The Next Industrial Revolution.* Boston: Little, Brown, & Company. 1999. p. 85.

[3] *Ibid.*, p. 264.

[4] Net metering allows the owner of a distributed generation system to direct surplus power back to the grid when their system is generating more power than they require, and draw from it when more is needed, generally at the same retail rate. While accessibility to interconnection is mandated at the federal level, net-metering rules and allowances vary widely from state to state.

APPENDIX A: ENERGY EFFICIENCY OPPORTUNITIES

Opportunities exist to improve energy efficiency in number of different sectors:

1. Residential
    a. Structural materials and design, HVAC systems, and site orientation of single and multi-family homes
    b. Home appliances, electronics, and lighting
    c. Power tools and landscaping equipment
2. Commercial and institutional
    a. Structural materials and design, HVAC systems, and site orientation of office buildings, retail, and other commercial buildings, government buildings, and facilities (including schools)
    b. Office electronics and equipment, food service equipment, commercial business equipment, building maintenance and landscaping equipment, institutional and commercial lighting, hospital and medical equipment, municipal wastewater and solid waste management equipment
3. Industrial
    a. Structural materials and design, HVAC systems, and site orientation of industrial buildings and facilities
    b. Industrial process equipment, materials handling equipment, process monitoring systems
    c. On-site electric generators
4. Agricultural
    a. Structural materials and design, HVAC systems, and site orientation of agricultural buildings and facilities
    b. Food processing and refrigerated storage equipment
    c. Planting and harvesting equipment, agricultural waste management equipment
5. Transportation
    a. Vehicles
        i. All private, commercial, and government-owned vehicles used primarily for transportation including automobiles, vans, trucks, buses, RVs

        ii. Construction and road-building equipment, road maintenance equipment
    b. Road engineering
        i. Traffic lights and timing
        ii. Lighted road signs
        iii. Integration of public transportation
    c. Municipal transportation planning
        i. Public Transportation
        ii. Bicycle paths
        iii. Urban walkability
6. Infrastructure
    a. Utility distribution systems including transmission and pipelines
    b. Municipal and utility infrastructure planning

Additionally, one can target improved efficiency at four different levels.

7. Level One: Individual — through improved appliance design (rated by the EnergyStar program), building design (through double and triple pane windows where appropriate, energy leakage tracking programs, appropriate building siting, and arrangement of glass and ventilation systems), change in usage behavior
8. Level Two: System design — support research that reduces leakages through transmission, provide technology sources closer to the user
9. Level Three: Land-use distribution and community design — by reducing need for vehicular trips, excessive lighting, and encouraging energy efficient building designs.
10. Level Four — alternative and realistic choices for mobility — through the use of transit, walking/biking, and other less consumptive habits

VIII. ENERGY PLAN

Vision Statement

This Plan envisions Burlington as a city where…

> *…Burlington is a leader in the development and implementation of energy efficiency and renewable energy measures that reduce energy costs, enhance environmental quality, improve security and sustainability, and enhance economic vitality. Key elements of this success are a broad range of energy efficiency programs, public education in resource conservation, publicly-owned alternatively-fueled electric generation, biomass-fueled district energy technologies, energy-efficient green building technologies, and climate-friendly transportation solutions, which includes support for alternative fueled vehicles.*

CITY POLICIES

THE CITY OF BURLINGTON WILL:

- **Optimize overall energy efficiency, reduce energy requirements, and minimize the need for new energy resources on a citywide basis.**
- **Continue to aggressively pursue the transition to renewable sources, cogeneration, and district heating.**
- **Improve the energy efficiency of city-owned buildings and facilities.**
- **Reduce transportation energy use by lessening reliance on drive-alone car trips, using more fuel-efficient vehicles, promoting increased transit use, and decreasing vehicle miles traveled.**
- **Educate its citizens regarding energy efficiency, the benefits of public utility ownership, renewable electric generation, and conservation to ensure that citywide resource allocation decisions in years to come will reflect the wishes of an informed citizenry.**
- **Make tangible efforts to reduce greenhouse gas emissions through the implementation of the *Climate Action Plan*.**

INTRODUCTION

Access to reliable and clean energy, at an affordable price, will be an important factor in defining and facilitating future growth and development in Burlington. This Chapter briefly outlines how energy is used and supplied to the city, discusses some of the most important public policy issues related to energy generation and consumption, and finally proposes a series of strategies to improve efficiency, protect the consumer and the environment, and maintain energy self sufficiency. Much of the information and policy direction for this section comes from *The Burlington Climate Action Plan*[1] adopted by the City Council in the late spring of 2000, and included as part of this plan by reference.

Energy Use & Supply

Nearly two-thirds of city residents rely on natural gas for residential use, and this is projected to increase in the near term. In 1989, approximately 23 percent of the non-transportation energy used, or 51 percent of the dollars spent, in homes came from electricity. Since that time, through the efforts of local demand-side management programs, residential electric heat has been reduced dramatically down to 2% of homes. Rather than raising electric rates, Burlington's ratepayers saw a 5.03 percent decrease in 1996.

Statewide energy use among fuels shows the dominance of oil in our energy consumption. Oil consumption is projected to increase 52% between 1990 and 2015. Use of other fuels (electricity, natural gas, and LPG) is also expected to increase, but their total usage is small compared to oil. Vermont Gas, a private company, provides natural gas to most of the city, except those areas where low demand, topography, or subsurface conditions make laying pipeline difficult.

Electricity is a high-quality power source, but to date has been inappropriate for space and hot water heating due to historically higher costs. Natural gas is a more suitable heat source. If gas and other fossil fuels prices continue their steady escalation however, this policy will need re-examination, particularly given associated greenhouse gas emissions. Although Vermont uses more hydroelectric power and wood energy than many other states, our total use of renewable energy sources is much smaller than our use of non-renewables. Use of renewables is not growing as fast as our use of non-renewables statewide.

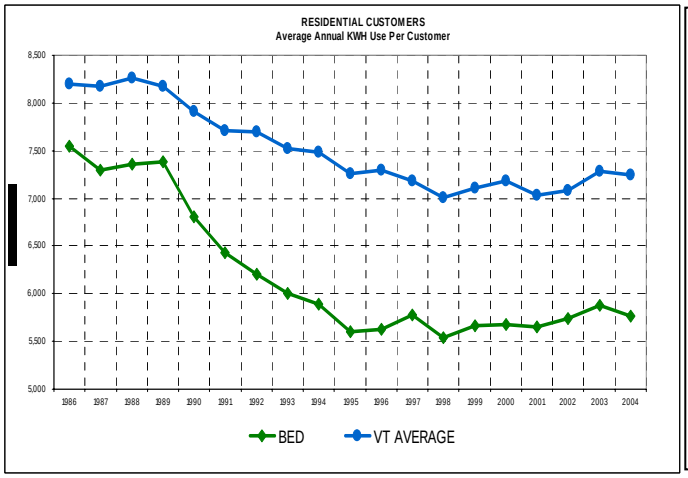
Burlington's energy use priorities focus on developing more effective and economically viable renewable energy alternatives including wind and solar energy sources, and a continued emphasis on conservation and efficiency programs aimed at both the end user and commercial producer.

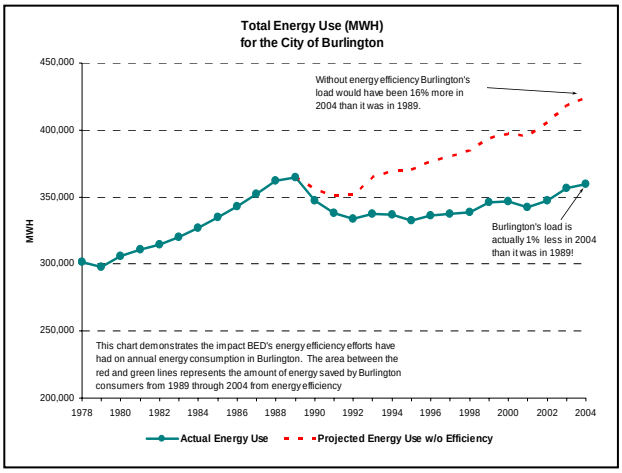
[1] *The Climate Action Plan: A Plan to Save Energy and Reduce Greenhouse Gas Emissions*. Climate Protection Task Force. Burlington, Vermont. February 2000.

BURLINGTON ELECTRIC

Burlington is fortunate to have a municipally-owned and operated electric company. Burlington Electric (BED) began in 1905, and currently serves about 16,000 residential customers and more than 3,600 commercial customers. BED serves the full range of energy services including generation, transmission, distribution, and other retail energy services.

Burlington is a recognized world leader in the use of renewable energy and enercy conservation. In 2004, Burlington as a whole used the same amount of electricity it used in 1989 – about 435,000 megawatts.





BED owns 50% of the 52-megawatt (MW) McNeil Generating Plant located in the Intervale. McNeil Station is one of the world's largest woodchip-fueled electric generating facilities, and is part of an experimental biomass gasification demonstration project started in 1997. During fiscal year 1999, McNeil Station produced 183,109,400 kwh of power while consuming 270,848 tons of wood chips. This represented a significant increase over recent years as McNeil Station is increasingly called upon to provide voltage support and transmission stability to the New England Power Grid. BED will continue to monitor fugitive dust in the area of McNeil Station that has been an issue for nearby residents, and continue to take the necessary steps to minimize emissions.

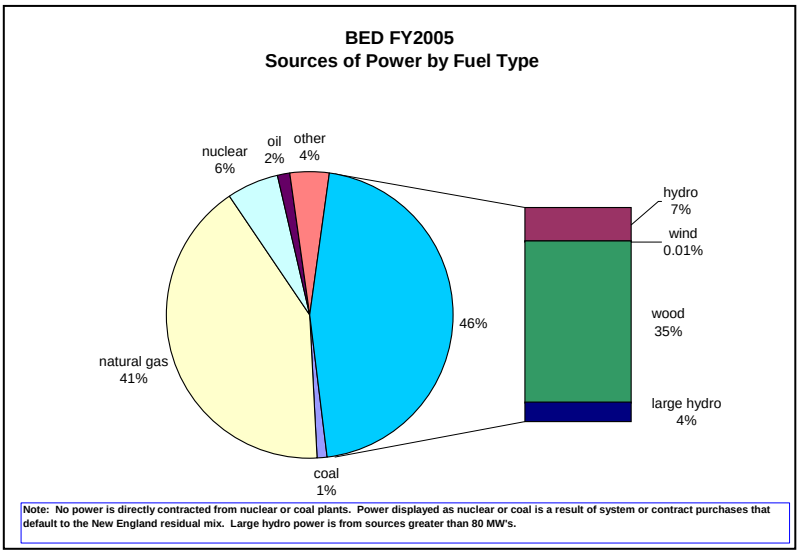
Land adjacent to McNeil Station remains undeveloped, and BED has expressed interest in its use for other innovative energy-related uses. This is the proposed as the future home of “Riverside Eco-Park” which is envisioned as a 60,000 sq.ft. greenhouse and business complex that utilizes thermal energy generated at nearby McNeil Station.

In addition, BED owns a 25-MW turbine located next to the Water Treatment Plan on Lake Street. The gas turbine is capable of bringing the entire city on-line, including the McNeil Station, in less than 30 minutes from a cold start. BED is also capturing methane

gas at the former city landfill north of Manhattan Drive to generate about 0.5-MW of power.

BED continues to seek other power supply options including local generation. BED is currently researching the viability of a locally-developed wind power facility. It is collaborating on the Chase Mill Hydro Project on the Winooski River between Burlington and Winooski which now delivers BED 1.3-MW of power. Maintaining this local energy self-sufficiency is an important component to Burlington's future sustainability.

In addition to its own generation facilities, BED purchases power from a variety of sources through the New England Power Grid. Approximately 46% of this power comes from renewable sources and this percentage is expected to continue to grow. In determining where to purchase energy, BED considers the total social and environmental costs as well as the out-of-pocket ones. For example, when one considers the difficulty and costs of nuclear waste disposal, Vermont Yankee may prove to be a more expensive alternative than other sources. In part, Burlington chose not to purchase power from Hydro-Quebec for these types of reasons. BED also will need to carefully scrutinize its generation expansion proposals in light of utility de-regulation and the success of demand reduction strategies. If new generation alternatives are pursued, careful consideration must be given to effects on the natural and built environments of the city.



District Heating & Cooling/ Community Energy

BED, in conjunction with the Department of Public Works, continues to study the feasibility of developing district heating and cooling, or now known as "Community Energy," within portions of the city. Areas under evaluation begin with the institutions on the Hill (UVM and FAHC), but could later include the City Center and Waterfront. Although not under consideration at this time, the concentration of industrial land uses along Pine Street may make this area another attractive location to provide this type of service.

The concept for Community Energy is to replace natural gas and fuel oil as heat sources with hot water. Such a plan will utilize excess city water capacity, combined with energy and excess heat produced by McNeil Station, with an expansion to possibly include a small gas turbine in a later phase. Energy would be distributed underground to either heat or cool buildings within the district. If feasible, district heating and cooling is expected to provide a viable energy alternative, make use of existing water capacity, diversify the city's energy mix, and make the city a more attractive and competitive location for business.

Energy Efficiency Programs

With the support of Burlington residents in the form of a $11.3 million bond, BED began an ambitious energy efficiency program in 1990. Over $26 million has been invested by BED since 1991 with half of this coming from matching from the customers. BED has implemented a wide range of programs to reduce overall energy consumption and costs through the city. These included:

- **Smartlight**: leases compact florescent energy saving light bulbs to consumers.
- **Neighbor$ave**: offers household energy audits of all energy consumed, compact florescent light bulbs, and installs water and energy savings measures for electric water heater customers. This program will be BED's vehicle to promote the "10% Challenge Campaign" portion of the *Climate Action Plan.*
- **Heat Exchange**: offers assistance and financial subsidies to convert customers from electric heating to other heating sources.
- **Top 10**: offers a customized menu of energy savings opportunities to the City's largest electrical customers to provide "positive cash flow" financing of demand-side management measures. This program will also carry forward the commitments customers have made to the Climate-Wise Program and the "10% Challenge Campaign."
- **Energy Advantage**: offers "positive cash flow" financing to deliver retrofit energy savings measures to small to medium-sized businesses.
- **Energy-Efficiency Guidelines**: adoption of minimum standards for buildings and energy-consuming equipment in new construction and rehabilitation projects.
- **Construction and Equipment Replacement**: provides technical assistance and customized incentives for reducing energy demand beyond the Energy Efficiency Guidelines.

The Future under De-Regulation

BED is participating in discussions at the federal and state level concerning de-regulation of the electric industry and the introduction of competition. The discussion centers primarily on the deregulation of the generation component of the industry, and the introduction of competition, or choice, for the retail customer. While this discussion has

recently lost momentum nationally, restructuring has been implemented in a number of states, and several legislative and regulatory efforts have been explored in Vermont since 1995.

While changes of this magnitude may offer unforeseen opportunities, several issues must be considered. These primarily include environmental impacts associated with energy sources, protection of low-income consumers, and continued support for research and development. BED has been a leader in environmental protection, efficiency and renewable energy resources, and addressing the needs of low-income consumers. Local ownership and control has been essential to realizing these objectives as well as achieving stable (and falling) electric rates since 1993. Any final solution to industry de-regulation must also address growing concerns over the vulnerability of the regional power grid to ensure a continuous supply of power at reasonable and stable rates. Additionally, maintenance of transmission corridors must be continued by trained foresters and arborists to minimize disruptions and protect vegetation within the rights-of-way.

BED and the VT Public Service Board should continue to investigate and advocate for opportunities to maintain local jurisdiction in the event the restructuring discussion regains momentum. , the use of exit fees to discourage or at least compensate for the potential loss of large customers, and support for environmental protection and renewable energy resource programs.

Energy Use and Climate Protection

Most climatic scientists now agree that human-caused emissions of greenhouse gases[2] are having a measurable impact on the earth's climate. While increases in global temperatures are highlighted as one of the primary outcomes of climate change, many impacts that are more serious may result. These include an increase in the frequency and intensity of extreme weather events, rising sea levels, and a northward expansion in the range of tropical diseases and pests. Each poses a significant economic and environmental threat to our region and beyond.

In 1996, the Burlington City Council agreed to participate in the "Cities for Climate Protection" campaign organized by the International Council for Local Environmental Initiatives (ICLEI). In 1998, the Council adopted a resolution that set a target of 2005 for reducing local greenhouse gas emissions by 10 percent below 1990 levels, and established the Climate Protection Task Force.

[2] "Greenhouse Gases" are any gas found in the earth's atmosphere that contributes to trapping energy under the atmosphere and causing warming. Such gases include carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons (CFC's) and water vapor.

The largest source of greenhouse gas emissions in Burlington is carbon dioxide resulting from the combustion of fossil fuels. Burlington's estimated CO_2 emissions were 509,000 tons in 1990, and 624,000 in 1997 - or 13 and 16 tons per person respectively. In order to meet the City Council's target, CO_2 emissions would have to be reduced by 257,000 tons.

In the spring of 2000, the City Council adopted the *Burlington Climate Action Plan* which recommends a more achievable reduction goal 156,000 tons – or 10 percent below 1997 levels. Burlington's *Climate Action Plan* seeks to:

- Raise awareness about individual and business actions that can reduce the threat of global climate change.
- Guide decision-makers in Burlington towards policies, strategies, and actions that can cut greenhouse gas emissions.

Recommended actions propose to reduce traffic and air pollution, save money for the City and its residents and businesses, and help protect the environment for future generations. Examples of strategies in the plan include:

- Retrofit city buildings and revise operations to make municipal operations more energy efficient and climate friendly. Including an increase in the use of energy efficient and alternative fueled vehicles as part of the city fleet; Expand and maintain the City's inventory of street trees and shrubs; and creation of a telecommute policy and program for employees to work from home.
- Encourage residences and businesses to invest in energy efficiency and renewable energy; Fully implement existing utility sponsored efficiency programs (electric and natural gas) in the commercial and industrial sectors; Fully implement existing utility sponsored efficiency programs (electric, natural gas, weatherization) in the residential sector; Implement a "10% Challenge Campaign" to enlist the support of all energy consumers in reducing greenhouse gas production; and Support the establishment of the efficiency utility.
- Implement policies and planning to reduce transportation demand and to encourage more fuel-efficient and alternative fueled vehicles; Continue implementation of existing TDM programs including park and ride lots, shuttles and rideshare programs; and develop park and ride lots and shuttle services that link and connect to employment centers.
- Support the development of a biomass district heating system; Support ongoing R&D of new technologies including bio-gasification and fuel cells; and Address the barriers to developing a district energy system that uses the rejected heat of the McNeil Electric Generating Plant to supply the energy needs of the Greater Burlington area customers including: UVM, FAHC, downtown, the waterfront and Winooski.

In addition to reducing greenhouse gas emissions, the recommendations of this Plan will benefit the city in other ways:

- **Cleaner air**: Motor vehicles are the single largest source of urban air pollution. In addition to greenhouse gases, cars emit such carcinogens as butadiene, benzene, and formaldehyde.

- **Improved human health**: Cleaner air will result in healthier people. An estimated 40,000 premature deaths nationally are attributed to motor vehicle emissions.
- **Improved economic vitality**: Improvements in energy efficiency mean tangible cost savings to individuals and businesses. Energy independence keeps local dollars in the local economy and improves the competitiveness of local businesses.
- **A more liveable community**: A city with less traffic, cleaner air, more trees, and successful businesses will be a more attractive and liveable place to live for current and future generations.

Energy Action Plan

Action Item	Lead Agency	Secondary Agencies
Analyze the potential of operating city-owned vehicles on alternative fuels and periodically review the analysis to consider changing conditions and opportunities.	Public Works	BED
Sponsor forums for architects, developers, contractors, and others to inform them about new city ordinances, regulations, and standards and to provide technical assistance as to how they can incorporate new analytic and production techniques in their work	BED	Public Works
Review vocational curricula to promote energy efficiency and to develop programs to prepare students for employment in new energy-related fields.	BED	Schools
Establish an energy district if justified by the positive result of BED's feasibility study of district heating and cooling.	BED	Public Works
Revise the Energy Efficiency Ordinance for new construction to integrate new technologies.	BED	Public Works
Develop an overall energy budget to manage the city's energy consumption. For electricity, the budget should be based upon local generating capacity.	BED	
Examine the costs and benefits of requiring new development to either pay an energy impact fee or make an offsetting investment in efficiency.	BED	Planning & Zoning
Prepare an evaluation of the citywide potential, constraints and impacts associated with the development of new renewable energy sources - including fuel cell, cogeneration, biomass, solar, geothermal, hydro, wind, and methane.	BED	
Develop guidelines for tree heights and species selection that maximize energy efficiency.	Parks & Recreation	BED

Increase use of energy efficient maintenance vehicles and City fleets.	Public Works	BED
Explore and develop climate friendly procurement and purchasing guidelines.	Treasurer's Office	BED
Amend and enforce the municipal code and ordinances with an eye on reducing CO2 loads.	Planning & Zoning	BED
Explore a telecommute policy and program for selected employees to work from home.	Human Resources	
Develop a comprehensive education/outreach program to increase public awareness about the affects of global climate change on public health, the economy and the environment.	BED	Planning & Zoning Public Works
Expand and maintain the City's inventory of street trees and shrubs.	Parks & Recreation	
Fully implement existing utility sponsored efficiency programs (electric and natural gas) in the commercial and industrial sectors.	BED	
Fully implement existing utility sponsored efficiency programs (electric, natural gas, weatherization) in the residential sector	BED	
Increase energy efficiency in municipal-owned and leased buildings.	Treasurer's Office	BED Public Works Schools
Explore and to obtain the resources necessary to implement the objectives of the municipal buildings and operations plan.	Treasurer's Office	BED Public Works Schools

ALTERNATIVE ENERGY SOURCES

SOLAR ACCESS

Minnesota Statutes require comprehensive plans to include an element for the protection and development of access to direct sunlight for solar energy systems. According to the Metropolitan Council's *Local Planning Handbook*, "this requirement was enacted in 1978, during a time of concern about declining fossil fuel supplies and heightened awareness that, in this harsh climate, the region is especially dependent on fossil fuels and nuclear power for domestic heating and industrial energy." The intent of this legislation was to prevent solar collectors from being shaded by adjacent structures and vegetation and to ensure that development decisions did not preclude the possible future development and use of solar energy systems. However, there are no specific regional or State standards or policies regarding solar access protection.

Weak as this legislation was, it was a noble effort. Even if the United States is no longer faced with the sort of energy crisis that occurred in the late 1970's, fossil fuels are a finite resource and eventually Americans will be forced to develop alternative energy resources. In 1979, the Minnesota Energy Agency stated that "simple flat plate collectors had the potential to supply one-half of Minnesota's space heating, cooling, water heating and low-temperature industrial process heat requirement, saving more than 150 billion cubic feet of natural gas, or 26 barrels of crude oil per year." Increasing the use of solar energy systems would at least extend the supply of fossil fuels.

Recently, photovoltaic technology, prohibitively expensive twenty years ago, has become cheaper to manufacture to the point that it will soon compete with other accepted utility-generating sources. Some Cities are providing incentives to homeowners to encourage their use. As this number grows and manufacturing costs continue to decline, the use of solar energy systems finally will begin to increase.

The 1979 Comprehensive Plan included a solar access protection element and adopted a goal to meet five percent of the total space heating requirements of the community with active and/or passive solar energy systems by 1990. Those who drafted the 1979 Plan, however, were doubtful that this goal would be achieved, given the technology and building practices at the time and, indeed, building practices have changed little since then.

This Plan has two goals regarding solar access. The first goal states that wherever possible, access to direct sunlight for solar energy systems shall be protected on all principle structures' rooftops and south-facing walls. The second goal states that the City will promote the efficient use of existing and new energy resources and the protection of solar access in municipal, commercial and residential developments. The City also will work with power companies to encourage customer use of solar energy systems, both new and retrofitted.

According to Burnsville's Zoning Ordinance, solar energy systems are permitted in residential districts and they must conform to the same yard area requirements as the principal structure. In business and industrial districts, non-passive solar energy collection devices and similar

equipment or structures must be screened on all sides from public streets and must be designed to be compatible with the architectural treatment of the principal structure. The development standards contained in the current Zoning Ordinance are consistent with the basic principles of solar access. Burnsville's buildings are generally low in height and the City's spacious yard requirements create an open environment conducive to the use of solar power.

Earth Sheltered Buildings

In addition to solar energy systems, the City of Burnsville permits earth sheltered buildings in single family residential districts and allows earth sheltered multiple family and commercial/industrial development projects as a conditional use. Earth sheltered homes are oftentimes more energy efficient than traditionally constructed homes. Earth sheltered homes are not required to have frost footings and a continuous perimeter, a permanent foundation consisting of concrete block, concrete or approved equivalent, a pitched roof, or a cellar or basement.

Wind-Powered Generators

The City permits the use of wind-powered generators. Towers must be sited so that they are located away from the nearest property line the same distance as the height. Any noise created by a wind generator must meet Minnesota Pollution Control Agency standards and the utility company must review and approve the system plan to ensure that the generator will not create a hazard.

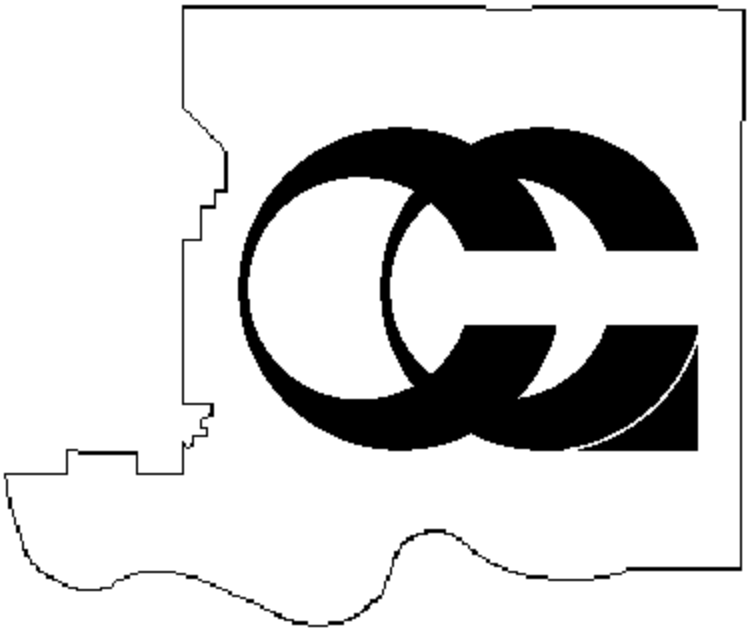
Sources

Best, Don. "Photovoltaics Come Home to Stay." *Home Magazine*, July/August, 1998, page 80.

Howard Dahlgren Associates, Inc. *City of Burnsville Comprehensive Plan*, 1979.

ENERGY AND SOLAR ACCESS ELEMENT

City of Cottage Grove Comprehensive Plan 2020



ENERGY AND SOLAR ACCESS ELEMENT

INTRODUCTION

Energy, conservation of energy, and how changing social lifestyles will affect future planning will be the primary discussion of this chapter. This discussion does not deal with national policy, statewide locations of energy resources, or research and development of alternative energy sources. What it will do is to begin focusing on issues and problems local planning efforts can deal with.

This section will form the base from which other comprehensive plans can be structured as changing technology and energy demand/supply relationships and political events necessitate revision of the City's energy policies. These are some factors affecting energy use that are within the power of the City to regulate. Some policies, such as growth management and land use planning, have been an important part of the City's regulatory activities for years, and these policies can be continued and expanded. The policies regarding newer technology, such as solar energy and wind energy, could be expanded now, even if they are only tentative policies subject to further study and evaluation in the future.

GOALS AND POLICIES

GOAL: **Promote increased energy efficiency in new and existing structures to lessen dependence on primary fuels and to decrease energy costs for City residents, businesses, and industries.**

POLICY: Require compliance with the State Energy Code for new construction.

POLICY: Use Community Development Block Grants and/or other funding sources to promote energy conservation methods for low and moderate income residents.

POLICY: Through education and handout pamphlets, encourage more energy-efficient construction such as weather stripping of doors and windows; the installation of more modern windows; the use of high-efficiency furnaces; and the insulation of ceilings, walls, and rim joists beyond minimum requirements.

POLICY: Encourage the reduction of all lighting levels to minimum acceptable levels.

GOAL: **Because of rising prices of nonrenewable energy and predicted declines in supplies, it is considered vital to the health and general welfare of citizens to promote and protect the installation and use of solar energy systems.**

GOAL: **New residential, commercial, and industrial developments should have access to sunlight for solar energy systems. Solar access should be provided or maintained for existing development to the extent possible.**

POLICY: To guarantee solar access to as many parcels of land as practical in the community so that solar energy systems can be used to supplement or replace conventional energy sources for hot water, space heating, air conditioning, and low-temperature industrial processes.

POLICY: Establish a minimum degree of solar access protection by adopting policies and regulations that establish the amount of solar access to be protected, permissible levels of shading by structures and vegetation, and the methods to be used to provide such protection.

POLICY: In developing its land-use regulations for protecting solar access, the City will consider both winter and summer solar system use.

POLICY: All new subdivision and planned unit developments should be designed to accommodate extensive use of passive and active solar energy systems with special attention given to street, lot, and building orientations.

POLICY: All new subdivisions, planned unit developments, shopping malls, and industrial parks will be encouraged to provide restrictive covenants that prohibit the shading of designated areas of neighboring property.

GOAL: Promote the use of landscaping treatments to increase the energy efficiency and comfort of buildings.

POLICY: Encourage maximum use of vegetation stressing energy efficiency in residential developments.

POLICY: Provide performance standards in the zoning ordinance maximizing vegetation for aesthetic and energy purposes.

POLICY: Minimize on-site paved areas to reduce the effects of thermal reflection from paved areas.

POLICY: Ensure that public buildings are landscaped correctly to aid in energy conservation efforts.

GOAL: Encourage the development of site designs for commercial and industrial projects, which will minimize the use of energy.

POLICY: Strong emphasis should be placed on reducing paving through “proof of parking” areas in order to reduce heat buildup in the area near the parking lots.

POLICY: Increase the amount of green area on site plans emphasizing landscaping that functionally can save energy as well as serve an aesthetic function.

POLICY: Consider reductions in parking requirements based on a demonstration by the business or industry that their employees/customers can use more efficient methods of transportation such as car or van pooling.

GOAL: **Promote the conservation of fossil fuels by reducing the fuel consumption involved in the trips to and from places of employment.**

POLICY: Promote mass transit routes, park-and-ride, bus turnouts, commuter rail, or other transit-related facilities to and within higher city employment centers.

POLICY: Encourage employees of local businesses to reside in the City, thereby reducing energy consumption for transportation to the workplace.

POLICY: Encourage the development of local employment centers, which will allow more residents to work near their homes, thus reducing energy consumption.

POLICY: Anticipate the need and plan for mass transit facilities to encourage the use of mass transit. Bus shelters, bus turnouts, separate bus lanes at bus stops are examples.

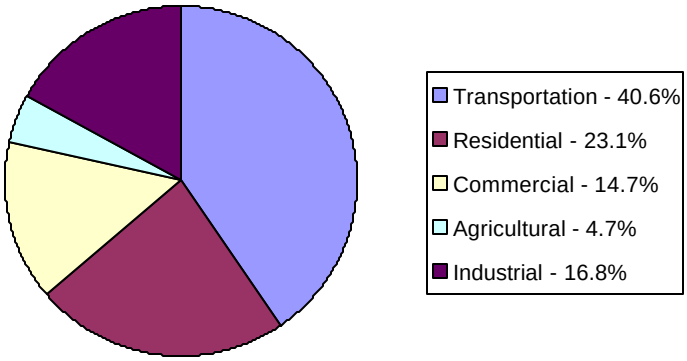
MINNESOTA'S ENERGY SITUATION

The State of Minnesota is today almost totally dependent on outside sources for its energy supply. Minnesota pays more for fuels than some other states and is more vulnerable to possible supply disruptions. The former Minnesota Energy Agency had developed forecasts of the supply/demand relationship in the year 1995. Its baseline forecast assumes that energy users would respond to higher energy prices by reducing their consumption or switching to lower priced fuels, that there would be some energy conservation, and that economic growth would continue. Natural gas supplies have already peaked and are expected to decline slowly.

Energy Consumption by Section, 1990

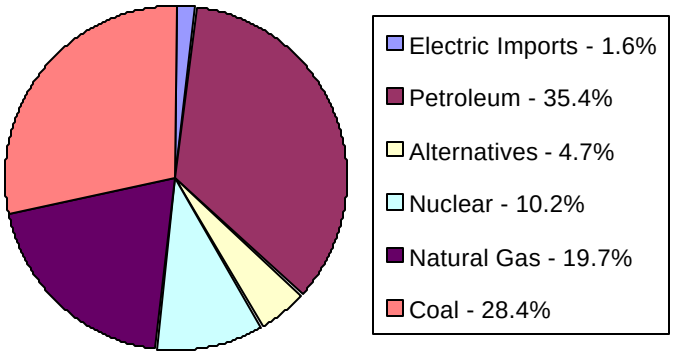
There are three basic strategies that may eliminate or postpone the forecasted gap between energy supply and demand.

Energy Consumption by Sector, 1990



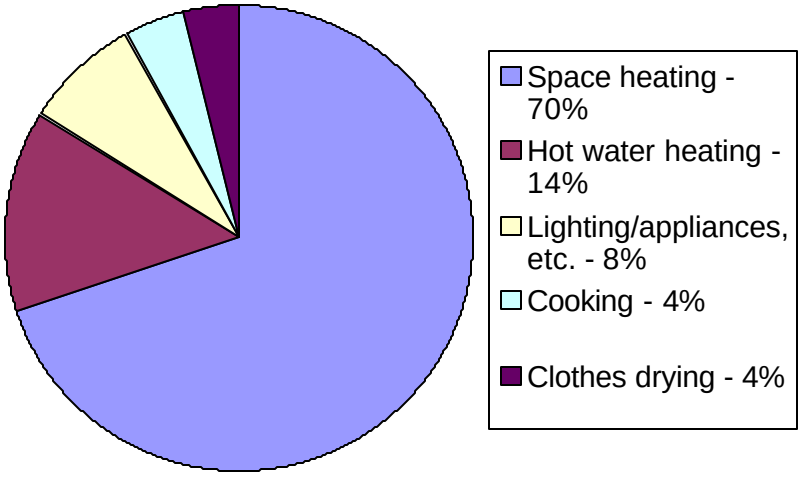
The first is to increase supplies of traditional fuels, the second is to increase conservation efforts, and the third is to develop additional supplies of energy from non-traditional sources. These strategies will undoubtedly all be pursued to some extent. Cottage Grove can play a role in energy conservation and encourage use of non-traditional methods.

Energy Consumption by Fuel, 1990



The residential sector accounted for 16 percent of all primary fuel used in 1975 and 38.2 percent of all electricity consumed, for a total of 26 percent of all primary energy used. In the breakdown of energy use in Minnesota homes, it can be seen that space heating and hot water heating account for over 80 percent of the energy use. Energy conservation in these areas can be an extremely important factor in reducing residential energy consumption.

Energy Use in a Minnesota Home



MN State Energy Agency

LANDSCAPING FOR ENERGY EFFICIENCY

Trees, shrubs, ground cover, and turf are among the best natural exterior solar and wind control devices. During summer months vegetation controls reflection/absorption of heat radiation, provides shade for walls and ground surfaces, and creates insulation of dead air spaces. Plants can insulate buildings from intense heat and protect space-cooling equipment from the effects of rapid exterior temperature changes. Plants serve double duty by absorbing day heat and then releasing it slowly at night, thereby cooling daytime temperatures and warming or moderating evening temperatures. Overstory deciduous trees can provide cooling effects during warm months while allowing maximum solar penetration during cooler seasons.

Vegetation can be effectively used for intercepting, diverting, or lessening the impact of wind. Thus, climate around structures can be greatly modified by the control of air movement. Depending upon the desired control, plants can provide an obstruction, deflection, or allow infiltration of air. Landscaping then can be a significant factor in microclimate control in and around buildings. As such, plantings can be given a very practical role while increasing the beauty and overall quality of the City.

SOLAR ACCESS

The Metropolitan Land Planning Act requires municipalities to address solar access in their comprehensive plans and regulations. As an alternative energy resource, direct solar radiation using simple flat-plate collectors has the potential to supply a significant amount of Minnesota's space heating, cooling, water heating, and low-temperature industrial process heat requirement energy needs, according to the MNEA.

Solar energy is not new for Cottage Grove. Several single-family homes have solar panels. Solar energy has the added benefit in that it is a non-polluting energy source.

Why Plan for Solar Access?

It is important to begin planning now for solar energy. The City does not have to consider only the existing available technology for solar energy. Planning should also take place to support any necessary regulatory changes for protecting solar access that may occur in the future.

What Level of Access is Necessary?

In the use of any solar system, the most important factor involved is the assurance of direct access to sunlight. The required level of access to sunlight varies according to the type of solar heating system used.

1. Rooftop protection, which protects the sunlight falling on south-facing rooftops of structures, favors the use of active solar energy systems for both space and domestic water heating. It is also useable by some type of passive space heating systems, such as skylights or clerestory systems with internal heat collectors and storage.

2. South wall protection, which protects the rooftops and south walls of structures, is suitable for passive solar energy systems.

3. South lot protection, which protects the rooftops, south wall, and south lot adjacent to the south wall, offers everything south wall protection offers with the additional possibility of using solar greenhouses, solaria, and reflective surfaces to increase the efficiency of both active and passive heating systems. Snow or light colored patios are examples of reflective surfaces.

4. Detached collector protection is protection of a portion of a lot for use by detached collector systems. It almost always favors active solar systems, especially those using a fluid to transfer heat from the collector to the dwelling. Detached locations could be a site for a free standing collector or a garage or accessory building roof.

As solar access protection moves from the rooftops down to ground locations on the lot, the restrictions on adjacent land to the south may become more severe. As a collector moves closer to the ground it becomes more susceptible to shadows from adjacent vegetation and buildings.

In the northern states the problems of solar access are more severe because of the lower winter solar altitude (the height of the sun above the horizon). It may not be possible in many cases to protect complete solar access for the full 12 months of the year and compromises must then be made.

The guidebook, *Protecting Solar Access for Residential Development*, recommends that cities consider south wall access as an objective for local solar access policies. The passive solar energy systems, which south wall access makes possible, are often less expensive to install and operate than active systems. Also, the option is open to use the roof or south wall for active collectors. In high-density districts with varied building heights, south wall, and sometimes even rooftop solar access, may be difficult to protect. High-rise buildings can be buffered from lower buildings by greenbelts, highways, or other land uses that do not require a high level of solar access.

The guidebook also states that good solar access does not justify sprawl – producing large lot zoning. Reasonably high housing densities can be achieved in many areas without sacrificing solar access, provided the housing is carefully sited and oriented. More study by the staff needs to be done to determine what minimum lot sizes, setbacks, height, and bulk restrictions will provide the desired solar access in Cottage Grove. However, the current ordinance regulations do not preclude use of solar heating systems.

Topography also has an effect on the accessibility to sunlight for any given lot. The southern one-quarter of Cottage Grove is flat land, so slope is not a very important factor for solar access in this City.

If solar access is to be assured, then trees must be of a suitable type and be placed correctly on the property. There are situations where the energy savings of tree shade during the summer months exceed the energy savings by allowing the maximum solar access to a solar heating system. The amount of sunlight that can be blocked by a leafless deciduous tree can vary from 0 to 80 percent of available radiation, depending on the species of tree. When trees

are planted, the mature height of the tree, its location, its shape, its leaf-out and leaf-drop characteristics, and its winter bare-branched shading should all be taken into consideration.

TOOLS AVAILABLE TO PROTECT SOLAR ACCESS

The private and public sectors both have options open to them for development of solar access.

Residential Initiative

This method contains many variables. The given lot size, orientation of existing homes to the sun, tree masses on or adjacent to the site, and size and type of collector to be installed, all play a role for the private sector. Lots with two or more acres normally allow a variety of options for the individual to control solar accessibility. Pitched roofs oriented to the south or south-facing walls provide the greatest solar access. Private developers can orient multiple-family structures to the extent that placement of buildings or design of structures maximizes southern exposures. Maximizing the amount of windows on the south side and minimizing openings on the north and northwest sides of buildings maximize energy efficiency. Solar easements can be obtained which limit building and tree heights on adjacent lots.

Commercial/Industrial Initiatives

Much of the discussion of solar access oriented and landscaping techniques can apply to the commercial/industrial sector. As a generalization, these types of land uses contain greater building massings. Maintaining solar access can be more difficult as the needs of various industries and locations of buildings do not guarantee low profile buildings within an industrial setting. Careful site selection and sensitive orientation of buildings will still be necessary.

Vast expanses of roofs and parking lots and heat loss from certain manufacturing processes create microclimates in a heavily developed industrial park. These design elements may increase the problems of cooling the buildings in the summer and protecting them from cold winter winds.

One method of reducing the amount of hard surface is allowing proof of parking. This means that a development must have the potential for providing all the parking spaces required by the Zoning Code. However, some of the parking area is left as unpaved open area. This reduces the amount of paved surface while providing the City the option of requiring additional paved parking spaces in the future if necessary.

Windmill Farms

Due to the relatively flat topography of the City, industrial sites may profit from a series of electricity-producing windmills. Aesthetically this "wind farm" may not be the most pleasing to the eye; but it may not be much different than clusters of radio towers, large power lines, or petroleum tank farms. Alternative sources of energy for aesthetic considerations may one day have to be a trade-off.

Cogeneration
Cogeneration is when heat or steam is produced as a by-product in an industrial process. The steam or heat is then harnessed and forced into an on-site turbine which runs a generator; thus escaping steam is put to use. Electricity produced can supplement conventional sources or can be shared by other nearby users. Peak demands are reduced while cost savings can also be realized. Currently, a cogeneration plant is located off of Innovation Road.

District Heating
This concept is not new but is making a reappearance. Steam or hot air by-products are re-cycled into the originating building or surrounding buildings as a source of heat. 3M Cottage Grove Center currently heats specific buildings in this manner.

Any of the above energy sources do not do not require modification of city codes, but one should be aware of these types of things in future developments.

Public Sector Opportunities

Considerations of local planning and land use controls to protect solar access can be very complex and comprehensive. The City must consider its administrative and technical potential to carry out a solar access program and choose the regulatory approach that will work best. In developing a program, the City could proceed in stages:

1. Modify the Zoning Code and other regulations, as necessary, to remove any barriers to private market actions to use solar energy systems and to ensure solar access. This permissive approach would apply only to the relatively small number of solar energy users and would not be applicable to all property owners.

2. Modify zoning and/or subdivision regulations to ensure that as many lots as possible offer proper solar orientation (prescriptive approach). A prescriptive approach is necessary if the City is to ensure that all new lots have the option for solar energy use.

3. Modify Zoning Code and other regulations in a more comprehensive manner to address building heights and setbacks, performance standards for solar access, site plan review, vegetation controls, and negotiated incentives.

Presently, subdivision and zoning regulations are the basic tools for protecting solar access at the local level. Care should be taken to ensure these regulations do not hamper individual homeowners who choose to utilize a solar heating system.

TRANSPORTATION AND LAND USE PLANNING

In planning for the City under the Metropolitan Land Planning Act, the City Council continued policies from the former Comprehensive Plan. With respect to the City's future transportation network, the following policies are established:

- The Comprehensive Plan assumes that the motor vehicle will continue to be a primary method of transportation within and through the community in the foreseeable future.

Therefore, the Transportation Plan, and other elements of the plan, are designed to meet the needs of motor vehicle traffic.

- Reduce unnecessary automobile use by conveniently locating community facilities.
- Bikeways and pedestrian walkways shall be provided in a comprehensive manner to provide linkage between commercial/community facilities and residential neighborhoods.
- Cottage Grove must be adequately served by a metropolitan mass transit system to reduce unnecessary use of the automobile.
- In the event that major changes in the primary mode of transportation seem imminent for the Twin Cities area, the Comprehensive Plan will be revised to the extent possible to reflect the needed changes to adapt to that mode of transportation.

Although the first item may seem contradictory to the remaining policies, it is not the case. America's dependence on the automobile has not lessened due to any oil shortages or increases in cost. The European experience shows that consumption rises irrespective of the price of gasoline. However, land uses will be designed to provide for those elements cited in the goals and policies. High-density land uses will be placed next to major transportation networks for future mass transit opportunities. Neighborhood convenience centers will be scattered to lessen the dependence on the automobile for convenience shopping trips. Trail and bikeway systems will link community and regional parks and major retail and employment centers, thus providing alternatives should the automobile not be a future primary source of transportation.

GROWTH MANAGEMENT

One of the most important energy conservation measures that the City can impact is the community's growth patterns. By timing and staging growth patterns, premature delivery of urban services is avoided and transportation networks are not "forced." By controlling urban sprawl, commuters are confined closer to job centers and mass transit lines are not strained by serving lower density areas. Residents inside urbanized areas have neighborhood or community centers to shop in, rather than depending on the automobile for long-distance shopping or social trips. Community services such as schools, police, fire, and recreation programs can be energy efficient by not having to spread their services over a wide-ranging, sparsely populated, geographic area.

SUMMARY

Local government must provide the leadership and regulatory tools to allow new energy technology for the average citizen. The City can provide leadership in a number of ways: workable zoning and subdivision regulations for solar access standards, energy efficient subdivision design, and performance standards for adequate landscaping techniques represent just a start.

Comprehensive Plan *for Owensboro, Whitesville, Daviess County, KY* *Contents*

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CLIMATE

Daviess County has a temperate climate that is favorable for supporting a variety of plant and animal life. Summers are generally warm and humid, and winters are moderately cold. Characteristic of all seasons are changes brought about by passing weather fronts and by the associated centers of high and low pressure. These fronts are least active in late spring and summer. They become somewhat more active in fall and are most active in winter and early spring.

Between moderately cold winters and warm summers, the county experiences a wide temperature fluctuation. The annual mean temperature is 56.5 degrees Fahrenheit, with extremes of 107 degrees in 1936 and 1944 and a low of minus 23 degrees in 1994. In the winter, an average temperature of 35.3 degrees can be expected, and in the summer 76.3 is an anticipated average. Temperatures are generally highest in July, and lowest in January. July temperatures vary less than other months of the year. They vary most in January.

Precipitation is usually fairly well distributed throughout the year. In most years, however, October is the month when the least precipitation is received, and March usually has the most. The average annual rainfall for Daviess County is 46.65 inches and is evenly distributed throughout the year. This average annual rainfall is generally adequate for farm crops to be grown successfully; however, droughts do occur. As an example, the average precipitation for the month of June is 3.7 inches. During periods of drought, occurring about one year in ten, less than 1.0 inch of rainfall is received in June. Also, during 1 year in 10, more than 7.3 inches of rainfall is received in June. During these periods of drought or excess rain, crop yields are occasionally reduced.

On the following pages are several graphs describing the climatology of Daviess County.

Exhibit 711-G1: Annual Wind Direction

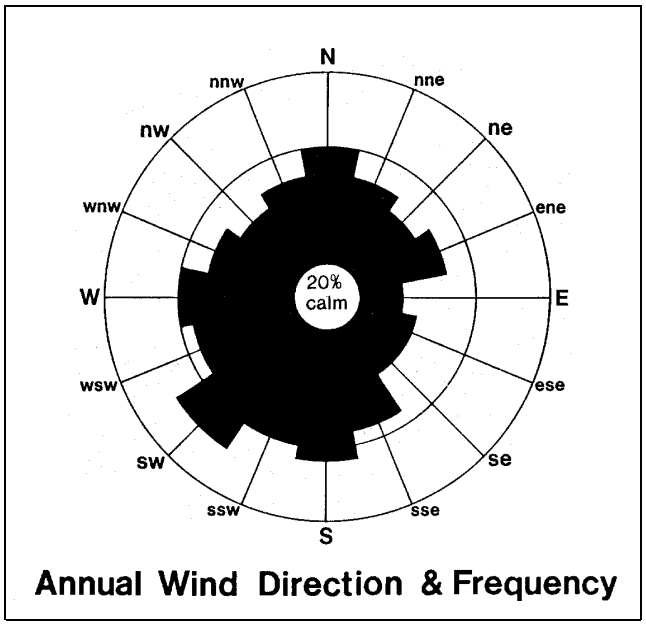
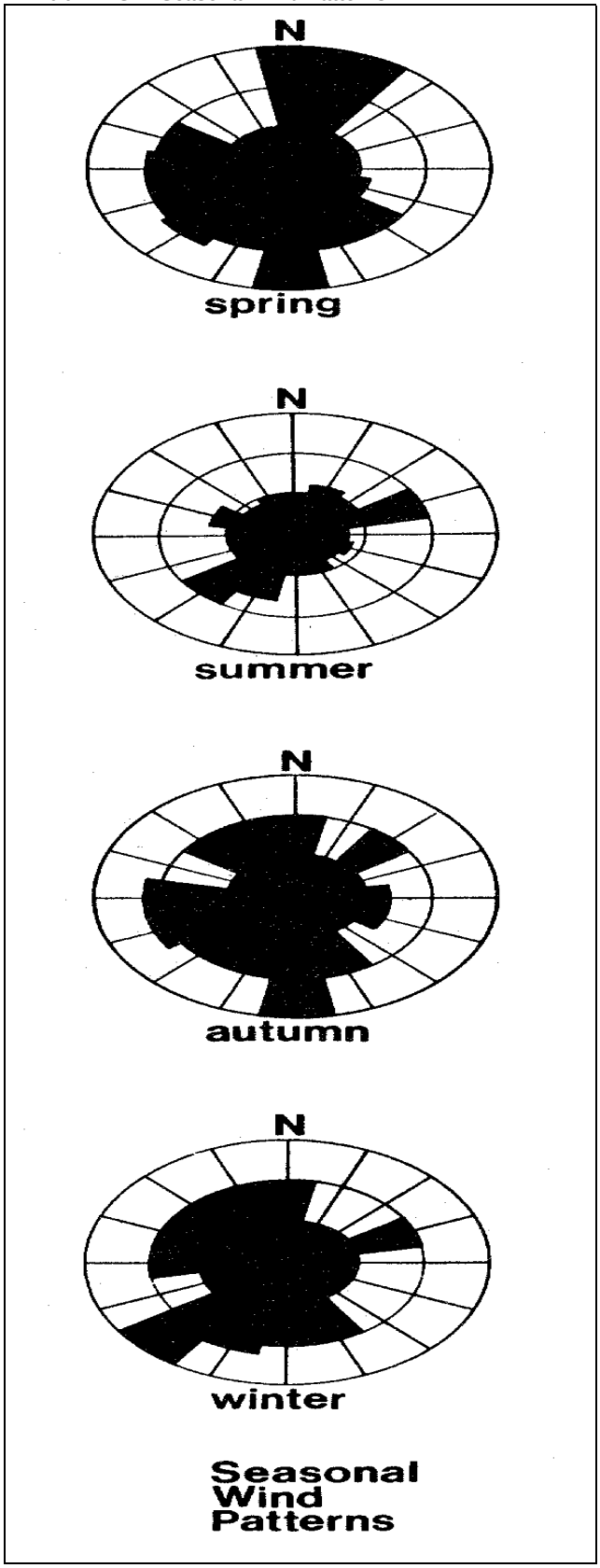


Exhibit 711-G2: Seasonal Wind Patterns



712
Climate & Solar Access
Comprehensive Plan Section 710

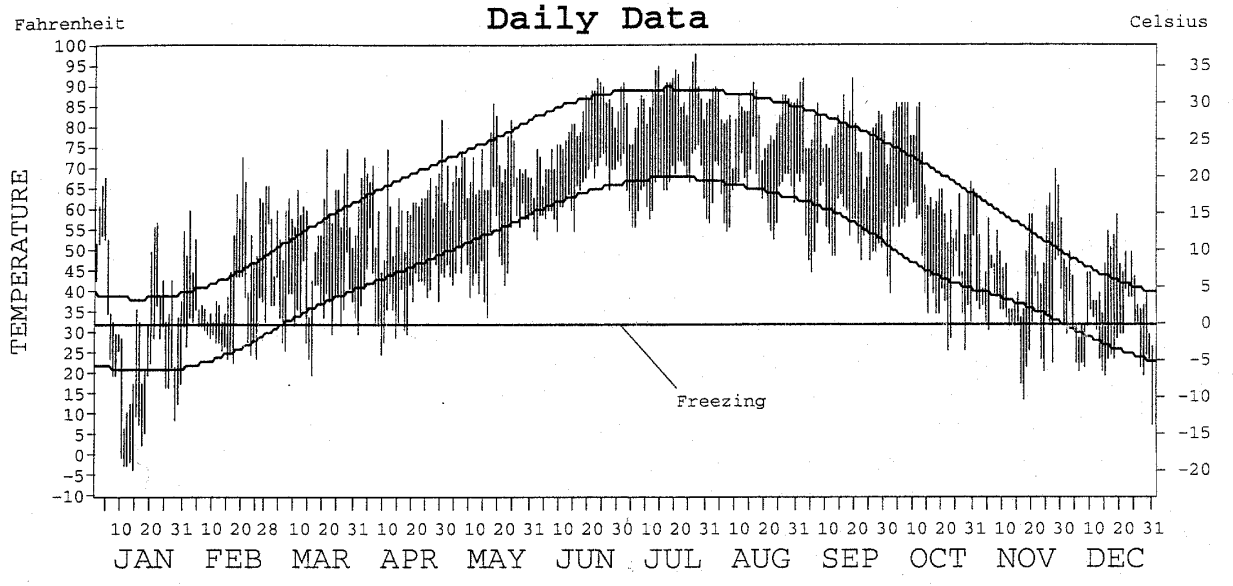
Exhibit 712-G1: Climatological Data for Evansville, Indiana for 1997

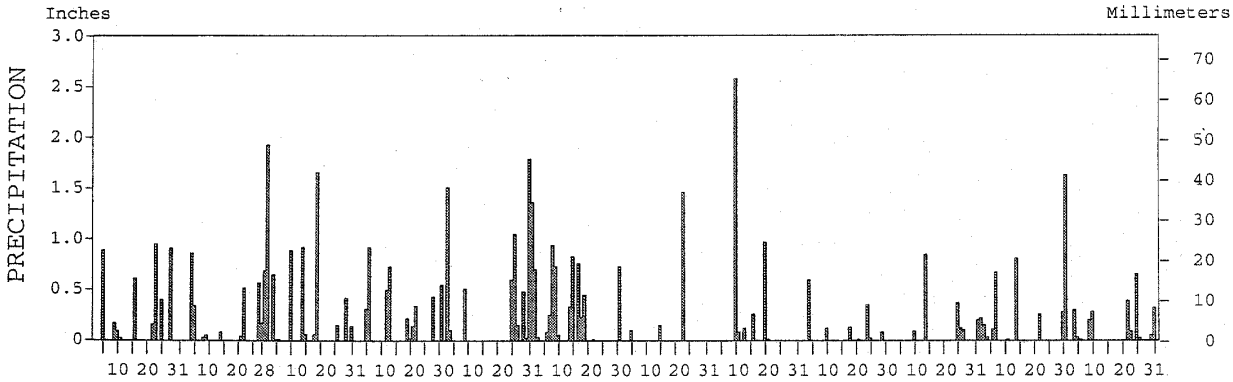
1997 LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

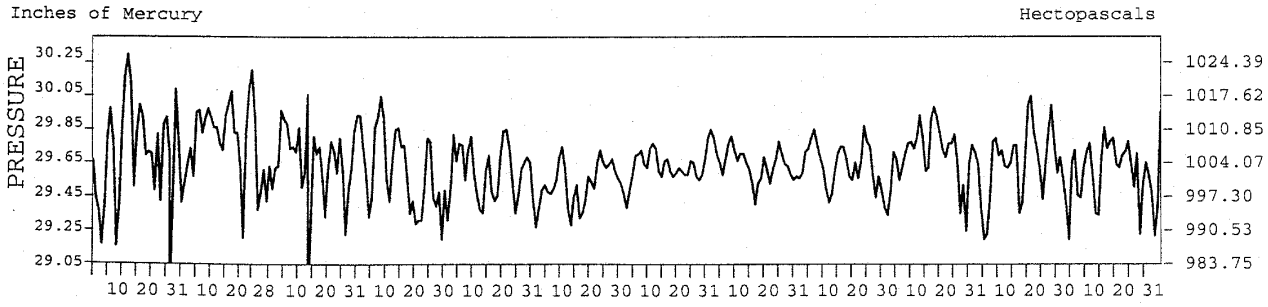
EVANSVILLE,
INDIANA (EVV)

ISSN 0198-1951

Daily Data







I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER ASHEVILLE, NORTH CAROLINA

ACTING DIRECTOR NATIONAL CLIMATIC DATA CENTER

713
Climate & Solar Access
Comprehensive Plan Section 710

Exhibit 713-T1: Normals, Means, and Extremes

EVANSVILLE, IN (EVV)

LATITUDE: 38° 02′ 35″ N LONGITUDE: 87° 32′ 13″ W ELEVATION (FT): GRND: 383 BARO: 388 TIME ZONE: CENTRAL (UTC+ 6) WBAN: 93817

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	38.9	43.7	55.9	67.4	76.9	86.2	89.1	87.2	80.7	69.6	55.9	43.6	66.3
	MEAN DAILY MAXIMUM	50	39.9	45.0	55.3	67.3	76.8	85.9	88.9	87.3	80.8	70.0	55.3	44.2	66.4
	HIGHEST DAILY MAXIMUM	57	76	79	84	91	95	104	105	102	103	94	83	77	105
	YEAR OF OCCURRENCE		1943	1962	1986	1989	1975	1954	1954	1983	1954	1953	1961	1982	JUL 1954
	MEAN OF EXTREME MAXS.	50	63.1	67.6	77.3	84.4	89.4	95.7	96.9	95.7	92.9	85.6	74.8	65.1	82.4
	NORMAL DAILY MINIMUM	30	21.2	25.0	35.7	45.0	54.2	63.3	67.5	64.9	57.6	44.7	36.5	26.7	45.2
	MEAN DAILY MINIMUM	50	23.0	26.4	35.0	45.0	54.5	63.6	67.7	65.1	57.2	45.0	35.5	27.5	45.5
	LOWEST DAILY MINIMUM	57	-21	-23	-9	23	28	41	47	43	31	21	-3	-15	-23
	YEAR OF OCCURRENCE		1977	1951	1960	1990	1963	1966	1947	1986	1942	1952	1950	1989	FEB 1951
	MEAN OF EXTREME MINS.	50	0.9	5.8	17.8	28.8	39.0	50.2	56.1	53.5	41.7	29.5	19.1	7.9	29.2
	NORMAL DRY BULB	30	30.1	34.4	45.8	56.2	65.5	74.8	78.4	76.1	69.2	57.2	46.2	35.2	55.8
	MEAN DRY BULB	50	31.5	35.7	45.1	56.1	65.6	74.7	78.3	76.3	69.0	57.5	45.3	35.8	55.9
	MEAN WET BULB	14	29.8	33.7	41.3	50.2	59.9	67.8	71.2	64.2	62.2	51.6	39.1	30.8	50.1
	MEAN DEW POINT	14	24.9	28.3	34.9	43.8	54.9	63.4	67.4	60.8	58.1	46.3	34.3	26.5	45.3
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.1	2.0	9.5	15.3	10.8	4.4	0.3	0.0	0.0	42.4
	MAXIMUM ≤ 32°	30	10.2	5.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	5.4	22.6
	MINIMUM ≤ 32°	30	25.3	20.3	13.0	2.6	0.1	0.0	0.0	0.0	0.0	3.3	11.7	22.0	98.3
	MINIMUM ≤ 0°	30	2.3	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.4
H/C	NORMAL HEATING DEG. DAYS	30	1082	857	595	273	114	0	0	0	33	266	564	924	4708
	NORMAL COOLING DEG. DAYS	30	0	0	0	9	130	294	415	344	159	25	0	0	1376
RH	NORMAL (PERCENT)	30	72	71	68	65	68	68	71	73	73	69	71	74	70
	HOUR 00 LST	30	75	76	74	74	79	80	83	85	85	80	76	77	79
	HOUR 06 LST	30	78	78	79	78	81	81	85	87	88	83	80	80	82
	HOUR 12 LST	30	66	65	60	54	54	54	57	58	57	53	62	68	59
	HOUR 18 LST	30	68	66	61	54	56	55	59	61	66	64	68	72	62
S	PERCENT POSSIBLE SUNSHINE	56	42	48	55	60	64	71	73	73	69	65	48	42	59
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	57	2.3	1.5	1.1	0.4	0.6	0.5	0.6	0.9	1.4	1.4	1.2	2.0	13.9
	THUNDERSTORMS	57	1.0	1.2	3.6	4.9	6.5	7.5	7.5	5.2	3.2	2.0	1.5	0.6	44.7
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	56	5.7	5.4	5.4	5.2	4.9	4.6	4.2	4.0	4.0	3.9	5.1	5.5	4.8
	MIDNIGHT-MIDNIGHT (OKTAS)	32	5.4	4.9	5.0	4.7	4.3	4.0	3.8	3.6	3.8	3.8	4.9	5.2	4.4
	MEAN NO. DAYS WITH:														
	CLEAR	56	6.6	6.5	6.5	6.8	8.5	8.1	9.2	11.1	11.3	12.3	7.7	6.5	101.1
	PARTLY CLOUDY	56	5.3	6.3	8.1	8.3	8.6	11.4	12.1	11.0	8.3	7.4	6.6	6.0	99.4
	CLOUDY	56	19.1	15.4	16.4	14.9	13.9	10.5	9.1	8.4	9.9	10.8	15.2	18.0	161.6
PR	MEAN STATION PRESSURE(IN)	25	29.70	29.70	29.60	29.60	29.60	29.60	29.60	29.60	29.60	29.70	28.55	28.55	29.45
	MEAN SEA-LEVEL PRES. (IN)	14	30.16	30.13	30.06	29.96	29.98	29.96	30.00	30.03	30.06	30.09	27.95	27.86	29.69
WINDS	MEAN SPEED (MPH)	45	9.4	9.3	10.0	9.7	8.0	7.1	6.2	5.6	6.3	6.8	8.6	8.9	8.0
	PREVAIL.DIR(TENS OF DEGS)	29	32	32	31	18	22	22	24	23	18	18	18	32	18
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	1	31	41	33	44	28	33	34	26	31	33	26	29	44
	DIR. (TENS OF DEGS)		27	27	29	28	32	26	33	25	27	25	26	22	28
	YEAR OF OCCURRENCE		1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	APR 1997
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	1	39	47	45	54	37	43	45	32	38	45	34	33	54
	DIR. (TENS OF DEGS)		26	27	28	26	31	26	34	25	27	26	27	22	26
	YEAR OF OCCURRENCE		1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	1997	APR 1997
PRECIPITATION	NORMAL (IN)	30	2.66	3.12	4.71	4.02	4.75	3.49	4.04	3.11	2.97	2.87	3.73	3.67	43.14
	MAXIMUM MONTHLY (IN)	57	13.50	7.25	12.84	11.83	13.51	9.30	9.69	8.43	9.89	8.33	8.49	8.23	13.51
	YEAR OF OCCURRENCE		1950	1956	1964	1996	1995	1943	1958	1977	1945	1941	1957	1982	MAY 1995
	MINIMUM MONTHLY (IN)	57	0.51	0.27	0.89	1.10	0.91	0.65	0.18	0.13	0.47	0.01	0.91	0.56	0.01
	YEAR OF OCCURRENCE		1981	1947	1941	1959	1965	1991	1974	1943	1995	1964	1965	1976	OCT 1964
	MAXIMUM IN 24 HOURS (IN)	57	3.73	3.20	5.63	7.26	6.05	3.67	4.09	3.70	3.45	3.00	3.48	2.35	7.26
	YEAR OF OCCURRENCE		1982	1986	1964	1996	1961	1996	1978	1977	1945	1976	1988	1990	APR 1996
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	9.9	9.5	11.9	11.5	10.8	9.3	8.9	7.4	7.6	7.6	9.6	10.9	114.9
	PRECIPITATION ≥ 1.00	30	0.6	0.9	1.1	1.0	1.3	0.8	1.2	1.1	0.7	0.7	1.1	0.9	11.4
SNOWFALL	NORMAL (IN)	30	4.9	4.3	2.6	0.5	0.0	0.0	0.0	0.0	0.0	0.*	0.6	2.6	15.5
	MAXIMUM MONTHLY (IN)	57	21.3	18.4	20.2	8.6	T	T	0.0	0.0	T	4.6	6.9	10.4	21.3
	YEAR OF OCCURRENCE		1977	1993	1960	1971	1993	1994			1990	1993	1958	1973	JAN 1977
	MAXIMUM IN 24 HOURS (IN)	57	8.7	10.9	10.6	8.6	T	T	0.0	0.0	T	4.1	6.9	7.0	10.9
	YEAR OF OCCURRENCE		1978	1993	1960	1971	1993	1994			1990	1993	1958	1963	FEB 1993
	MAXIMUM SNOW DEPTH (IN)	49	14	9	13	4	0	0	0	0	0	2	7	7	14
	YEAR OF OCCURRENCE		1978	1993	1960	1971						1993	1958	1984	JAN 1978
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	1.7	1.3	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	4.8

POR (Period of Record) begins with the January data month and is the number of years used to compute the mean. Individual months within the POR may be missing. **Source:** National Oceanic and Atmospheric Administration & National Climatic Data Center (1997)

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Climate & Solar Access
Comprehensive Plan Section 710

SOLAR ACCESS

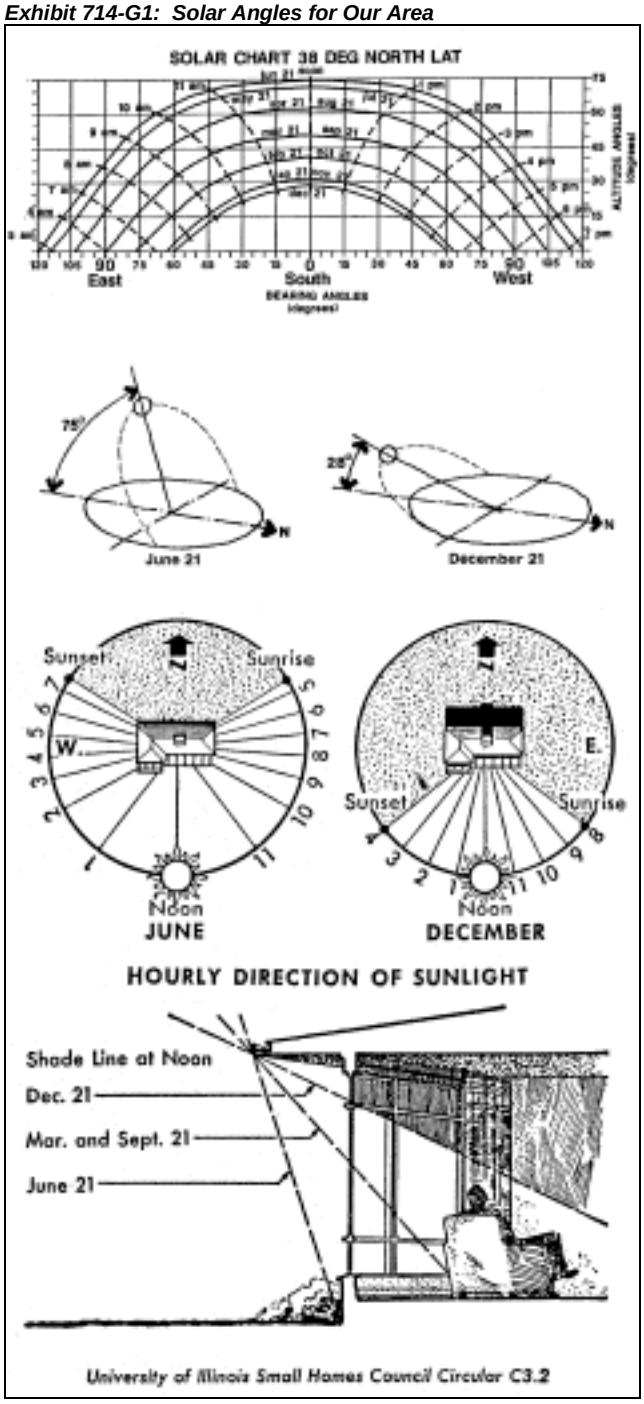
As our limited supplies of fossil fuels become further depleted, the potential for solar energy and orientation will demand more of our time and effort. Both passive and active systems can be used to increase the efficiency of our heating and cooling systems. And solar energy is virtually inexhaustible. Presently the cost of active solar systems does not warrant the investment in such systems, but the inevitable increase in fossil fuel costs will soon justify the expense of all types of systems. An increase in our awareness of solar issues now will help us lay the ground rules for the solar access, orientation, and compatible building designs that will be appreciated for generations to follow.

Much of what we know comes from studying the past principles of solar awareness during times when heating homes involved both cost and considerable work. Many homes from the early 1900s were built using large amounts of glass with southern exposure for heat gain. Unfortunately much heat was lost because of single-glazed glass and the lack of insulation. Overhangs were also used to control the amount of sun falling on the glass, allowing the sun to enter during the winter, and blocking its entry during the summer. Living areas were oriented toward the south. Bedrooms, family rooms, and dining rooms faced south, while service areas -- baths, halls, stairs, and closets -- were used as buffers on a home's north side. Cross ventilation was also used extensively along with tall ceilings to make a home more comfortable during the summer months. It has been said that history repeats itself and these past practices will again become criteria for future planning.

The benefits of additional warmth, countered by the appropriate eave overhang to prevent heat gain in the summer, better ventilation, enjoyment of sunlight, and the broader views that create spaciousness, can all be achieved with minimal solar planning and sometimes no additional cost. All of these aspects add to the pleasure of living in the home while cutting its operating costs. Four or five hours of sun a day in our area is equivalent to about 800 to 1000 Btu / sq. ft. per day on southern exposed glass, a substantial gain of energy generally wasted at present. Another plus for the northern hemisphere we live in is the fact that about 16% more radiant heat is received in the winter than in the summer, due to less water vapor in the air during the winter, making solar energy even more enticing.

Planning for solar at the subdivision development stage would greatly increase solar potential and cut the costs for its installation. Fast-west street directions would allow easier home conversion to solar use and improve access potential. Zoning laws can also provide crucial protection against the shading of solar collectors by buildings or vegetation. Height limitations, tree placement requirements, and open space allotments can often prevent the construction or placement of obstacles that could block sunlight. Energy saving planting schemes can be used to reduce heating and cooling loads by using evergreens and deciduous trees in appropriate areas for wind breaks and shading. By making ourselves aware of the solar potential we have today, we can be sensitive to the issues we will be facing for the solar development of tomorrow.

Exhibit 714-G1: Solar Angles for Our Area



6. Goals, Policies and Five-Year Action Plan

Key Points

- St. Helena has defined six overall **goals** for responding to housing needs in the City. A goal is a general statement of values or aspirations held by the community. It is the end towards which the City will direct its efforts. The goals of the St. Helena Housing Element are:

  Goal 1 *A Diversity of Housing to Meet Local Needs*
  Goal 2 *Efficient Land Use and High Quality Neighborhoods*
  Goal 3 *Conservation of Existing Housing*
  Goal 4 *Assistance to Support Affordable Housing*
  Goal 5 *Resource Conservation*
  Goal 6 *Equal Housing Opportunities*

- For each goal, one or more **policies** help define how the goal will be interpreted and implemented. Policies are referenced by goal number. Policy 1A is the first policy of Goal 1, Policy 1B is the second policy, and so on.

- Each policy statement is followed by one or more **implementing programs** that define exactly what is to be done to put the goals and policies into practice. This might include ongoing programs sponsored by the City; discrete time-specific actions; or further planning actions. In accordance with State law requirements, the agencies and/or officials responsible for implementation are identified for each program, along with the timeframe for taking action.

- **Quantified objectives** are also identified for each group of implementing programs, and summarized at the end of the chapter. These identify the number of units to be constructed, rehabilated or conserved, and the number of households to be assisted as the result of each implementing program. This provides a measure for gauging the Housing Element's success in meeting identified housing needs and achieving stated goals through the planning period.

The housing goals, policies, implementing programs and quantified objectives for the City of St. Helena for the 1999 to 2006 planning period are presented below, in response to the housing needs, resources and constraints identified in the preceding chapters and building upon the achievements and experiences from the City's previous Housing Element. Policies and programs are organized under six goal areas.

Goal 1
A Diversity of Housing to Meet Local Needs

Facilitate development of a variety of housing types to meet the full range of housing needs in our community, with particular emphasis on housing for our local workforce, people with special housing needs, and people with very low, low and moderate incomes.

Policy 1A

Ensure that the General Plan's Growth Management Policies Do Not Limit Our Ability to Meet Regional Housing Needs

1A-1 Amend the Growth Management System to exempt permits for regulated Affordable Units. The goal is to meet the Regional Housing Needs Determination (RHND) of 31 units for very low income households, 20 for low income households, and 36 for moderate income households. Developers shall be encouraged to propose projects that meet this need.

Responsibility: Planning Department (lead); Planning Commission; City Council Timeframe: 2002

1A-2 Continue to allow a maximum of 9 market rate units per year.
Responsibility: Planning Department (lead); Planning Commission; City Council Timeframe: 2002

Responsibility: Planning Department
Timeframe: Ongoing

Quantified Objectives for the Implementing Programs of Policy 4D: 20% of new units to meet senior housing needs; 10% accessible to people with disabilities.

4D-2 Encourage the development of housing that meets the needs of seniors.
Responsibility: Planning Department
Timeframe: Ongoing

4D-3 Reasonable Accommodation. The City shall amend its Municipal code to provide individuals with disabilities reasonable accommodation in rules, policies, practices and procedures that may be necessary to ensure equal access to housing. The purpose of this is to provide a process for individuals with disabilities to make requests for reasonable accommodation in regard to relief from the various land use, zoning, or building laws, rules, policies, practices and/or procedures of the City.
Responsibility: Planning Department (lead), Planning Commission, City Council.
Timeframe: 2002

Goal 5
Resource Conservation

Promote resource conservation by encouraging housing types and designs that use fewer resources (water, electricity, etc.) and therefore cost less to operate over time, supporting long-term housing affordability.

Policy 5A

Alternative Energy Sources

5A-1 Promote the use of solar energy. Adopt a 'solar access ordinance' to assure solar access in all new development.
Responsibility: Planning Department
Timeframe: 2002

5A-2 Promote use the use alternative energy technologies. Encourage use of solar and wind energy in new and rehabilitated housing.
Responsibility: Planning Department
Timeframe: Ongoing

5A-3 Provide public information on alternative energy technologies for residential developers, contractors, and property owners.
Responsibility: Planning Department
Timeframe: 2003 and ongoing

Quantified Objectives for the Implementing Programs of Policy 5A: None specified.

Policy 5B

Encourage Energy Conservation

5B-1 Promote the energy conservation measures in all new and rehabilitated housing.
Responsibility: Planning Department
Timeframe: Ongoing

5B-2 Require cost-effective energy conservation measures in new housing to promote long-term affordability for occupants.
Responsibility: Planning Department
Timeframe: Ongoing

5B-3 Provide low-interest loans for implementation of energy conservation measures.
Responsibility: Planning Department
Timeframe: 2003 and ongoing

5B-4 Provide public information *on energy conservation measures for homeowners, tenants, developers, contractors and property owners.*
Responsibility: Planning Department
Timeframe: Ongoing

Quantified Objectives for the Implementing Programs of Policy 5B: Low-interest loans for rehabilitation, including energy conservation provided to 20 moderate, low, or very-low income households by 2006.

Goal 6
Equal Housing Opportunities

information on the public's desire to increase sales, property and parcel taxes or issue General Obligation bonds to pay for the acquisition and maintenance of open space lands should be included in the study.

- An analysis of an open space dedication requirement for all new residential development projects.

A2. Partner with non-profit organizations, such as the Central Valley Farmland Trust, to identify and purchase land and easements within the Planning Area.

A3. Pursue a cooperative effort with the City of Lathrop and San Joaquin County to implement an open space community separator program.

Goal OSC-5 Efficient use of energy resources throughout the City of Tracy.

Objective OSC-5.1 Ensure that development is designed for maximum energy efficiency.

Policies

P1. New development projects should be designed for solar access and orientation. Maximum efficiency is gained by siting homes on an east-west axis.

P2. New development projects should include measures to reduce energy consumption through site and building design, material selection and mechanical systems.

P3. Use of on-site alternative energy sources, such as photovoltaic (PV) cells for commercial, residential and industrial users to install shall be encouraged.

P4. The City shall encourage businesses to replace diesel vehicles with less polluting alternatives such as compressed natural gas (CNG), bio-based fuels, hybrids and electric cars.

Actions

A1. Study programs that encourage "green" building, such as the LEED (Leadership in Energy & Environmental Design) program developed by the US Green Building Council, and consider code amendments that encourage "green" construction.

A2. Develop a program to educate the public about energy efficiency technologies and practices for homes and businesses, such as solar panels and low-energy appliances.

A3. Partner with public utilities to establish and promote a program for home weatherization and solar retrofit.

A4. Develop design guidelines for residential construction to address the placement solar panels.

Objective OSC-5.2 Promote energy efficiency and conservation through the City's direct actions.

Policies

P1. New vehicles purchased and leased by the City should be alternatively fueled to the extent feasible. Common alternative fuel technologies include hybrid, electric bio-based fuels and compressed natural gas (CNG).

P2. The City shall promote the development of alternative energy systems, including but not limited to solar thermal, photovoltaic and other clean energy systems, directly into building design and construction.

P3. The City shall proactively support long-term strategies, state and federal legislation and partnerships that assure affordable and reliable production and delivery of electrical power to the community.

P4. The City shall support public and private efforts to develop and operate alternative systems of wind, solar and other electrical production that take advantage of local renewable resources.

P5. Future development projects shall consider the following design features, during the Specific Plan, PUD, subdivision, and design development review: solar access and orientation, natural ventilation, energy efficient landscaping and energy efficient and conserving building design and technologies.

P6. The City shall encourage and support voluntary retrofit energy programs for residential, commercial, and industrial buildings.

P7. The City shall pursue the implementation of energy efficiency measures of existing and future City facilities as opportunities arise.

P8. The City shall support land use patterns that maximize energy efficiency, both by minimizing transportation and by making use of existing capital improvements.

Actions

A1. Develop emergency contingency energy plans, in cooperation with other local agencies and regional suppliers, to assure needed energy supplies and significant reduction in non-essential consumption during periods of abrupt energy shortage.

A2. Develop or otherwise make available information to developers and citizens on energy efficient and conserving building design and technologies, including enhanced wall and ceiling insulation, thermally efficient glazing, and efficient heating and cooling equipment and household appliances.

A3. Review, and revise if necessary, the zoning ordinance and building codes, to allow for a variety of energy efficiency technologies so long as the revisions do not adversely impact human health or safety or conflict with other goals in this General Plan.

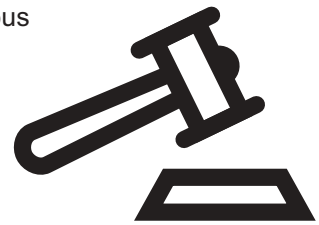
Wind Power –
Reports and Model Ordinances

SMALL WIND
FACTSHEETS

Zoning Ordinances

Many existing zoning ordinances contain restrictions, which while not intended to discourage the installation of small wind turbines, can substantially increase the time and costs required to obtain necessary construction permits. By designating small wind energy systems as a specifically permitted use, subject to certain requirements, local jurisdictions (counties, cities, townships) can effectively standardize and streamline the process of permitting small wind turbines within their jurisdiction.

Ordinances designating small wind energy systems as a permitted use typically comprise a definition of what constitutes a "small wind energy system" - e.g., listing system components and establishing the maximum rated capacity of systems that may qualify. The definition may also specify that the system be intended primarily to reduce on-site consumption of utility power. The ordinance also defines the requirements such systems must meet. These typically include appropriate height restrictions (which may vary as a function of property size), minimum set-back, maximum noise levels, and compliance with various standards such as the Uniform Building Code, FAA regulations, and the National Electric Code.



Examples of State Zoning Laws:
See AWEA's online toolbox for links to California, Minnesota, Montana and Nebraska

www.awea.org/smallwind/toolbox/default.asp

AWEA Model Zoning Ordinance:
Permitted Use Regulation for Small Wind Turbines

SECTION 1 PURPOSE: It is the purpose of this regulation to promote the safe, effective and efficient use of small wind energy systems installed to reduce the on-site consumption of utility supplied electricity.

SECTION 2 FINDINGS: The [city or county] finds that wind energy is an abundant, renewable, and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on non-renewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Distributed small wind energy systems will also enhance the reliability and power quality of the power grid, reduce peak power demands, and help diversify the State's energy supply portfolio. Small wind systems also make the electricity supply market more competitive by promoting customer choice.

The State of _____ has enacted a number of laws and programs to encourage the use of small-scale renewable energy systems including rebates, net metering, property tax exemptions, and solar easements [as appropriate]. However, many existing zoning ordinances contain restrictions, which while not intended to discourage the installation of small

American Wind Energy Association

For more information, contact AWEA at windmail@awea.org or call 202-383-2500.
Visit our web site at www.awea.org, or write us at 122 C Street, NW, Washington, DC 20001.

wind turbines, that can substantially increase the time and costs required to obtain necessary construction permits.

Therefore, we find that it is necessary to standardize and streamline the proper issuance of building permits for small wind energy systems so that this clean, renewable energy resource can be utilized in a cost-effective and timely manner.

SECTION 3 DEFINITIONS:

Small Wind Energy System: A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than 100 kW and which is intended to primarily reduce on-site consumption of utility power.

Tower Height: The height above grade of the fixed portion of the tower, excluding the wind turbine itself.

SECTION 4 PERMITTED USE: Small wind energy systems shall be a permitted use in all zoning classifications where structures of any sort are allowed; subject to certain requirements as set forth below:

4.1 Tower Height: For property sizes between ½ acre and one acre the tower height shall be limited to 80 ft. For property sizes of one acre or more, there is no limitation on tower height, except as imposed by FAA regulations.

4.2 Set-back: No part of the wind system structure, including guy wire anchors, may extend closer than ten (10) feet to the property boundaries of the installation site.

4.3 Noise: Small wind energy systems shall not exceed 60 dBA, as measured at the closest neighboring inhabited dwelling. The level, however, may be exceeded during short-term events such as utility outages and/or severe wind storms.

4.4 Approved Wind Turbines: Small wind turbines must have been approved under the Emerging Technologies program of the California Energy Commission or any other small wind certification program recognized by the American Wind Energy Association.

4.5 Compliance with Uniform Building Code: Building permit applications for small wind energy systems shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower showing compliance with the Uniform Building Code and certified by a licensed professional engineer shall also be submitted. This analysis is frequently supplied by the manufacturer. Wet stamps shall not be required.

4.6 Compliance with FAA Regulations: Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

4.7 Compliance with National Electric Code: Building permit applications for small wind energy systems shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of installation con-forms to the National Electrical Code. This information is frequently supplied by the manufacturer.

4.8 Utility Notification: No small wind energy system shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

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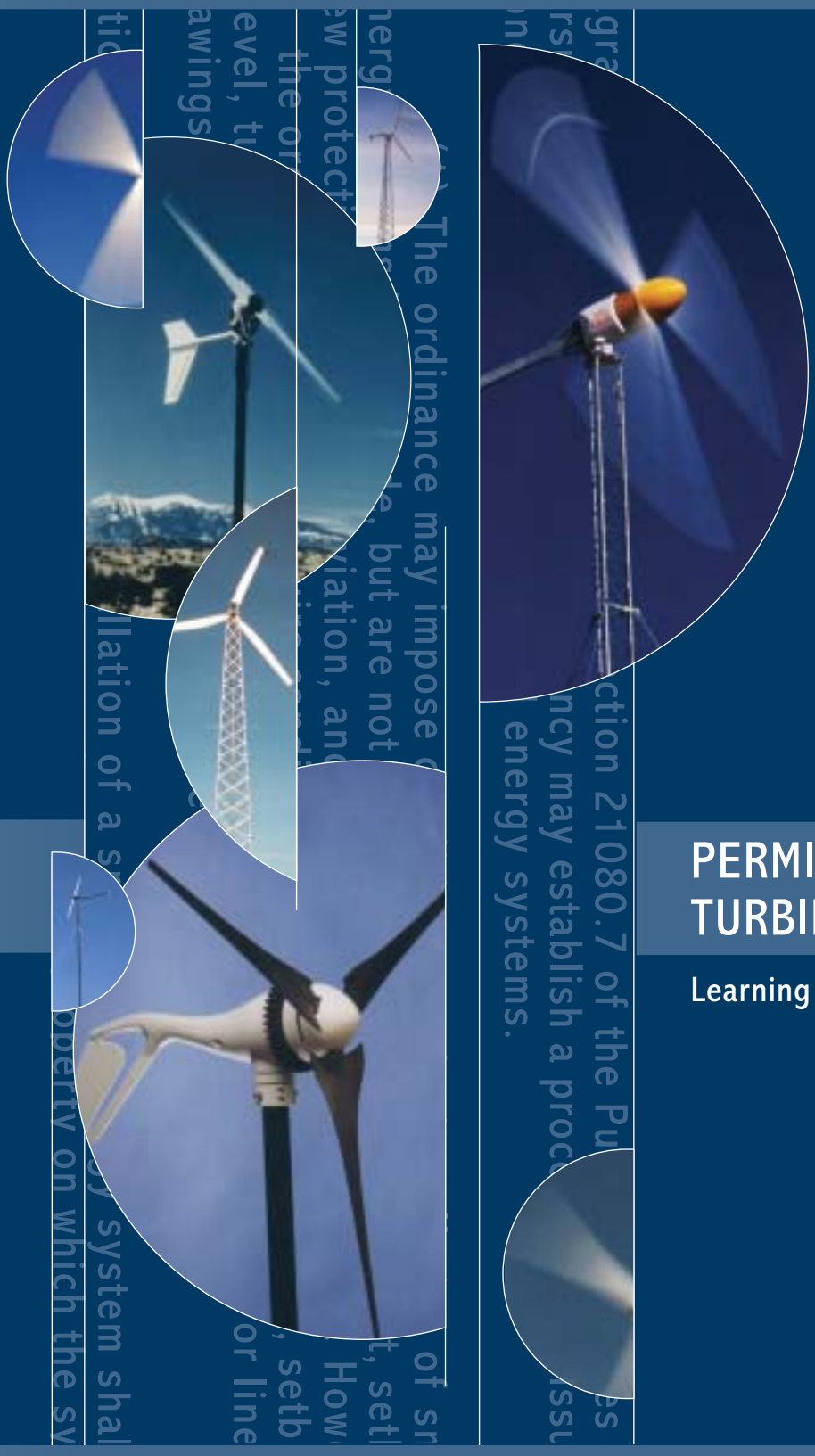

PERMITTING SMALL WIND TURBINES: A HANDBOOK

Learning from the California Experience

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Learning from the California Experience

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American Wind Energy Association

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INTRODUCTION

Small Turbines – Large Benefits

Americans today generally associate wind energy with dense arrays of commercial-scale turbines that rise on 200 ft or taller towers, so they are often less familiar with wind turbines scaled for personal use on small acreages. Small (or "residential") wind energy systems typically generate just enough power to meet the demands of a home, farm, or small business. They range from 400 watts to 100 kilowatts or more, and typically consist of a single turbine, while commercial wind farms consist of dozens or even hundreds of megawatt-scale turbines.

But small wind systems are not mere playthings for backyard hobbyists. They can be significant power resources that have proven records of performance, even in locations with modest winds. The success of the commercial wind industry has propelled significant advances in small turbine design, making these systems more reliable, quieter, and safer than those introduced in past decades. And though most of the electricity they produce is used on-site, excess generation from small wind turbines can be fed into distribution lines, strengthening the electric grid.

Small wind systems can be an important component of a power system that's more affordable, secure, and sustainable.

Photo courtesy Kevin Schiebel

Small wind turbines were commonplace on farms and ranches across the Midwestern United States before the advent of rural electrification programs. Wind generators powered lights, radios, and kitchen appliances in far-flung reaches of the country, offering rural families most of the conveniences of modern urban life.

In this new century, small wind turbines are an attractive investment for residents in rural areas looking for relief from high energy costs. Small turbines also contribute a larger public benefit by reducing demand on utility systems now supplied primarily by centralized fossil-fuel plants. In recent years this system has left electricity customers vulnerable to power shortages and sharp price increases. The development of large-scale power plants has become riskier in the turbulent energy market, creating the need for new forms of distributed generation sources to make the system more secure

and sustainable. Small wind systems can be an important component of such energy independence.

In 2001, the California Legislature passed landmark legislation, Assembly Bill 1207, to promote small wind turbine installations by standardizing permitting requirements. Other state incentives include a rebate program administered by the California Energy Commission and a state income tax credit for purchasers of small wind systems. The following excerpt from AB 1207 articulates the benefits the state hopes to derive from small wind development:

Distributed small wind energy systems …enhance the reliability and power quality of the power grid, reduce peak power demands, increase in-state electricity generation, diversify the state's energy supply portfolio, and make the electricity supply market more competitive by promoting consumer choice.[1]

Photo courtesy Southwest Windpower

1. California Government Code, Section 65892.13 (a) (2) www.leginfo.ca.gov/cgi-bin/displaycode?section=gov&group=65001-66000&file=65892.13

Using This Handbook

Public officials and property owners alike will find the information in this handbook useful in determining best practices for siting wind turbines and in understanding the permitting implications of California's new law. The handbook cites key provisions of Assembly Bill 1207 and describes how California counties are complying with the new law. It notes the steps counties have taken (and could take) to streamline the permitting of small wind turbines, using existing installations as examples. Public officials will gain a better understanding of small wind systems, and property owners will learn what to expect in the permitting process.

I. The first section covers site considerations. It lists the factors that determine whether the site is right, where to position the turbine, and what impacts the turbine could have on neighboring properties, wildlife, and safety.

II. The next section describes key provisions of AB 1207, explaining both the letter and the spirit of the law, and illustrates how the law has been applied in specific counties throughout California.

III. The third section provides a model zoning ordinance recommended by the American Wind Energy Association and a list of best practices for permitting small wind turbines both in California and nationwide.

IV. The final section lists a variety of information resources, including publications and web resources offered by the American Wind Energy Association, the California Energy Commission, utilities, and other government agencies and organizations. Small wind turbine manufacturers are also listed.

I. INSTALLING SMALL WIND ENERGY SYSTEMS

Permitting reviews can absorb a significant amount of time and energy from property owners and public officials. Before beginning the process, property owners should be reasonably certain that their site is windy enough to justify the effort. After that, there's more to consider: How difficult will it be to obtain the necessary permit? How do you arrange for a utility line connection? What about safety and impacts on wildlife?

Much of the land mass of the United States gets enough wind to power small wind turbines.

Evaluating the Site

Small wind turbines require lesser wind resources than large commercial turbines, so they are feasible in many more places. Much of the land mass of the United States gets enough wind to power small turbines. Simply put, if a site "feels" windy enough, it is probably worth investigating and determining the estimated pay back. Does the wind blow steadily for sustained periods on a regular basis? Are there large seasonal variations? What are the expected electricity bill savings? Turbine dealers can often help assess a potential site through visual inspection of surrounding terrain.

Property owners in many parts of the country can analyze their hunches with recently updated wind maps that predict wind patterns. County officials also can use wind maps to familiarize themselves with local wind

Photo courtesy of Tom Rhamy

Hybrid Solar and Wind Installation Pays Off

Ridgecrest (Kern County) — Tom and Angela Rhamy decided that electricity had become too expensive during the power crisis of 2001, so they bought a combination wind/solar energy system and started generating their own. When conditions are good their meter spins backward, cutting their power bills to half what they used to be.

The Rhamys, who own a 2,000-square foot home and keep an office in the barn behind the house, have joined the ranks of homeowners discovering that small-scale wind systems are a viable alternative to high power bills. They took advantage of state

For more info on the economics of small wind, see: www.awea.org/smallwind/toolbox/INSTALL/financing.asp

incentives designed to encourage the installation of home generating systems, receiving a state tax credit and a rebate from the California Energy Commission that covered half the cost of their machine. Their system went online in May 2002 and should pay for itself within five to seven years.

The Rhamys found plenty of information available from the American Wind Energy Association, *Home Power Magazine*, and state resources such as California's "Green Team" video conferences and the California Energy Commission. Their turbine dealer gave them the information they needed to approach the county building inspector, who approved a permit for the system that same day.

Kern County allows towers up to 80 feet high in most zoning districts, so no special permitting was required. "It was very simple," says Tom Rhamy.

Connecting their generator to the utility's system was also a straightforward process. Southern California Edison sent the Rhamys a blank contract that included a net metering agreement and other interconnection requirements. The Rhamys filled in specific information about their system, and the utility sent a completed contract for them to sign.

Small wind turbine installations are not this easy in all California counties, but the Rhamys' experience shows the widespread acceptance that residential renewable power systems have earned in recent years.

resources and answer inquiries from prospective permit applicants.

The primary map used by the small wind industry in California to predict the performance and economics of a small wind system for potential customers is produced by the California Energy Commission and available online[2] or by calling (916) 654-3902. Also available online is *The Renewable Energy Atlas of The West: A Guide to the Region's Resource Potential*, which allows users to find average wind speeds at specific locations in 11 western states using ZIP codes or geographic coordinates.[3]

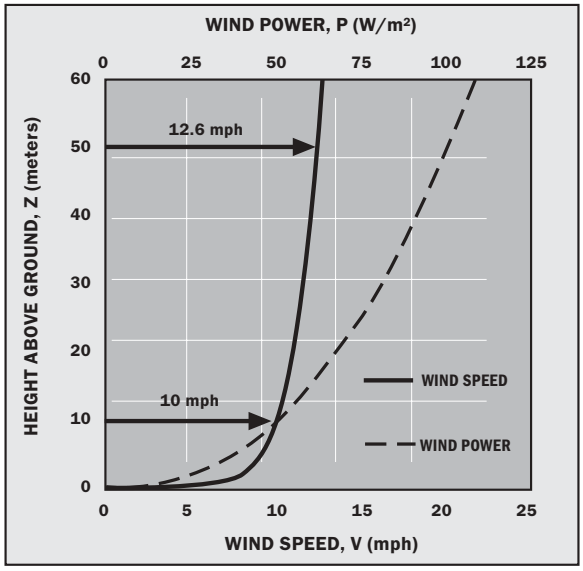
The Department of Energy ranks wind strength according to seven classifications. Class 1 winds are the weakest. Small wind turbines are generally cost-effective when installed in at least Class 2 or Class 3 winds (taller towers, 100 ft or higher, may be necessary in Class 2 winds), or where winds average at least 10 to 12.5 miles per hour (4.4 to 5.6 meters per second) at a height of 33 ft (10 meters) above ground. However, the wind power on a particular site is greatly affected by terrain. The wind may be obstructed by a hill or accelerated by a trough or valley. In complex terrain, small turbine dealers can help determine whether the wind is sheltered or concentrated. In a few cases, the installation of a wind data logging system may be necessary. (See inset next page.)

Positioning the Turbine

Ideally, property owners will place their turbines where wind is least obstructed, which is often the highest point on the site. Wind speed increases with height, and gaining even a small increase in velocity boosts

2. www.energy.ca.gov/maps/wind.html
3. www.EnergyAtlas.org

a turbine's generating potential significantly (see graph below). County officials may have aesthetic concerns about allowing turbines proposed on hills or ridges. However, planners and permitting officials should be aware that restricting the placement of a wind turbine within a site for aesthetic reasons may adversely affect project economics.



Graphic: Texas State Energy Conservation Office

Typical Wind Shear Profile — Speed and power available in the wind increases with increasing elevation. The relationship is commonly referred to as the one seventh power law (a=1/7).

Wind turbines should be elevated so that the bottom tips of their blades pass three times above the tallest upwind barrier, or at least 25-30 feet above any physical wind barriers (trees, buildings, bluffs) within 300-500 feet of the tower or the local treeline, whichever is higher. This is advisable to minimize air turbulence that places stress on mechanical components and reduces turbine performance. (See diagram next page.) Elevating the turbine higher above adjacent obstacles is always better, although one manufacturer suggests that clearance of at least 20 feet may be adequate for "micro" turbines (under 1 kW). *However, optimum tower height is always determined by the terrain and wind resource, not the turbine size.*

In cases where it is impossible to elevate a turbine sufficiently because of local permitting restrictions, planning officials can review their rules to see

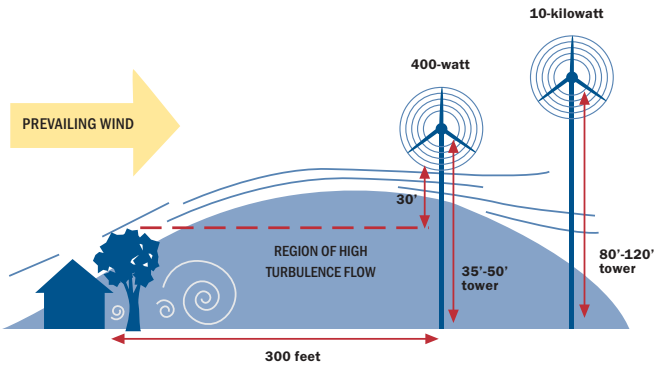
Your Best Guess May Not Be Good Enough

Scotts Valley (Santa Cruz County) — Larry Gilliam found out that wind maps are no substitute for on-site wind measurements. A map may show healthy winds over a general area, but topological features significantly affect the strength of the wind blowing across a particular site. "I looked at the maps and thought I was in a Class 2 wind regime," says Gilliam, whose 10-kilowatt turbine hasn't been as productive as he'd hoped. "If I had to do it over again, I would have erected an anemometer."

Still, Gilliam's enthusiasm for wind turbines — inspired by a visit to a wind farm in San Gorgonio Pass — is not diminished. His turbine cut his monthly electric bill from $120 to about $80, and he's confident that the turbine will prove an even better investment over time as energy prices continue to rise.

Photo courtesy Bergey Windpower

if they are more restrictive than necessary or allowed by AB 1207 and grant waivers as appropriate. (See "County Staff Make Way for Small Wind," page 27.)



Utility Line Interconnection

Wind turbine owners serviced by distribution lines can derive significant economic advantages by connecting their generators with the utility's system. Federal law (PURPA, 1978) requires that all utilities permit customer-owned generators to interconnect with their systems and compensate them for energy production.

In California and many other states, utilities are also required to provide **net metering** service, which allows turbine owners' electric meters to spin backward when the turbines generate more power than the owners need.[4] *This does not mean that the turbine owner is selling electricity.* Rather, net metering is a trade between the turbine owner and utility. When the turbine owner does not need the power the generator is producing, the energy is essentially banked with the utility. When the customer's demand exceeds the turbine's output, electricity is drawn back from the utility.

Photo courtesy of Chuck Koch

4. California State Public Utilities Code 1995 § 2827, as amended 1998, 2000 & 2201); www.dsireusa.org

Do it Yourself, but be Prepared to Wait

Tracy (San Joaquin County) — Steve and Kathy Nelson, who live five miles from one of the world's largest wind developments at the Altamont Pass, didn't have to worry about tower height restrictions when they put up a small turbine on their rural property. But they learned that it can still take some time and patience to install a turbine, especially if you do it yourself rather than contract with a turbine supplier.

Local permitting officials required two sets of plans for the Nelsons' installation — one from a civil engineer, and another from a structural engineer. Local inspectors were sometimes too busy to sign off on plans right away and asked for revisions. The Nelsons waited three months just for utility staff to approve the interconnection. (Other utility customers, however, have not encountered such lengthy delays.)

Fortunately for the Nelsons, the California Energy Commission had not yet changed the rules of its Emerging Renewables Program to discount the rebate awarded to owner-installed systems. The new rules, which took effect in 2003, now reduce the rebate by 15% for systems not installed professionally. So a prospective turbine owner should carefully consider whether self-installation will save money once the reduced rebate is calculated in.

For the Nelsons, the do-it-yourself ethic did pay off. Their wind turbine has been performing well, reducing monthly bills on their 3,000 square-foot home from nearly $300 to under $100. The Nelsons expect their turbine to pay for itself in six to seven years.

Net metering shortens the payoff period for a wind turbine because it gives retail credit for power generated during low-use periods. Under net metering laws in California and several other states, however, utilities have the right to claim excess generation left over at the end of an annual billing cycle. If a turbine produces more electricity than the customer uses over a 12-month period, the utility does not have to reimburse the customer for that extra power.

For more information on net metering, see www.awea.org/smallwind/

Wind turbines must be connected to the utility system to be eligible for rebates through the California Energy Commission's **Emerging Renewables Program**.[5] Customers of Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), San Diego Gas & Electric Company (SDG&E), and Bear Valley Electric are eligible for rebates that can currently cover up to $2.30/watt toward a wind turbine's installed cost. Rebates apply only to equipment that has been certified by the Energy Commission. Applicants must document and may be asked to justify specific installation expenditures when applying for rebates.

Utilities generally define requirements for connecting to the grid through interconnection agreements. California's three private utilities (PG&E, SCE, and SDG&E) offer simplified interconnection agreements that are consumer friendly. These contracts define turbine specifications, permitting and design requirements, technical requirements for interconnection, conditions under which the turbine is to be disconnected, and legal liability. They also set the rate at which the utility will credit the customer for excess electricity, the billing arrangement, and any administrative fees the customer must pay. The Energy Commission is preparing a document for customer-generators interested in interconnecting to their utility.[6]

Communicating with Neighbors

County planners advise and sometimes require that permit applicants notify their neighbors before proceeding with a project as visible as a wind turbine. Small wind turbine manufacturers also recommend early notification of neighbors. That courtesy will in many cases correct misperceptions and head off full-blown opposition. A letter like the one below can answer most questions people have about small wind turbines.

Dear Neighbor,

You may be interested to learn that I plan to install a small wind energy system on my property at [address]. This modern, non-polluting system will generate electricity solely for my own use, reducing my dependence on the local utility. Any excess generation will be supplied to the utility system, but I will not receive any income from this exchange.

I plan to install a [turbine make and model] that will be mounted on a ___-foot tower, set back ___feet from the street and ___ feet from the [south/north/east/west] property line. This wind turbine uses a [two/three] -bladed propeller __ feet in diameter and has only ___ moving parts. It does not turn until the wind speed reaches at least ___ mph. On calm, quiet days the wind turbine will not likely be audible. When the rotor is turning, the sound of the wind passing over the blades will register about ___ decibels (dB(A)), at a distance of ___ feet, which will barely be audible over other noises caused by the wind.

[Manufacturer] has installed __ [number] of [turbine make and model] in the United States [and overseas]. They have a proven track record of producing energy quietly, cleanly, and safely. If you have any questions about the proposed installation, please feel free to contact me.

Sincerely,

5. Emerging Renewables Program requirements are at: www.consumerenergycenter.org/erprebate
6. For more information see: www.energy.ca.gov/distgen/interconnection/guide_book.html

It also lets the neighbors know that an applicant has properly researched the project. California law limits locally imposed notification requirements to neighbors living within 300 feet of the proposed installation.

Concerns that may arise about small wind turbines are typically about noise and other perceived nuisances, safety, and impacts on views and property values. Often these worries are fueled by neighbors' lack of familiarity with wind systems. Below are some facts that address common issues.

1. Acoustics

Wind turbines produce two types of noise: one from the equipment inside the nacelle, such as the generator, and the second from the aerodynamic noise of the rotating blades. Most small wind turbines do not have gearboxes or other noisy mechanical systems, and manufacturers have made them quieter through better sound insulation, lower rotor speeds and adjustments to blade geometry.

Although turbine noise increases with wind speed, so does the background noise produced by nearby trees, cars, animals and airplanes. Research has found that the background can be almost as noisy as the wind turbine, and at low wind speeds, will usually mask the wind turbine noise.

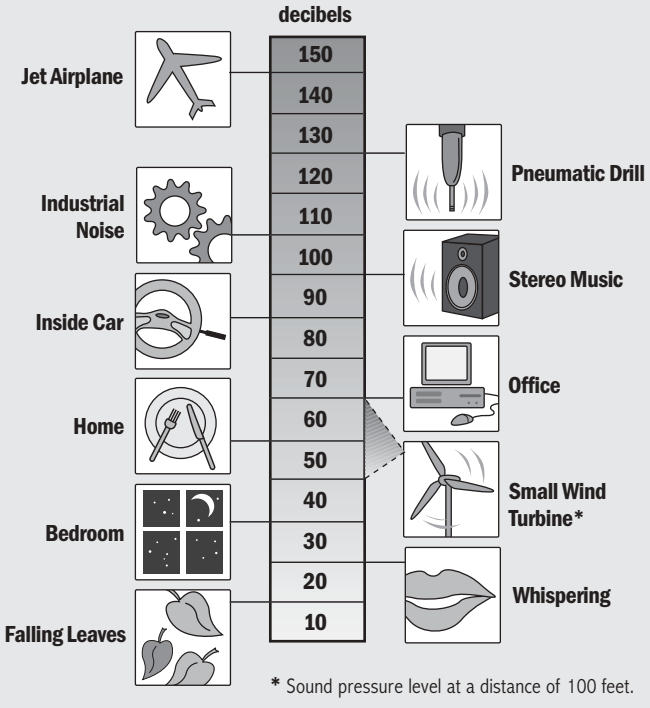
In a test conducted by the Clinton (Iowa) Detective Bureau, the noise from a 10-kW Jacobs wind system was measured in winds between 16 and 36 miles per hour. At 50 feet, the decibels measured between 55 dB(A) and 59 dB(A). But the detective, noting that the turbine noise was partially masked by rustling leaves, also took readings from trees that were 300 feet away. The trees registered 60 dB(A) to 62 dB(A).

7. Mick Sagrillo, Windletter Feb/Mar 1997.

The report concluded that the wind generator produced "inconsequential" noise emissions.[7]

Wind turbine noise is measured in two ways: sound power level is a measure of the acoustic strength of the source – the wind turbine itself, and sound pressure level is a measure of the noise perceived at a particular location. Therefore, a distance from the wind turbine rotor hub must be specified for the sound pressure level to be meaningful. The noise perceived at a receptor location also depends upon the wind speed and the local surroundings. Mathematical models allow estimates of the sound pressure level at any location around the wind turbines.

The acoustic source strength of a wind turbine is measured in dB (decibels) on a logarithmic scale.



http://www.awea.org/faq/noisefaq.html

Because humans hear higher frequencies better then lower frequencies, an adjusted dB(A) scale is used to replicate this human response. Tests at the National Wind Technology Center[8] show that the sound power level of small wind turbines varies from about 75-100 dB(A). At a distance of 100 feet from the rotor hub, this range corresponds to sound pressure levels (perceived noise) of 40-65 dB(A). A level of 40 dB(A) – about the same as inside an average living room – is generally considered acceptable for neighboring structures. A level of 65 dB(A) – noisier than a loud conversation – may cause an annoyance.

Photo courtesy Southwest Windpower

Noise complaints are rarely lodged against installed small wind turbines. The noise from their blades tends to blend in with the background acoustic vibrations produced in windy conditions.

When responding to neighbors' questions about noise, remember that sound levels decrease at a rate approximately equivalent to the square of the distance from the source. So a noise reading taken 25 feet away from a turbine will fall by a factor of four at 50 feet, by a factor of 16 at 1000 feet, and so on.

2. Aesthetics

Turbines must be mounted on tall towers to achieve their best performance and avoid damaging turbulence, so visibility is unavoidable. This isn't a problem for the many people who find wind turbines aesthetically pleasing. But in response to neighbors who do not, planning officials should consider the relative visual impacts of wind turbines. Communities already accept water towers, billboards, relay towers, and utility lines as part of the landscape. Does a wind turbine constitute a greater intrusion on a neighbor's view than would the addition of a second story to a home or other property improvements that are legally permitted? The right of applicants to generate their own local, clean energy, along with the public benefits spelled out by AB 1207, must be weighed against those who object to turbines on aesthetic grounds. County planners should weigh the potential cost impacts and lost revenue resulting from preventing turbines from being sited in optimal locations, and follow the guidance of Assembly Bill 1207:

> *In light of the state's electricity supply shortage and its existing program to encourage the adoption of small wind energy systems...local agencies [should]...not unreasonably restrict the ability of homeowners, farms, and small business to install small wind energy systems ...It is the policy of the state to promote and encourage the use of small wind energy systems and to limit obstacles to their use.*[9]

Small turbines are not as visibly noticeable as many people imagine. Even in flat, treeless areas it is difficult to pick them out from a quarter of a mile away. Among hills or trees they are even less noticeable. Guyed lattice towers are the least visible from a distance. Turbines and towers can be painted light gray to further minimize visual impacts.

8. Migliore, P., van Dam, J. and Huskey, A, Acoustic Tests of Small Wind Turbines, NREL SR-500-34601, Golden, CO, 2003.
9. California Government Code, Section 65892.13(a)(2)

Photo courtesy Southwest Windpower

3. Property Values

There is no documented evidence that wind turbines — including commercial wind farms — have ever lowered the values of surrounding properties. In fact, the opposite effect has been recorded. A recent study that examined 25,000 property transactions within five miles of wind farms found that values almost always rose faster in those areas than in similar communities without turbines. The report, commissioned by the U.S. Department of Energy, included data from 10 wind installations in seven states.[10]

Vermont turbine owner David Blittersdorf reports that the home next to his sold within one day for the full asking price. His new neighbors later told him that his 10-kW wind turbine was a major factor in the quick sale. "They said they wanted to live in a place where the community cared about the environment. They told me that they too wanted to install a small wind turbine someday," says Blittersdorf.

Wind turbine manufacturer Mike Bergey says that in 20 years of business he's never heard of a customer's wind turbine adversely affecting the value of neighboring real estate. "Our customers have sold their homes and adjacent lots, and they have had direct and nearby neighbors sell their homes. In all but one case the wind turbine was not an issue. In that case, the turbine had been partially installed on the abutting property due to a faulty survey. This situation was resolved amicably," notes Bergey.

Some homebuyers will pay more for a home equipped with a renewable energy system. A California Energy Commission market survey of 300 California homeowners found that half were willing to pay extra for homes with solar panels or wind turbines. The study also found that more than 60% of homeowners preferred to buy a home already equipped with a renewable energy system rather than install it themselves.[11]

4. Electronic Interference

Experimental wind turbines with metal blades put up in the 1970s reportedly "chopped up" television signals, resulting in ghost images on TV screens.

But the rotors on small-scale turbines are not large enough to interfere with TV or telecommunications signals, and their blades are made from wood, fiberglass, and plastic — materials that signals easily pass through.

Small wind turbine generators have never been shown to disrupt telecommunications or radio waves through electromagnetic interference. Jim Green of the U.S. Department of Energy's National Renewable Energy Laboratory reports that in 10 years researching small wind turbines, he has never encountered a problem with electromagnetic interference, nor have other researchers found cause to study them.

In fact, one of the major niche markets for small wind systems is powering remote telecommunications sites. Small wind turbines have been approved by the U.S. Navy for powering military communications.[12]

10. www.REPP.org
11. www.energy.ca.gov/reports/2002-04-03_500-02-016.PDF
12. Mick Sagrillo, "Telecommunication Interference from Home Wind Systems" AWEA Windletter, Volume 22, Issue No. 4 April 2003.

Photo courtesy Southwest Windpower

5. Safety

No public injuries have been attributed to falls from the thousands of unfenced small turbine towers installed over the past 25 years. Turbine towers should be required to have the same access restrictions — such as fencing or warning signs — as similar structures such as ham radio towers. Some turbine tower models currently on the market, primarily for the smallest turbines, are designed to be lowered to the ground for maintenance and repairs and don't have hand- and foot-holds. The small wind industry does not recommend fencing or anti-climbing devices.

Under AB 1207, turbine permit applications are required to include standard drawings and an engineering analysis of the system's tower, showing compliance with national or state building codes and certification by a licensed professional engineer, demonstrating that the system is designed to meet requirements for the most stringent wind (Uniform Building Code wind exposure D), the worst seismic class (Seismic 4), and the weakest soil class (soil strength of not more than 1,000 pounds per sq ft). Applications are also required to include a line drawing of the system's electrical components in sufficient detail to allow determination that the installation conforms to the National Electric Code.

Utility personnel unfamiliar with wind generation may mistakenly worry that turbines are a threat to utility line workers responding to power outages. In the 25 years that utilities have been required to interconnect small wind turbines, not a single liability claim has been filed against a turbine owner over electrical safety. Inverters certified by the California Energy Commission for use with small wind turbine installations are required to comply with UL 1741, which ensures safe operation on an electricity grid, including during utility outages.

Section 2827 of the California Public Utilities Code, most recently amended in 2002 by Assembly Bill 58, establishes standard terms for interconnection:

> *A…wind turbine electrical generating system …used by an eligible customer-generator shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories and, where applicable, rules of the Public Utilities Commission regarding safety and reliability. A customer-generator whose …wind turbine electrical generating system …meets those standards and rules shall not be required to install additional controls, perform or pay for additional tests, or purchase additional liability insurance.*

6. Avian Risk

Bird collisions with small wind turbines are very rare. Statistically, a sliding glass door is a greater threat to birds than a small, unlighted wind turbine. Smoke-stacks, power lines, and radio and television towers have been associated with far greater numbers of bird fatalities than have even larger-scale wind farms.

Motor vehicles and pollution are responsible for an even higher proportion of total bird deaths. House cats kill an estimated 100 million birds annually.[13]

Wind turbines have been associated with avian impacts primarily because of unique conditions at California's Altamont Pass Wind Development. Habitat for golden eagles and other protected species, Altamont Pass is one of the world's largest, and earliest, commercial wind installations. Much research has been conducted to make wind turbines more "bird safe," including tower design changes and better siting practices. According to a recent report from the Bonneville Power Administration, "Raptor mortality has been absent to very low at all newer generation wind plants studied in the U.S. This and other information ...strongly suggests that the level of raptor mortality observed at Altamont Pass is unique."[14]

Because small wind turbines have small rotor swept areas, are not usually tall enough to interfere with bird migration patterns, and are not often installed in dense enough configurations to create a "windwall" effect, they generally do not cause problems with birds or other wildlife. The California chapter of the National Audubon Society endorsed the passage of AB 1207, stating that the number of bird collisions with small-scale turbines is expected to be "similar to the deaths caused by other stationary objects that birds routinely fly into."[15]

13. National Wind Coordinating Committee (NWCC), Permitting of Wind Energy Facilities: A Handbook, 2nd ed. www.nationalwind.org
14. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments, West, Inc., December 2002
15. Letter from John McCaull, California Audubon, to California Assemblyman John Longville, July 17, 2001.

Who Says Wind Turbines Need Lights? Not the FAA.

Solara Energy President Peter Burcat takes issue with counties that require beacon lights on small wind turbines. An attorney who is also working to obtain a pilot's license, Burcat knows that even the tallest small turbine towers do not reach high enough to trigger Federal Aviation Administration (FAA) lighting requirements.

The FAA doesn't require lights on structures less than 200 feet tall, and prohibits both commercial and small private aircraft pilots from flying lower than 1,000 feet. Pilots cannot drop lower than 500 feet when approaching a runway. The only time a small wind turbine would be affected by FAA regulations is if it were proposed to be sited adjacent to an airport.

Many common structures that are taller than small wind turbines – transmission line poles, for example – are not required to be lit.

California's AB 1207 does, however, require that turbine owners alert crop duster pilots to their installations in certain regions. Section 65892.13(d)(4) stipulates that:

"In the event a small wind energy system is proposed to be sited in an agricultural area that may have aircraft operating at low altitudes, the local agency shall take reasonable steps ...to notify pest control aircraft pilots registered to operate in the county pursuant to Section 11921 of the Food and Agricultural Code."

7. Air Traffic

The height of small wind turbine towers is well below the 200-foot elevation that would require them to be lit under Federal Aviation Administration (FAA) rules. Nor does the FAA require notification of small wind turbine construction[16] unless the proposed tower would be within:

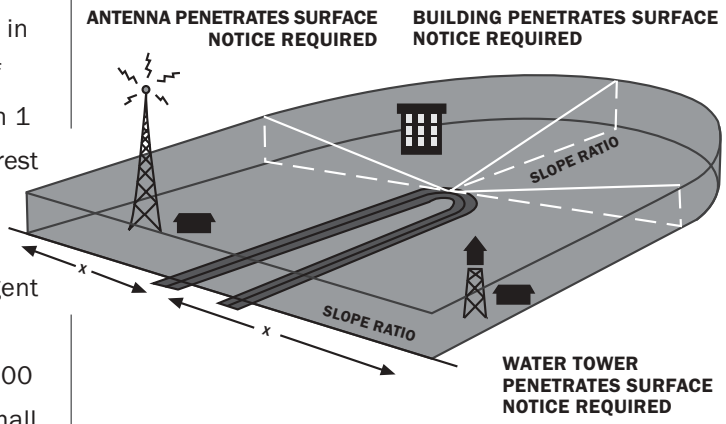
- 20,000 feet of an airport or seaplane base with at least one runway more than 3,200 feet in length and the object would exceed a slope of 100:1 horizontally (100 feet horizontally for each 1 foot vertically) from the nearest point of the nearest runway; or

- 10,000 feet of an airport or seaplane base that does not have a runway more than 3,200 feet in length and the object would exceed a slope of 50:1 horizontally (50 feet horizontally for each 1 foot vertically) from the nearest point of the nearest runway. (See figure to the right.)

The California State Aeronautics Act is less stringent than FAA guidelines, requiring Department of Transportation review for structures exceeding 500 feet, which is four times as high as the tallest small wind turbine tower available.[17]

Some townships in close proximity to Edwards Air Force Base Flight Test Center are subject to a recent California law (SB 1989) that requires the military be notified of small wind energy systems proposed in the zone classified R-2515. R-2515 lies mostly in Los Angeles County, extending slightly into Kern County. The law does not prohibit small wind turbines in R-2515. It requires only that local planning agencies forward applications for small wind turbines to military authorities. The law is intended as a precaution — small wind turbines are not expected to raise problems for the air base.

Object Penetrates Airport / Seaplanes Base Surface



Airports with one runway more than 3,200 ft. X=20,000 ft. Slope ratio 100:1

Airports with no runway over 3,200 ft. X=10,000 ft. Slope ratio 50:1

Graphic: Federal Aviation Administration

16. FAA Advisory Circular AC70/7460-1K
17. State Aeronautics Act, Part 1 Division 9 Section 21656 of California State Public Utilities Code.

Vineyard Gets Good Wind Harvest

Paso Robles (San Luis Obispo County) — Joe Mathewson says permitting staff weren't sure what to expect when he proposed the first small wind turbine in the county, but their ready acceptance of the project made for a smooth installation. "San Luis Obispo County was very friendly toward the application," Mathewson says.

Mathewson had been spending $15,000 annually on electricity to irrigate his 40-acre vineyard. He figured it was time to see if the wind, which blows steadily from afternoon to midnight in the summers, could do some of the work instead. Mathewson's instincts were right: his 10-kilowatt wind generator has cut his power bill from $1,000 to $200 per month during the grape irrigation season. All told, he has cut his annual electricity bill by nearly half.

Mathewson put up the turbine and 100-foot tower himself. The permit cost $400, and the process took only a couple of weeks. He says county planners were primarily interested in the integrity of his tower foundation and electrical connections. Since the turbine was installed in the center of his property, he did not encounter any opposition from neighbors.

Photo courtesy of Joe Mathewson

He's so impressed with his system that Mathewson has taken to selling small wind turbines on the side. "If you have a consistent wind resource, a suitable location, and want to reduce your electric bill, this is a good way to go," he says.

PERMITTING OF SMALL WIND TURBINES:

A CHECKLIST

A summary of basic steps for obtaining a permit for a small wind turbine in California[18]

1. Contact your county planning department or permitting agency.

- ☐ Find out if small wind energy systems are addressed by local ordinance and, if so, get a copy of the ordinance. (If not, see **2** below.)
- ☐ Learn the relevant permitting procedures.
- ☐ Ask what documents you'll need. Are you required to submit plans from a consulting engineer, or will documentation from the turbine manufacturer or dealer do?

2. Review the applicable standards and restrictions.

In California, if small wind energy systems are not specifically addressed by local ordinances in your area, or if local ordinances have not been brought into compliance with AB 1207, then your small wind turbine is an allowable use, subject to the provisions of the *California Government Code*, Section 65892.13(f), which sets the following restrictions:

- ☐ **Minimum parcel size:** One acre; must be outside an "urbanized" area unless otherwise specified.
- ☐ **Minimum allowable tower height:** Up to 65 feet must be allowed on parcels 1-5 acres; up to 80 feet must be allowed on parcels of five acres or more. Taller towers are not prohibited by state law.
- ☐ **Setback:** No part of the system, including guy wires, may be closer than 30 feet to the property boundary. (The installation must also comply with fire setbacks established by Section 4290 of the Public Resources Code.)
- ☐ **Noise levels:** Must not exceed 60 dB(A) during normal operation, as measured from the closest neighboring inhabited dwelling.
- ☐ **Equipment:** Contact the California Energy Commission for a list of certified small wind turbines[19] and for recognized national certification programs.
- ☐ **Building code compliance:** Standard drawings and an engineering analysis of the tower are required showing compliance with the Uniform Building Code or the California Building Standards Code and certification by a licensed professional engineer. "Wet stamps" are not required.
- ☐ **Electric code compliance:** Requires line drawings of system electrical components showing sufficient detail to determine that installation conforms to the National Electric Code.

18. Many permit requirements are not applicable in certain California counties or outside the state. For recommended practices, see "Do's & Don'ts" and AWEA's model zoning ordinance, pages 27-29.
19. www.consumerenergycenter.org/erprebate/equipment.html

- ☐ **Federal Aviation Administration requirements:** Installations close to airports (within 10,000 to 20,000 feet of runways) may require prior FAA notification. (See “Air Traffic”, p. 16.)

- ☐ **Other siting restrictions:** Small wind energy systems may be subject to local restrictions adopted pursuant to state legislation establishing coastal areas, scenic highway corridors, or other specially designated areas.

3. For California grid-connected systems:

- ☐ **Notify utility:** You may need to show your permitting agency that you have notified the utility of your intent to install an interconnected wind generator.

- ☐ **Reserve an Energy Commission rebate:** Reserve your rebate prior to installation by submitting a Reservation Request Form and required supporting documentation to the Energy Commission.[20] Once your rebate reservation is accepted, you have up to nine months to install your (10 kW or smaller) system.

- ☐ **Interconnection agreement:** The state’s investor-owned utilities (SDG&E, PG&E, SCE) have simplified, consumer-friendly interconnection agreements. Utilities are required to process net metering applications within one month.[21]

20. See: www.consumerenergycenter.org/erprebate/forms.html
21. For more information see: www.awea.org/smallwind/california.html

4. Notify your neighbors.

- ☐ Counties may not require notice of an application to install a small wind turbine to property owners beyond 300 feet from the proposed site. (See “Communicating with Neighbors,” p. 11.)

5. Comply with permitting requirements.

Permitting requirements, procedures, and fees vary widely among counties.

- ☐ Building permit, use permit, zoning permit, or “plot plan” fees can range from less than $100 to $1600.

- ☐ Other costs for public notification, hearings, or environmental impact studies may range from a few hundred to several thousand dollars.

- ☐ If a particular fee seems excessive or inappropriate for your situation, find out the basis for the fee. You may be able to avoid it or have it reduced. (See “County Staff Make Way for Small Wind,” p. 27.)

- ☐ To be eligible for an Energy Commission rebate, your system must be installed by a licensed California contractor possessing an active "A," "B," "C-10,” or “C-46” (photovoltaic system) license.

- ☐ Obtain a final inspection sign-off prior to claiming your rebate. Net metering provisions take effect when the permit is obtained or the wind turbine begins operation.

II. PERMITTING SMALL WIND TURBINES UNDER AB 1207

SOME COUNTY COMPARISONS

Photo courtesy Southwest Windpower

The California Legislature's adoption of Assembly Bill 1207 in 2001 sent a clear message to local authorities that "the implementation of consistent statewide standards to achieve the timely and cost-effective installation of small wind energy systems is not a municipal affair...but is instead a matter of statewide concern."[22]

California electricity customers had endured rolling blackouts that year and were facing steep electricity rate hikes. The legislature hoped to clear obstacles to small forms of "distributed generation" that would shore up both the supply and reliability of energy in the state. AB 1207 was written to standardize the small wind permitting process at the local level, removing complications that had frustrated and stymied many potential applicants, requiring local agencies to approve small wind turbine applications by right if specified conditions are met. Similar to existing state law prohibiting "the legislative body of any city or county from enacting an ordinance that prohibits or unreasonably restricts the use of solar energy systems other than for the preservation or protection of the public health and safety," AB 1207 was intended to promote and encourage the use of small wind energy systems and to limit obstacles to their use, declaring that:

> *Small wind energy systems, designed for onsite home, farm, and small commercial use, are recognized by the Legislature and the State Energy Resources Conservation and Development Commission as an excellent technology to help achieve the goals of increased in-state electricity generation, reduced demand on the state electric grid, increased consumer energy independence, and nonpolluting electricity generation.*[23]

As of July 1, 2002, AB 1207 is the default permitting ordinance applied to small wind energy systems in California counties that lack their own ordinance. The law also supersedes specific restrictions contained in existing county ordinances. Although, the provisions of AB 1207 are scheduled to sunset in July 2005, some counties may need additional time to bring local ordinances into compliance with the state goal of encouraging renewable energy, so small wind advocates will likely seek extension.

Key Provisions of AB 1207

AB 1207 allows counties and other local agencies to follow their own processes for permitting small wind energy systems and enforce compatibility and use issues. However, the law limits the restrictions that may

22. California Government Code, Section 65892.13(a)(5)
23. California Government Code, Section 65892.13(a)(5)

be imposed on tower height, notification, setbacks, noise level, turbine approval, tower drawings, and engineering analysis. Counties may not enforce restrictions more severe than those established by AB 1207, which include:

- Notice of an application to install a small wind turbine need only be provided to property owners within 300 feet of the property on which the turbine is proposed. (The law allows but does not itself require notification.)

- The allowable height for a small wind turbine tower on a site of one to five acres must be at least 65 feet; on parcels of five acres or more, the allowable height must be at least 80 feet. Counties may allow applicants to exceed these heights, but applicants must demonstrate that the proposed height for a small wind turbine tower is within the range recommended by the turbine manufacturer.

- Setbacks from the property line shall be no farther than the height of the turbine tower, provided they also comply with Section 4290 of the Public Resources Code.

"Small wind turbines are being installed all across the country without the need for a permit or the payment of any fees to local governments. It is in California's best interests to make as simple as possible the installation of a much underutilized technology."

— Joe Guasti, small wind turbine dealer

- Under California law, small wind turbines shall not cause a sound pressure level in excess of 60 dB(A) as measured at the closest neighboring inhabited dwelling. This level, however, may be exceeded during short-term events such as utility outages and severe wind storms.

- The small wind turbine must be certified by the California Energy Commission as qualifying under the Emerging Renewables Program, or by a national program approved by the Energy Commission. Properly certified equipment cannot be excluded by local ordinance.[24]

- The applicant must include standard drawings and an engineering analysis of the turbine tower that demonstrate compliance with the Uniform Building Code or the California Building Standards Code. In addition, the drawings and analysis must

County Reluctance Generates Positive Interest in Wind Turbines

Madera County's resistance to a small wind turbine installation in San Juan Bautista seems to have backfired. County officials sent a letter to neighbors of the proposed 10-kilowatt turbine explaining that they disliked the idea of approving the project, but they had no choice because of the passage of AB 1207. The controversy generated local media attention, and Solara Energy President Peter Burcat, who applied for the permit, says he subsequently received approximately 10 phone calls from local residents interested in installing wind turbines.

24. For a list of these wind turbines, see www.consumerenergycenter.org/erprebate/eligible_smallwind.html

be certified by a professional mechanical, structural, or civil engineer licensed by the State of California.

- The applicant must also include a line drawing of the electrical components of the small wind energy system in sufficient detail to demonstrate compliance with the National Electric Code.

- The small wind turbine must comply with all applicable Federal Aviation Administration requirements, including Subpart B (commencing with Section 77.11) of Part 77 of Title 14 of the Code of Federal Regulations regarding installations close to airports.[25] It must also comply with the State Aeronautics Act (Part 1, commencing with Section 21001 of Division 9 of the Public Utilities Code).[26] Small wind energy systems proposed in zone R-2515, surrounding Edwards Air Force Base, may be subject to the notification requirements of SB 1989. (See p. 17.)

County Responses to AB 1207

Even under AB 1207, the permitting process differs a great deal across counties. Many planning and permitting departments are unfamiliar with the policy rationale behind the new law. In some cases, county staff have not understood that the law trumps all local rules governing height restrictions and other permitting matters for wind turbines unless they are less restrictive than AB 1207.

Some counties have changed their permitting rules as a result of the legislation, but have not necessarily made their processes less cumbersome. Others have not changed their ordinances because of budget constraints or because they have not yet received any wind turbine applications. But some counties in windy regions are becoming increasingly good at accommodating small wind turbines while still protecting the public interest.

Twelve counties (Mendocino, Napa, Santa Cruz, Solano, Kern, Los Angeles, San Bernardino, Sonoma, Riverside, San Diego, San Luis Obispo, and El Dorado) were surveyed for this handbook. Four (Mendocino, Napa, Santa Cruz, and Solano) elected to accept the minimum state standards included in AB 1207. Three others (Kern, Los Angeles, and San Bernardino) modified their local ordinances as a result of AB 1207, and one (Sonoma) adopted a small wind permitting ordinance which it has revised several times to resolve land use issues raised by applicants.

Riverside County simply modified its application criteria to comply with AB 1207 neighbor notification requirements without going through a local public approval process. At the time of interview for this handbook, San Diego and San Luis Obispo counties were still unaware of AB 1207. A representative of the El Dorado planning department said he would welcome a "model ordinance" to help his county conform with AB 1207. (An ordinance recommended by the American Wind Energy Association is included in this handbook. See p. 29.)

Photo courtesy National Center for Appropriate Technology

25. www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/14cfr77_00.html
26. www.dot.ca.gov/hq/planning/aeronaut/documents/2003PUC_SAA.pdf

"We are trying to be wind-friendly. We want to promote wind energy in our general plan." —Susan Calladao, Planner, San Luis Obispo County

The next page contains descriptions of permitting processes applied in various counties. For a summary of permitting rules and practices recommended by the authors of this handbook, please see page 31.

In Kern, Solano, and Santa Cruz counties, small wind turbines are permitted "by right" and can only be denied a permit if they violate air safety standards. Turbine installations also require a separate building permit.

Photo courtesy Joe Mathewson

AB 1207 has actually made permitting slightly more difficult and expensive in Kern County. A process that could once be completed over the counter in a single day may now involve public hearings. Kern County added a $325 filing fee to cover additional administration costs for wind turbines on top of the $400 building permit fee. Both permits can be acquired in three to four weeks.

Los Angeles County, by contrast, is one of the most difficult places in the state to get a small wind energy system approved. An ordinance adopted in September 2002 subjects applicants to an expensive conditional use permit review, which generally involves a public hearing. Applicants may qualify for a minor use permit at the discretion of the planning office director if the installation meets established development standards and is opposed by no more than one person.

Will Winds Prevail in L.A. County?

Small wind advocates hope that Los Angeles County will eventually make it easier to site small wind turbines. Acting Chief of Ordinance Study Leonard Erlanger says he believes the few applicants that are trying to get through the county's difficult permitting process will set positive precedents. "As this unfolds, things will be clarified, making it easier for small wind turbine applicants in the future," says Erlanger.

The $800 fee for the first stage of what the county calls a "minor" use permit is a rude surprise for many applicants. But Erlanger says the county reduced the fee for this permit below what it charges for a conditional use permit. Applicants who encounter no neighborhood opposition and avoid public hearings are charged only for the less expensive permit, though the price quickly goes up if hearings are necessary.

Recognizing that applicants "are not real happy" with the performance security the county imposes to cover the eventual removal of a turbine (an event not likely to happen for 20 to 30 years after installation), Erlanger says that "I'd back off on that provision if I had to do it again."

Erlanger says planners could use some guidance from state officials on how best to protect scenic corridors and ensure aviation safety. He says he's receptive to bringing the county's lighting requirements more closely in line with FAA standards, which are less restrictive. The county currently notifies various air safety agencies of small wind turbine applications, and requires a beacon light if any agencies request it.

Photo courtesy Daniel Scott

A small wind energy installation must meet the following standards in Los Angeles County:

- Small wind turbines over 50 feet tall may have to install an FAA-approved beacon light. The lighting specified can consume half of the electricity generated by a 1-kW wind turbine.
- Small wind turbines cannot be placed on, or within 100 feet of, a ridgeline. They cannot exceed the height of any nearby ridge by more than 25 feet.
- Small wind turbine owners must pay a performance security to cover the eventual cost of removing the wind turbine. Turbine lifespans range from 20-30 years.
- All wind turbines require fencing even if the site is already enclosed.

Anyone seeking a permit of any kind in Los Angeles County must either obtain an exemption from the California Environmental Quality Act (CEQA) or pay an $800 fee for the first stage of a minor use permit. As a result of these obstacles, few permits have been issued. The small wind industry and local residents are working with Los Angeles County to remedy these problems (See text box previous page.)

Trial and Error in Riverside County

Moreno Valley (Riverside County) — Steve Anderson's determination has not only helped pave the way, but also highlights the pitfalls facing small wind turbine customers. When he first explored the possibility of putting up a small wind turbine two years ago, "county officials didn't have a clue about what I was trying to do," he recalls. Although his wind resource was moderate, California's energy shortage spurred him to invest the time and funds needed. "It took me six months to finalize the county paperwork and comply with all of their documentation and other siting requirements. I went down to their office five or six times, and each time I got a different answer about what I needed to do."

Fortunately for Anderson, the passage of AB 1207 in 2001 required Riverside County to streamline its local codes governing small wind turbines.

The county previously required that wind turbine applicants notify every landowner within a half-mile radius of the site – even absentee landowners. Anderson was preparing to send letters to nearly 50 people when AB 1207 went into effect. Under the new law, which limits notification requirements to neighbors within 300 feet of a proposed wind turbine, Anderson needed only six stamps. (One notification recipient even decided to install a wind turbine himself.)

Anderson admits that a few individuals, particularly the county's head planner, cut him quite a bit of slack. For example, his initial development fee assessment of $10,500 was reduced to $257. His fee assessment to protect the Kangaroo rat, a threatened species in

Photo courtesy Carl Frazier

California, was reduced from $2,500 to $50.

Anderson wound up paying approximately $4,000 in fees to Riverside County, plus another $1,000 for required trenches, topographical maps, signs, and vegetation. Due to low wind resources at the turbine site, his investment is taking longer than he had hoped to pay for itself. He learned that his turbine needs to be elevated higher to reach good sustained winds.

Michael Freitas, senior planner for Riverside County, says Anderson's difficulties resulted from "our inexperience with small wind turbines." In the future, prospective small wind turbine owners may not have to overcome all the siting hurdles Anderson encountered, he says, though the total permitting costs will likely be similar.

The good news, says Freitas, is that there's been little public opposition to small wind turbines in the county. Still, Freitas advises permit seekers to talk to neighbors before proceeding. He also suggests that applicants carefully analyze their wind resource to select the proper tower height and make sure a turbine will repay the time and expense county permits require.

"As this unfolds, things will be clarified, making it easier for small wind turbine applicants in the future."

— Leonard Erlanger, acting Chief of Ordinance Study at Los Angeles County

San Bernardino County responded to AB 1207 by making its turbine tower height limits less restrictive than the state's. Landowners in the desert regions of the eastern and northern portions of the county can now erect turbine towers as high as 120 feet on five acres of land — 40 feet higher than the minimum allowance provided by state law.

In addition, San Bernardino permit applicants may receive a variance allowing a 30% increase in tower height, raising the limit to 156 feet. The county removed a ban on small wind turbines in urbanized areas.

Sonoma County adopted AB 1207 prohibitions against small wind turbines in urbanized areas, but later changed the way it defines those areas, concluding that the designations applied by the U.S. Census Bureau were preventing some residents with suitable sites from putting up turbines. The county deleted the federal designations and now defines urbanized areas according to the reach of city services such as water and sewer connections.

However, the county extended 2,500-foot buffer zones around its urban service areas. Wind turbines taller than 40 feet sited in those zones require a conditional use permit, which is much more expensive ($2,044) than the zoning permit needed outside the buffer ($71). Turbines below 40 feet in height can be installed within urban service areas and buffer zones with a minor use permit.

County Staff Make Way for Small Wind

Oak Hills (San Bernardino County) — Fortunately for Gus Sansone, San Bernardino County staff were willing to negotiate details that could have made the difficult task of permitting his small wind turbine much more expensive. Sansone first teamed up with other small wind enthusiasts to get the county supervisor to lower the permitting fee from $1,200 to $500. Then Sansone had to negotiate with the county assessor, who said his wind turbine would be taxed at its total installed value. Sansone eventually got the county assessment reduced by about half.

a lot of time and effort, but Sansone praises the county staff. "I have to give them a lot of credit. They worked diligently to see that my wind turbine was up and running," he says.

County zoning restrictions limited the height of Sansone's turbine tower to 60 feet, and setback requirements prevented him from putting the tower on high ground near the edge of his lot. (Sansone's property was smaller than the five-acre minimum that would have allowed a tower of 80 feet.) But again, Sansone got a break. He was eventually permitted to extend the tower to 80 feet for a $150 fee. He estimates the additional height is increasing the generation from his 10-kilowatt machine as much as 25%, based on the experience of other local wind turbine owners.

Height restrictions in Santa Cruz County were also an obstacle for Scotts Valley resident Larry Gilliam, but with the help of the county supervisor, Gilliam was able to permit his 80-foot tower through a special wind zoning ordinance Gilliam says was "left over from the last energy crisis."

> "I have to give them a lot of credit. [County staff] worked diligently to see that my wind turbine was up and running."
>
> — Gus Sansone of San Bernardino County

Photo courtesy Bergey Windpower

That ordinance, in fact, stipulated minimum rather than maximum tower heights to make sure small wind turbines generated substantial amounts of electricity.

Both turbine owners are glad they persisted in negotiations with county officials.

For Sansone, the result is a reduction in power bills from $100 per month to $0. "I haven't had to pay an Edison bill at all over the course of an entire year!" he says. His turbine has "accomplished everything I've wanted it to — and then some."

Key compliance issues for small turbines include the following:

- Applicants must submit an architectural or artistic rendering of the proposed turbine.
- Vegetation or other natural features may be required to screen the installation from view.
- The turbine must be painted to blend in with its background.
- Turbines are prohibited on ridge tops.

Although they have adopted stringent regulations, the Sonoma County Board of Supervisors wants to be "wind friendly." A recent ordinance drastically cut permitting fees and removed public notification requirements for zoning permits.

Riverside County imposes no height restrictions on wind turbine towers. AB 1207 greatly simplified the county's notification requirements, but wind turbine permit fees are still quite high.

The county requires a plot plan that costs $1,600. Most applicants also have to pay about $600 for an initial study to determine whether an Environmental Impact Report is required. Applicants make a deposit to cover other application costs — if the county expends more than the deposit, it charges by the hour for staff time until the process is completed. Permitting for installations recently completed in western Riverside County cost up to $5,000. Although county staff have been able to reduce some of the site-specific fees, Riverside remains one of the most costly places to install a wind system in California.

Small Wind and Solar System Prompts Lifestyle Changes

Adreine Jenik was looking for ways to tap the rich natural energy resources around her art studio in 29 Palms, a small community located in the High Desert portion of San Bernardino County. "I noticed that it was pretty sunny out here most of the time. And when it wasn't sunny, there seemed to be quite a bit of wind," says Jenik, an associate professor of Computer & Media Arts at UC-San Diego. She figured a renewable energy system would minimize the environmental impact of her creative getaway.

In 1998, she installed a custom-designed hybrid energy system that combines a 400-watt Southwest Windpower turbine with a 325-watt solar photovoltaic system. It took a year to work out all the technical bugs and get the paperwork straightened out, but now she's satisfied with a system that supplies 100 percent of her electricity. "I paid the price of being an early adopter, but my electricity bills are now zero," she reports.

"What I like the most about my own renewable energy system is that it has made me much more aware of my own energy usage. And that was a very powerful experience," Jenik says. For example, she purchased a new heavily insulated refrigerator and put her water heater on a timer. "I made some major lifestyle changes. Sometimes I just bring a bag of ice instead of turning the refrigerator on if I'm only here for a little while."

Though permitting took some time, there was no opposition to her hybrid wind/solar system from her neighbors. "People pretty much stick to themselves in a community like this," says Jenik. Her "micro" wind turbine tower is less than 35 feet tall, so it didn't present a problem for county permitting authorities. The wind and solar system requires minimal maintenance. So far, Jenik has been able to handle everything by herself, even filling her six batteries with distilled water.

III. AWEA'S RECOMMENDATIONS

Model Zoning Ordinance: Permitted Use Regulation for Small Wind Turbines

Recommended Practices

The American Wind Energy Association offers a Model Zoning Ordinance to help local officials update ordinances governing small wind turbine installations.[27] The following template serves as a starting point that can save planning and permitting staff valuable time. However, states often have unique subsidies or other programs designed to encourage on-site electricity generation, and local ordinances need to be fine-tuned to accommodate both existing state laws and local regulations. A list of practices recommended by the authors of this book are on page 29.

SECTION 1 PURPOSE:

It is the purpose of this regulation to promote the safe, effective, and efficient use of small wind energy systems installed to reduce the on-site consumption of utility supplied electricity.

SECTION 2 FINDINGS:

The [city or county] finds that wind energy is an abundant, renewable, and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on non-renewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Distributed small wind energy systems will also enhance the reliability and power quality of the power grid, reduce peak power demands, and help diversify the State's energy supply portfolio. Small wind systems also make the electricity supply market more competitive by promoting customer choice.

The State of _____ has enacted a number of laws and programs to encourage the use of small-scale renewable energy systems including rebates, net metering, property tax exemptions, tax credits, and solar easements [as appropriate]. However, many existing zoning ordinances contain restrictions which, while not intended to discourage the installation of small wind turbines, can substantially increase the time and costs required to obtain necessary construction permits.

Therefore, we find that it is necessary to standardize and streamline the proper issuance of building permits for small wind energy systems so that this clean, renewable energy resource can be utilized in a cost-effective and timely manner.

SECTION 3 DEFINITIONS:

Small Wind Energy System: A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than [100 kW/1 MW] and which is intended primarily to reduce on-site consumption of utility power.

27. Available online at:
www.awea.org/smallwind/documents/modelzo.html

Tower Height: The height above grade of the fixed portion of the tower, excluding the wind turbine itself.

SECTION 4 PERMITTED USE:

Small wind energy systems shall be a permitted use in all zoning classifications where structures of any sort are allowed, subject to certain requirements as set forth below:

4.1 Tower Height: For property sizes between ½ acre and one acre the tower height shall be limited to [80 ft/150 ft]. For property sizes of one acre or more, there is no limitation on tower height, except as imposed by FAA regulations.

4.2 Set-back: No part of the wind system structure, including guy wire anchors, may extend closer than ten (10) feet to the property boundaries of the installation site.

4.3 Noise: For wind speeds in the range of 0-25 mph, small wind turbines shall not cause a sound pressure level in excess of 60 dB(A), or in excess of 5 dB(A) above the background noise, whichever is greater, as measured at the closest neighboring inhabited dwelling. This level, however, may be exceeded during short-term events such as utility outages and severe wind storms.

4.4 Approved Wind Turbines: Small wind turbines must have been approved under the Emerging Renewables Program of the California Energy Commission or any other small wind certification program recognized by the American Wind Energy Association.

4.5 Compliance with Uniform Building Code: Building permit applications for small wind energy systems shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower showing compliance with the Uniform Building Code and certified by a licensed professional engineer shall also be submitted. This analysis is frequently supplied by the manufacturer. Wet stamps shall not be required.

4.6 Compliance with FAA Regulations: Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports.

4.7 Compliance with National Electric Code: Building permit applications for small wind energy systems shall be accompanied by a line drawing of the electrical components in sufficient detail to allow for a determination that the manner of installation conforms to the National Electrical Code. This information is frequently supplied by the manufacturer.

4.8 Utility Notification: No small wind energy system shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

Examples of State Zoning and Easement Laws:

See AWEA's online toolbox for links to California, Minnesota, Montana and Nebraska policies:

www.awea.org/smallwind/toolbox/default.asp

Best Practices for Counties

The following recommendations are based on California counties' experiences with small wind turbine installations since the California Energy Commission's Emerging Renewable Program was put in place in 1998. They are lessons learned through counties' responses to AB 1207 and the experiences of pioneering consumers attempting to install wind generators.

Do's and Don'ts

The Do's:

- Remember that small wind turbines reduce the threat of blackouts in your community, contribute to national security, and reduce dependence on polluting forms of electric generation. Small wind turbines are community assets, not toys or hobbies.
- Make sure that your fee structure isn't discouraging potential wind turbine buyers. Ideally, total permitting costs should not exceed two percent of the original capital cost of a small wind turbine.
- Consider following the example of San Bernardino County by allowing turbine towers to exceed the state's minimum height allowances in rural areas.
- Review design integrity of wind turbine towers, with standard drawings and an engineering analysis showing compliance with national or state building codes and certified by a licensed professional engineer.
- Identify a model project to set a high standard for future applicants and to prepare staff to address misconceptions about small wind turbines.
- When in doubt, refer to the language of AB 1207 regarding height restrictions and other rules.

The Don'ts:

- Don't supersede FAA lighting requirements. Small wind turbine towers are usually below heights regulated by the FAA or state aviation law.
- Don't require all small wind turbine applicants to obtain a conditional use permit. Instead, create a permitted use designation with appropriate requirements and restrictions.
- Don't arbitrarily prohibit wind turbines on all ridgelines. Consider the particular merits of individual sites.
- Don't require that all small wind turbines "blend in with their environments." Require such mitigation only when there is a clear public benefit.
- Don't require consumers to post a bond or performance security for removal of small wind turbines. No such obligation is required for any other type of privately financed infrastructure.
- Don't require fencing unless public safety is an issue of particular concern at a given site, or unless similar fencing is required for other similar types of structures (cell phone or amateur radio towers).

IV. REFERENCES AND RESOURCES

Publications and Websites

American Wind Energy Association — Small Wind
http://www.awea.org/smallwind.html
Comprehensive resource on wind energy and energy systems. Includes:

- State-by-state wind energy pages
  www.awea.org/smallwind/index.html
- Small wind toolbox resource for individuals seeking to install a small wind system or for those interested in improving opportunities for small wind energy use.
  www.awea.org/toolbox/default.asp

Buying a Small Wind Electric System — A California Consumer's Guide
Developed for the California Energy Commission by Evergreen Energy LLC and its principals, Tom Starrs and Rob Harmon. (February 2002)
www.energy.ca.gov/renewables/marketing/2002-04-6_WIND_GUIDE.PDF

California Energy Commission — Renewable Energy Program
Renewable energy resources and information for residents of California.
www.consumerenergycenter.org

California Energy Network
Designed to facilitate the installation of wind and solar energy in California, as part of a multi-faceted consumer education program.
www.energybuilder.calenergy.org/

Database of State Incentives for Renewable Energy
Online database compiled by the Interstate Renewable Energy Council.
www.dsireusa.org

Federal Aviation Administration
www2.faa.gov

- Advisory Circular 70/7460-1K, Obstruction Marking and Lighting (2/3/00) (ATA-400)
- Advisory Circular 70/7460-2K, Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace (ATA 411)

Home Power Magazine
The hands-on journal of home-made power.
www.homepower.com

- Issue #90 includes Mick Sagrillo's article "Apples and Oranges: Choosing a Home-Sized Wind Generator."
  www.homepower.com/files/hp90-50.pdf

Iowa Energy Center — Wind Energy Manual
An online manual that walks you through the considerations involved with setting up a small wind system. Written for Iowa residents, but generally applicable.
www.energy.iastate.edu/renewable/wind/wem/wem-01_print.html

Renewable Energy Atlas of the West
Depicts in full color the renewable energy resources of 11 western states, including high-resolution wind maps that are searchable in the online version. Profiles wind, solar, geothermal, and biomass potential. From the Land and Water Fund of the Rockies, Black Graphics, NWSEED, and GreenInfo Network. (July 2002)
www.energyatlas.org

Wind Maps.org
High-resolution maps of wind energy potential in the Pacific Northwest. Resource estimates are accessible to the public through an interactive Geographic Information System (GIS) website.
www.windmaps.org

Wind Power for Farm, Home & Business

Comprehensive review of wind energy from micro wind turbines to megawatt machines, including site selection, installation, and operation. Other books by Paul Gipe include **Wind Energy Basics** and **Wind Energy Comes of Age**.
www.chelseagreen.com

Windustry — Wind Energy Basics

Basic information on wind energy and small wind project resources for rural and urban landowners.
www.windustry.com/basics/default.htm

Agencies and Incentive Programs

California Energy Commission

Renewable Energy Program
1516 Ninth Street, MS-45
Sacramento, CA 95814-5512
Phone: (800) 555-7794 (in California)
or (916) 654-4058 (outside California)
www.energy.ca.gov

- **Emerging Renewables Program**
  The California Energy Commission offers rebates of up to $2.30 per watt of qualified small wind turbines (up to 10 kW) for customers of Southern California Edison, Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Bear Valley Electric. Program funding was extended until at least 2012 by recent legislation.

  E-mail: renewable@energy.state.ca.us
  www.consumerenergycenter.org/erprebate

- **Guidebook for the Emerging Renewables Program**
  Covers all aspects of the rebate program, including eligibility requirements (for consumers and equipment), incentives, application rules, and forms.
  www.consumerenergycenter.org/erprebate/forms

- **List of Certified Small Wind Turbines**
  www.consumerenergycenter.org/erprebate/eligible_smallwind.html

- **List of Registered Small Wind Turbine Dealers**
  www.consumerenergycenter.org/erprebate/retailers.html

U.S. Department of Energy

- **Wind Energy Program**
  Provides information on the latest small wind turbine research, homeowner information, wind energy basics, answers to frequently asked questions, and links to wind publications and organizations.
  www.eere.energy.gov/wind

- **Wind Powering America**
  Compiles state wind maps, small wind consumer's guides, wind workshops, and much more. Visit the "Regional Activities" section to read news articles, press releases, and fact sheets.
  www.eere.energy.gov/windpoweringamerica

Nonprofit Organizations

American Solar Energy Society (ASES)

National organization dedicated to advancing the use of solar energy for the benefit of U.S. citizens and the global environment. ASES promotes the widespread near-term and long-term use of solar energy.
www.ases.org

American Wind Energy Association (AWEA)

Advocating the development of wind energy as a reliable, environmentally superior energy alternative in the United States and around the world.

122 C Street, NW, Suite 380
Washington, DC 20001
Phone: (202) 383-2500
www.awea.org

Golden State Power Cooperative

Helping California communities use the cooperative business model to own and operate their own nonprofit, member-controlled energy co-ops to ensure honest, efficient, affordable and reliable service.

14619 Hamlin Street
Van Nuys, CA 91411
Phone: (818) 988-8690
www.gspower.org

Interstate Renewable Energy Council (IREC)

Dedicated to accelerating the sustainable utilization of renewable energy sources and technologies in and through state and local government and community activities.

P.O. Box 1156
Latham, New York 12110-1156
Phone: (518) 458-6059
www.irecusa.org

Northwest Sustainable Energy for Economic Development (Northwest SEED)

Supports and develops creative programs, policies, and financing approaches to build rural economies and meet the Pacific Northwest's power needs through affordable, renewable energy generation.

119 1st Ave South, Ste. #400
Seattle, WA 98104
Phone: (206) 328-2441
www.nwseed.org

Union of Concerned Scientists

Independent alliance of concerned citizens and scientists committed to building a cleaner, healthier environment and a safer world. UCS analyzes and advocates energy solutions that are sustainable both environmentally and economically, with a focus on supporting policies that let renewables compete successfully.

2 Brattle Square
Cambridge, MA 02138-9105
Phone: (617) 547-5552
www.ucsusa.org

California Utility Companies

Pacific Gas and Electric Company

Phone: (415) 973-2628
www.pge.com

- **Net Metering: www.pge.com/gen/retail_gen_net_metering.shtml**
- **Utility Tariff: www.pge.com/customer_services/business/tariffs/pdf/ER21.pdf**

San Diego Gas & Electric Company

Phone: (858) 650-6166
www.sdge.com/Small_Wind_Electric_Systems

- **Net Metering: www.sdge.com/net_metering.html**
- **Utility Tariff: www.sdge.com/tm2/pdf/ERULE21.pdf**

Southern California Edison Company

Phone: (626) 302-6242 or (626) 302-9680
www.sce.com

- **Interconnection Application Form: www.sce.com/sc3/002_save_energy/002k_gen_your_own_power/nemfaq.htm**
- **Utility Tariff: www.sce.com/NR/sc3/tm2/pdf/Rule21.pdf**

For other utilities in California contact:
The California Public Utility Commission
www.cpuc.ca.gov/

County Planning and Permitting Contacts

For additional county information contact: Willie Beaudet of the California State Association of Counties at (916) 327-7500 x 517

Alameda County Planning Department
James Sorensen, Planning Director
399 Elmhurst Street
Hayward, CA 94544

Alpine County Planning Department
Brian Peters, Director
17300 State Highway 89
Markleeville, CA 96120

Amador County Land Use Agency
Susan C. Grijalva, Chief Planner
500 Argonaut Lane
Jackson, CA 95642-9534

Butte County, Department of Development Services Planning Division
Tom Parillo, Director
7 County Center Drive
Oroville, CA 95965

Calaveras County Community Development
Kim Hansen, Director
891 Mountain Ranch Road
San Andreas, CA 95249

Colusa County Department of Planning and Building
Steven Hackney, Director
220 12th Street
Colusa, CA 95932

Contra Costa County Community Development Department
Dennis M. Barry, Interim Director
651 Pine Street, 4th Floor
North Wing
Martinez, CA 94553

Del Norte County Community Development Department
Ernest Perry, Director
700 5th Street
Crescent City, CA 95531

El Dorado County Planning Department
Conrad B. Montgomery, Director
2850 Fairlane Court
Placerville, CA 95667

Fresno County Public Works and Development Services Department
Carolina Jimenez-Hogg, Director
Planning & Resources
2220 Tulare Street, 8th Floor
Fresno, CA 93721

Glenn County Resource Planning and Development Department
John Benoit, Director
125 South Murdock Street
Willows, CA 95988

Humboldt County Planning
Stephen R. Nielson, Acting Director
3015 H Street
Eureka, CA 95501

Imperial County Planning/ Building Department
Jurg Heuberger, Planning Director
939 Main Street
El Centro, CA 92243

Inyo County Planning Department
Chuck Thistlethwaite, Director
P.O. Drawer L
Independence, CA 93526

Kern County Planning Department
Ted James, Director
2700 M Street, Suite 100
Bakersfield, CA 93301

Kings County Planning Agency
William R. Zumwalt, Director,
Planning and Building Inspection
Kings County Government Center
Hanford, CA 93230

Lake County Community Development Department, Planning Division
Robert Cervantes, Director
255 North Forbes Street
Lakeport, CA 95453

Lassen County Department of Community Development
Robert K. Sorvaag, Director
707 Nevada Street, Suite 500
Susanville, CA 96130

Los Angeles County Department of Regional Planning
James E. Hartl, Director
320 West Temple Street
Los Angeles, CA 90012

Madera County Planning Department
Leonard Garoupa, Director
135 West Yosemite Avenue
Madera, CA 93637-3593

Marin County Community Development Agency, Planning Division
Alex Hinds, Director
3501 Civic Center Drive, Rm 308
San Rafael, CA 94903

Mariposa County Planning Department
Eric Toll, Director
PO Box 2039
Mariposa, CA 95338

Mendocino County Planning & Building Services Department
Raymond Hall, Director
501 Low Gap Road, Rm. 1440
Ukiah, CA 95482

Merced County Association of Governments
Bill Nicholson, Director
369 West 18th Street
Merced, CA 95340

Modoc County Planning
Scott Kessler, Planning Director, AICP
202 West Fourth Street
Alturas, CA 96101

Mono County Planning Department
Scott Burns, Director
PO Box 347
Mammoth Lakes, CA 93546

Monterey County Planning & Building, Inspection Department
William L. Phillips, Director
PO Box 1208
Salinas, CA 93902

Napa County Conservation Development and Planning Department
Charles Wilson, Director
1195 Third Street, Room 210
Napa, CA 94559

Nevada County Planning Department
Mark Tomich, Director
950 Maidu Avenue
Nevada City, CA 95959

Orange County Planning and Development Services Department
Thomas B. Matthews, Director
PO Box 4048
Santa Ana, CA 92702-4048

Placer County Planning Department
Fred Yeager, Director
11414 B Avenue
Auburn, CA 95603

Plumas County Planning Department
John S. McMorro, Director
520 Main Street, Room 121
Quincy, CA 95971

Riverside County Transportation and Land Management Agency/Planning Department
Aleta J. Laurence, Planning Director
PO Box 1409
Riverside, CA 92502-1409

Sacramento County Planning and Community Development Department
Thomas W. Hutchings, Director
827 7th Street, Room 230
Sacramento, CA 95814

San Benito County Planning Department
Rob Mendiola, Director
3220 Southside Road
Holister, CA 95023

San Bernardino County Land Use Services Department
Michael E. Hays, Director
385 North Arrowhead Avenue
3rd Floor
San Bernardino, CA 92415-0182

San Diego County Department of Planning and Land Use
Gary L. Pryor, Director
5201 Ruffin Road, Suite B
San Diego, CA 92123-1666

San Francisco Planning Department
Gerald G. Green
1660 Mission Street
San Francisco, CA 94103

San Joaquin County Community Development Department
Chet Davisson, Director
1810 East Hazelton Avenue
Stockton, CA 95205

San Luis Obispo County Department of Planning and Building
Victor Holanda, Director
County Government Center
San Luis Obispo, CA 93408

San Mateo County Environmental Services Agency, Planning and Building Division
Terry Burnes, Planning Administrator
590 Hamilton Street, 2nd Floor
Redwood City, CA 94063

Santa Barbara County Planning and Development
Valentin Alexeef, Director
123 East Anapamu Street
Santa Barbara, CA 93101-2058

Santa Clara County Department of Planning and Development
Michael M. Lopez, Office Manager
70 West Hedding Street
7th Floor, East Wing
San Jose, CA 95110

Santa Cruz County Planning Department
Alvin James
701 Ocean Street, Room 400
Santa Cruz, CA 95060

Shasta County Department of Resource Management Planning Division
Russ Mull
Director of Resource Management
1855 Placer Street
Redding, CA 96001

Sierra County Department of Planning
Tim H. Beals, Director
PO Box 530, Downieville, CA 95936

Siskiyou County Planning Department
Richard D. Barnu, Director
PO Box 1085, Yreka, CA 96097-1085

Solano County Department of Environmental Management
Christopher Monsk
Planning Program Manager
601 Texas Street, Fairfield, CA 94533

Sonoma County Permit & Resource Management Department
Pete Parkinson, Director
2550 Ventura Avenue
Santa Rosa, CA 95403

Stanislaus County Department of Planning and Community Development
Ron E. Freitas, Director
1100 H Street
Modesto, CA 95354-2380

Sutter County Community Services Department, Planning Division
Tom Las, Principal Planner
1160 Civic Center Blvd., Suite E
Yuba City, CA 95993

Tehama County Planning Department
George W. Robson, Director
444 Oak Street, Room 1
Red Bluff, CA 96080

Trinity County Planning Department
John Alan Jelicich, Director
PO Box 2819
Weaverville, CA 96093-2819

Tulare County Resource Management Agency
George E. Finney, Planning Director
5961 South Mooney Blvd.
Visalia, CA 93277

Tuolumne County Planning Department
Bev Shane, Director
2 South Green Street
Sonora, CA 95370

Ventura County Planning Division, Resource Management Agency
Keith Turner, Director
800 South Victoria Avenue
Ventura, CA 93009

Yolo County Community Development Agency
John Bencome, Director
292 West Beamer Street
Woodland, CA 95695

Yuba County Community Development Department
James P. Manning, Director
938 14th Street
Marysville, CA 95901

Small Wind Turbine Manufacturers and Distributors

Abundant Renewable Energy
(Distributor, African Wind Power generators)
22700 NE Mountain Top Rd.
Newberg, OR 97132
Phone: (503) 538-8292
www.abundantre.com

Aeromax Corporation
(Distributor, Lakota Turbines)
9234 E. Valley Rd., Suite E
Prescott Valley, AZ 86314
Phone: (888) 407-9463
www.aeromaxenergy.com

Atlantic Orient Corporation
P.O. Box 832, 49 Pownal Street
Charlottetown, P.E.I., C1A 7L9
(Prince Edward Island, Canada)
Phone: (902) 368-7171
www.aocwind.net

Bergey Windpower Company*
2001 Priestley Ave.
Norman, OK 73069 USA
Phone: (405) 364-4212
www.bergey.com

Southwest Windpower*
2131 N. First Street
Flagstaff, AZ 86004 USA
Phone: (928) 779-9463
www.windenergy.com

Photo courtesy Bergey Windpower

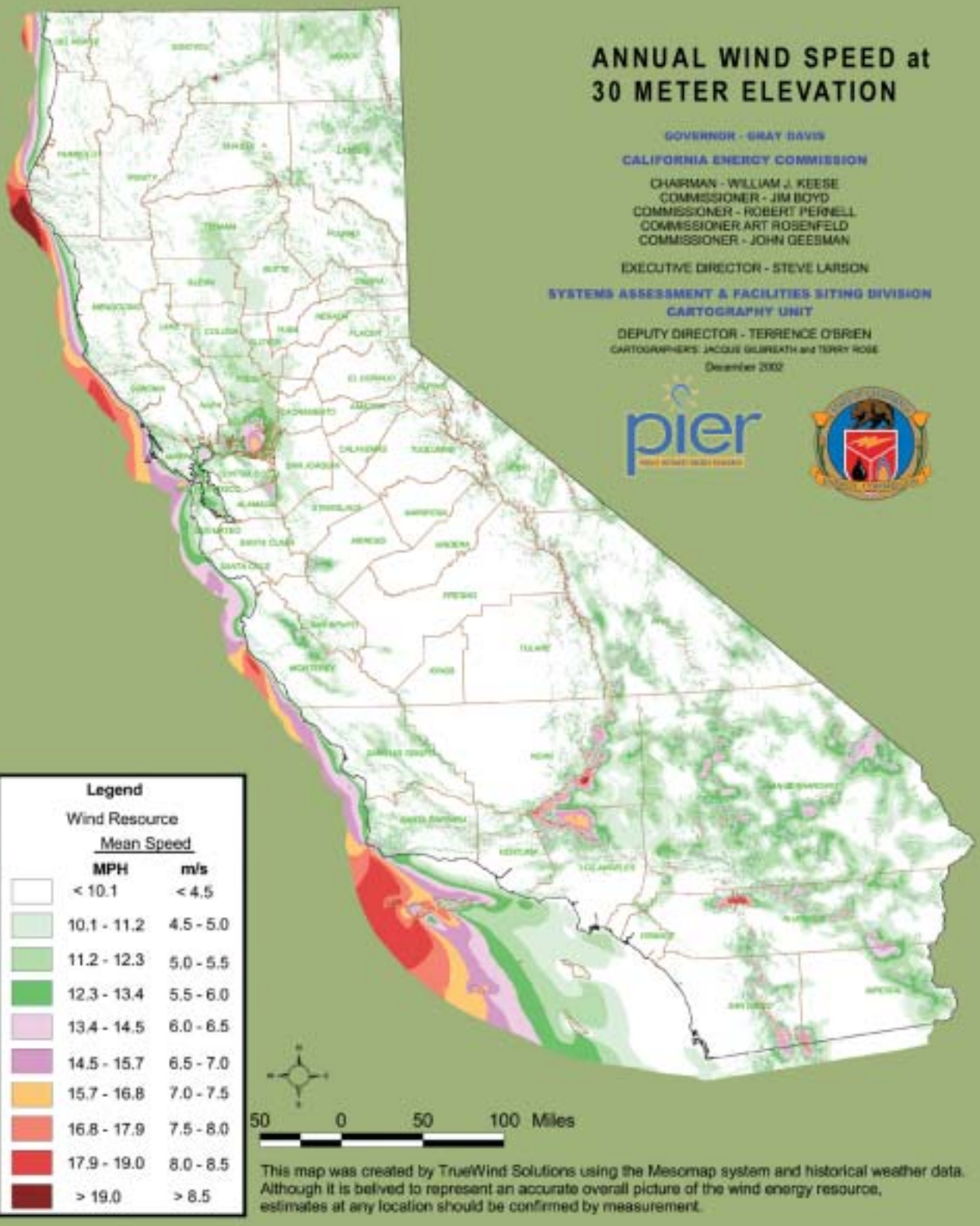
Courtesy Southwest Windpower

Courtesy Wind Turbine Industries Corp.

Wind Turbine Industries Corporation*
(manufacturer, Jacobs® Wind Energy Systems)
16801 Industrial Circle S.E.
Prior Lake, MN 55372
Phone: (952) 447-6064
www.windturbine.net

Solar Wind Works
(distributor, Proven Wind Turbines)
16713 Greenlee Road
Truckee, CA 96161
Phone: (530) 582-4503
www.solarwindworks.com

* manufacturer of California Energy Commission certified wind turbines


CALIFORNIA ENERGY COMMISSION
ANNUAL WIND SPEED at
30 METER ELEVATION
GOVERNOR - GRAY DAVIS
CALIFORNIA ENERGY COMMISSION
CHAIRMAN - WILLIAM J. KEESE
COMMISSIONER - JIM BOYD
COMMISSIONER - ROBERT PERNELL
COMMISSIONER ART ROSENFELD
COMMISSIONER - JOHN GEESMAN
EXECUTIVE DIRECTOR - STEVE LARSON
SYSTEMS ASSESSMENT & FACILITIES SITING DIVISION
CARTOGRAPHY UNIT
DEPUTY DIRECTOR - TERRENCE O'BRIEN
CARTOGRAPHERS: JACQUE GILBREATH and TERRY ROSE
December 2002
pier
Legend
Wind Resource
Mean Speed
MPH
m/s
< 10.1
< 4.5
10.1 - 11.2
4.5 - 5.0
11.2 - 12.3
5.0 - 5.5
12.3 - 13.4
5.5 - 6.0
13.4 - 14.5
6.0 - 6.5
14.5 - 15.7
6.5 - 7.0
15.7 - 16.8
7.0 - 7.5
16.8 - 17.9
7.5 - 8.0
17.9 - 19.0
8.0 - 8.5
> 19.0
> 8.5
50 0 50 100 Miles
This map was created by TrueWind Solutions using the Mesomap system and historical weather data.
Although it is belived to represent an accurate overall picture of the wind energy resource,
estimates at any location should be confirmed by measurement.

CALIFORNIA WIND POTENTIAL BY COUNTY

Based on 2002 California Energy Commission Wind Map Data

COUNTY	ACRES IN WIND CLASS 2-7*	% OF COUNTY IN WIND CLASS 2-7	ACRES WITH PRIME SMALL WIND DEVELOPMENT POTENTIAL**
San Bernardino	7,075,745	55%	610,514
Kern	1,588,973	30%	253,198
Imperial	1,082,929	38%	181,088
Riverside	2,144,764	46%	170,398
Los Angeles	1,038,075	40%	142,800
Solano	428,505	75%	120,651
Inyo	2,108,495	32%	112,311
San Diego	807,947	30%	62,026
Siskiyou	552,615	14%	24,937
Ventura	445,338	37%	22,312
Alameda	61,480	13%	15,545
Santa Barbara	514,992	29%	12,024
Lassen	474,358	16%	10,035
Mono	566,010	28%	9,268
Mendocino	189,666	8%	7,987
Modoc	398,353	15%	5,867
Contra Costa	97,774	20%	5,631
Shasta	341,459	14%	4,996
Humboldt	315,672	14%	4,607
Plumas	174,705	10%	4,110
Del Norte	145,231	22%	3,872
Marin	101,352	30%	3,767
San Joaquin	64,952	7%	3,526
San Luis Obispo	171,523	8%	2,881
Sierra	97,198	16%	2,137
Tehama	413,119	22%	2,135
Lake	67,725	8%	1,887
Sonoma	91,282	9%	1,782
Alpine	133,647	28%	1,677
Yolo	433,990	66%	1,577
Monterey	214,720	10%	1,544
Orange	99,737	20%	1,459
Butte	207,861	19%	761
Trinity	132,566	6%	740
Colusa	104,854	14%	635
Merced	90,180	7%	616
El Dorado	69,247	6%	579
Nevada	37,211	6%	494
San Benito	44,056	5%	447
Tulare	159,285	5%	443
Napa	34,977	7%	437
Placer	61,108	6%	425
Sutter	72,014	18%	292
Fresno	130,694	3%	267
San Mateo	61,647	21%	225
Santa Clara	14,704	2%	217
Stanislaus	28,750	3%	175
Glenn	170,009	20%	116
Kings	7,184	1%	108
Tuolumne	108,706	7%	91
Amador	7,621	2%	83
Calaveras	8,540	1%	69
Mader	35,731	3%	57
Santa Cruz	13,600	5%	7
San Francisco	12,900	43%	2
Sacramento	102,566	16%	-
Mariposa	7,091	1%	-
Yuba	726	-	-
TOTAL	**24,029,276**	**24%**	**1,815,826**

* At least 11.5 mph at 30 meters above ground

** At least 13.3 mph at 30 meters above ground (wind classes 3-7); urban areas, water bodies, protected land and <20% slopes are excluded

CALIFORNIA WINDIEST ZIP CODES BY REGION

Based on 2002 California Energy Commission Wind Map Data

Northern California

TOP ZIP CODES BY WIND DENSITY*

95538	95958	95551	96035	95917	95974	96078	96090
96094	96021	96092	95913	95564	95970	95589	95536
95963	96067	95943	95938	95558	96112	96071	96104
96038	95920	95982	95531				

TOP ZIP CODES BY PRIME SMALL WIND DEVELOPMENT ACREAGE**

94571	94585	95620	95687	94550
94514	94512	95468	95376	93514
95459	94533	93517	96107	96120
93546	94923	95457	94971	95694
94952	94929	95443	94510	93635

Central California

TOP ZIP CODES BY WIND DENSITY*

94535	94512	94966	94083	94104	94105	94123	94128
95625	95639	95680	94929	95697	94030	94571	95615
95612	95618	95641	94108	94133	94066	95690	95620
94923	95776	94005	95687	94107	94080	94937	94109
94971	94130	95698	94129	94510	95695	95616	95694
94940	94134	94585	94514	95837	94111	94565	95645
94965	94533	95937	94121	95931	94127	94525	94038
94103	94115	94014	95627	94124	94018	95688	94561
94015	94592	94131	95832	94555	95691	94924	95424
96107	94010	95950	95606	95912	95957	94521	95242
94117	94941	94112	94118	93517	95468	95450	94591
94019	93529	95721	96120				

TOP ZIP CODES BY PRIME SMALL WIND DEVELOPMENT ACREAGE**

96094	96064	95531	96065	96134
95536	96112	95543	96101	96130
96108	96054	95587	96013	96056
96115	95549	96114	96069	96104
96109	95987			

Southern California

TOP ZIP CODES BY WIND DENSITY*

93062	93021	92335	92377	91326	91330	91752	92323
92366	92398	93020	93042	93044	92336	92327	92316
91304	93502	92258	91310	91948	92509	91311	92378
91739	93551	92241	93534	92337	91324	93501	92240
93536	92376	91351	93528	92808	91362	93063	91905
93065	93532	92230	92501	92222	91307	91344	93554
92602	92282	91350	92285	92862	92223	92807	92259
93542	92365	93519	91384	92308	93243	92329	93505
93527	92267	93066	92284	92340	92252	93043	93560
91962	92312	93510	93504	92310	91325	91321	92203
92886	91934	92322	92326	92276	92304	91340	93552
93550	92338	92364	90265	92066	92278	91360	92887
92311	91760	92356	92220	93033	93012	92869	92345
91342	92283	92555	92239	91931	92262	92280	91301
92505	92610	92277	93437	92536	92004	92823	91320
93950	92036	93283	93555	92341	92676	92407	93041
93545	92332	93429	91306	92618	92392	93255	92371
92709	92404	92256	91709	92363	92561	91761	91331
91720	92539	91759	91963	93561	92582	91906	93436
92405	92314	91710	90704	92325	91980	92307	92620
92384	93117	93035	93960	92317	91381	93015	90272
91916	91343	92320	92352	92391	92339	93518	92242
92065	93516	92385	93240	91042	92782	93040	91361
92328	93434	91303	92070	92867	93543	93441	93953
92368							

TOP ZIP CODES BY PRIME SMALL WIND DEVELOPMENT ACREAGE**

92283	93536	93555	92365	92310
93501	92239	92363	92364	93560
92338	92304	93545	92332	91905
92278	92277	92285	92384	93527
92259	92311	93519	92241	92240
92004	92223	93021	93505	92220
91350	92230	93551	93436	92407
92327	92280	93550	91384	91962
93243	92356	92308	93561	92274
91906	92066	92262	92070	92555
92582	91720	93518	91934	93203
92036	92282	91752	93283	92377
92314	92267	93437	92336	93065
93066	93510	91739	91351	92561
92284	92509	92536	93532	92065
93452	93225	93063	92371	92242
92316	92539	92376	93552	92307
91342	92276	93920	92252	92544
93429	92309	90704	92086	91710
92320	91311	93255	93453	92347
93117	92258	91948	93020	92323
92366				

* 30% or more of land in Wind Class 2-7 (at least 11.5 mph at 30 meters above ground)

** At least 500 acres or at least 10% of land in Wind Class 3-7 (at least 13.3 mph at 30 meters above ground); urban areas, water bodies, protected land and <20% slopes are excluded

CALIFORNIA ENERGY COMMISSION
COMPLETED WIND FACILITIES FUNDED BY THE RENEWABLE ENERGY PROGRAM
RENEWABLE ENERGY PROGRAM
CALIFORNIA ENERGY COMMISSION
LEGEND
Renewable Technologies
Large Wind
(Greater than 10 Kilowatts)
Small Wind
(10 Kilowatts or less)
County Lines
Completed as of March 2003
Altamont Pass Wind Area
Tehachapi Wind Area
San Gorgonio Pass Wind Area

SMALL WIND ENERGY INSTALLATIONS BY COUNTY

196 small wind turbines have been installed in 40 of California's 58 counties under the Emerging Renewables Program, for a total of 862.1 kW installed capacity as of March 31, 2003.

Source: California Energy Commission

Pacific Gas and Electric Company

TOTAL NUMBER OF UNITS COMPLETED: 108

TOTAL INSTALLED CAPACITY (kW): 373.4 kW

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
Alameda	**10070**			
	630	Albany	94706	16-Aug-02
	9440	Livermore	94550	27-Nov-02
Amador	**11331.36**			
	472	Sutter Creek	95685	08-Nov-01
	453.12	Pioneer	95666	27-Nov-01
	453.12	Ione	95640	10-Jan-02
	453.12	Ione	95640	18-Jan-02
	9500	Fiddletown	95629	28-Aug-02
Butte	**14457.5**			
	855	Chico	95926	11-Jun-99
	2850	Oroville	95965	07-Mazr-02
	2820	Cohassett	95926	13-May-02
	2850	Oroville	95966	28-Jun-02
	2232.5	Chico	95973	25-Nov-02
	2850	Bangor	95914	26-Dec-02
Calaveras	**12380**			
	2880	Copperopolis	95228	08-Jun-01
	9500	Burson	95225	31-Jan-03
Colusa	**2820**			
	2820	Colusa	95932	04-Sep-02
Contra Costa	**24010**			
	9600	Brentwood	94513	28-Jun-00
	9200	Clayton		14-Jan-02
	470	Brentwood	94513	25-Feb-02
	4740	Brentwood	94513	05-Feb-03
El Dorado	**3384**			
	3384	Greenwood	95635	20-Nov-00
Fresno	**443**			
	443	Tollhouse	93667	15-May-00
Glenn	**9943.68**			
	443.68	Willows	95988	08-Aug-01
	9500	Orland	95963	14-Nov-01
Humboldt	**38762**			
	846	Freshwater	95503	25-Sep-00
	9200	Ferndale	95536	10-Dec-01
	9200	Ferndale	95536	21-Dec-01
	9200	Ferndale	95536	21-Dec-01
	9200	Alton	95540	26-Dec-01
	1116	Fortuna	95540	18-Oct-02
Lake	**3167**			
	887	Kelseyville	95451	18-Dec-00
	1140	Kelseyville	95451	27-Nov-01
	1140	Kelseyville	95451	27-Nov-01
Madera	**3988**			
	1756	Raymond	93653	26-Jul-02
	2232	Madera	93638	04-Sep-02
Marin	**1344.8**			
	448.4	Lagunitas	94938	11-Jul-01
	448.4	Bolinas	94924	06-Nov-01
	448	Tiburon	94920	04-Mar-02
Mendocino	**1888**			
	1440	Laytonville	95454	09-Mar-99
	448	Albion	95410	21-Dec-99
Merced	**1779.4**			
	1331	Gustine	95322	25-Jul-01
	448.4	Los Banos	93635	22-Feb-02
Napa	**897**			
	897	Pope Valley	94567	12-Jun-00
Nevada	**4223.68**			
	443.68	Nevada City	95959	11-Oct-01
	960	North San Juan	95960	30-Sep-02
	2820	Grass Valley	95949	27-Nov-02
Placer	**4176.48**			
	1920	Auburn	95603	07-Dec-99
	1812.48	Loomis	95650	15-Jan-02
	444	Newcastle	95658	13-Aug-02
Sacramento	**472**			
	472	Rancho Cordova	95670	16-May-01
San Francisco	**443.68**			
	443.68	San Francisco	94107	08-Nov-01

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
San Joaquin	**14885.18**			
	9500	Tracy	95304	11-Oct-01
	897	Lodi	95240	10-Dec-01
	1812.48	Tracy	95304	21-Feb-02
	2232	Linden	95236	02-May-02
	443.7	Acampo	95220	12-Aug-02
San Luis Obispo	**31898**			
	285	Arroyo Grande	93420	10-Mar-99
	9200	San Luis Obispo	93401	01-Nov-01
	4013	Atascadero	93422	23-May-02
	9200	Paso Robles	93451	30-May-02
	9200	San Luis Obispo	93405	20-Feb-03
San Mateo	**2724**			
	972	Pacifica	94044	20-Jan-00
	897	Burlingame	94010	22-Jan-02
	855	Pacifica	94044	24-Jan-02
Santa Barbara	**1116**			
	1116	Santa Ynez	93463	01-Aug-02
Santa Clara	**11245**			
	887	San Jose	95117	25-Jan-01
	1359	San Jose	95123	10-Jan-02
	2850	Gilroy	95020	14-Jan-02
	2242	Morgan Hill	95037	28-Jun-02
	2151	Morgan Hill	95037	28-Jun-02
	1756	Morgan Hill	95037	22-Jul-02
Santa Cruz	**11235.12**			
	376	Los Gatos	95033	22-Sep-00
	453.12	Davenport	95017	11-Oct-01
	9500	Santa Cruz	95066	06-Nov-01
	906	Santa Cruz	95060	29-Nov-01
Shasta	**20415**			
	887	Whitmore	96096	08-Jun-01
	9200	Redding	96001	25-Feb-02
	9200	Bela Vista	96008	18-Dec-02
	1128	Redding	96062	23-Jan-03
Siskiyou	**9200**			
	9200	Corning	96031	01-Nov-02
Solano	**58764**			
	9600	Rio Vista	94571	20-Jan-00
	10000	Birds Landing	94512	16-Aug-00
	9200	Suisun	94585	23-Oct-01
	9200	Suisun	94585	01-Nov-01
	9600	Suisun	94585	02-Nov-01
	9600	Vallejo	94591	15-Nov-01
	448	Martinez	94533	30-Apr-02
	1116	Vacaville	95688	19-Jul-02

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
Sonoma	**26667.4**			
	453	Santa Rosa	95404	01-Nov-99
	2880	Occidental	95465	13-Aug-01
	2054.4	Penngrove	94951	27-Aug-01
	9200	Glen Ellen	95442	05-Aug-02
	9200	Casadero	95421	14-Aug-02
	2880	Santa Rosa	95404	09-Oct-02
Tehama	**14250**			
	5760	Corning	96021	08-Nov-01
	2850	Gerber	96035	16-Nov-01
	2850	Corning	96021	02-May-02
	2790	Manton	96059	06-Sep-02
Yolo	**15703.8**			
	9600	Winters	95694	01-Nov-99
	4320	Esparto	95627	07-Nov-00
	896.8	Capay	95607	25-Nov-02
	887	Capay	95607	19-Feb-03
Yuba	**5277.8**			
	331	Oregon House	95962	28-Jun-02
	878	Oregon House	95962	27-Sep-02
	836.8	Oregon House	95962	30-Sep-02
	897	Oregon House	95962	03-Oct-02
	448	Oregon House	95962	06-Dec-02
	887	Oregon House	95962	13-Feb-03

Southern California Electric

TOTAL NUMBER OF UNITS COMPLETED: 83

TOTAL INSTALLED CAPACITY (kW): 479.3 kW

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
Kern	**140965**			
	2880	Rosamond	93560	29-Oct-99
	1410	Tehachapi	93561	01-Nov-99
	7200	Tehachapi	93561	01-Nov-99
	7200	Tehachapi	93561	01-Nov-99
	9500	Tehachapi	93561	18-Apr-00
	9600	South Lake	93240	01-Jun-00
	10000	Tehachapi	93561	02-Aug-00
	384	Rosamond	93560	02-Aug-00
	9500	Tehachapi	93561	05-Mar-01
	9500	Tehachapi	93561	05-Mar-01
	453	North Edwards	93523	17-Jul-01
	448	Tehachapi	93561	25-Jul-01
	9200	Tehachapi	93561	13-Sep-01
	9200	Rosamond	93560	25-Sep-01

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
Kern Continued...				
	9200	Tehachapi	93561	27-Nov-01
	9200	Willow Springs	93561	23-Jan-02
	9200	Rosamond	93560	24-Jan-02
	2850	Boron	93516	01-Jul-02
	2820	Ridgecrest	93555	13-Aug-02
	2820	Mojave	93501	04-Dec-02
	9200	Tehachapi	93561	13-Feb-03
	9200	Tehachapi	93561	25-Mar-03
Los Angeles	**30750.42**			
	1410	Pomona	91768	03-Jun-99
	960	Castaic	91384	09-Aug-01
	1992.72	Norwalk	90650	04-Sep-01
	2850	Lancaster	93536	27-Dec-01
	2850	Sauges	91350	17-Jan-02
	444	Lancaster	93535	16-Jul-02
	443.7	Torrance	90501	01-Aug-02
	2850	Agua Dulce	91350	05-Aug-02
	2850	Acton	93510	27-Aug-02
	5640	Palmdale	93550	19-Dec-02
	5640	Palmdale	93550	19-Dec-02
	2820	Palmdale	93550	21-Jan-03
Riverside	**27270**			
	3625	Riverside	92509	07-Dec-99
	940	Winchester	92596	18-Apr-00
	960	Winchester	92596	09-May-00
	2395	Temecula	92592	03-Apr-02
	950	Hemet	92545	23-May-02
	9200	Moreno Valley	92557	03-Jan-03
	9200	Moreno Valley	92557	04-Feb-03
San Bernardino	**266601**			
	897	Alta Loma	91737	21-Dec-99
	897	Hesperia	92345	21-Dec-99
	270	29 Palms	92277	15-Nov-00
	887	Apple Valley	92307	24-May-01
	443	Johnson Valley	92285	30-May-01
	9200	San Bernardino	92407	13-Sep-01
	9500	Oak Hills	92345	13-Sep-01
	9500	Apple Valley	92308	11-Oct-01
	2880	Phelan	92371	11-Oct-01
	9200	Victorville	92392	01-Nov-01
	9500	Hesperia	92345	01-Nov-01
	9200	Phelan	92371	14-Nov-01
	855	Lake Arrowhead	92352	27-Dec-01
	9200	Apple Valley	92308	16-Jan-02
	425	Morongo Valley	92256	14-Feb-02
	9200	Hesperia	92340	15-Feb-02
	9200	Oak Hills	92345	27-Feb-02
	9200	Devore	92407	01-Mar-02
	9200	Hesperia	92345	15-Mar-02
	9200	Phelan	92371	15-Mar-02

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
San Bernardino Continued...				
	9200	Barstow	92311	15-Mar-02
	9200	Apple Valley	92308	15-Mar-02
	9200	Hesperia	92345	22-Jul-02
	5700	Barstow	92311	16-Aug-02
	897	Victorville	92392	03-Sep-02
	9200	Apple Valley	92308	17-Sep-02
	9200	Phelan	92371	30-Oct-02
	9200	Phelan	92371	03-Jan-03
	2850	San Bernardino	92407	09-Jan-03
	9200	Apple Valley	92308	15-Jan-03
	9500	Lucerne Valley	92358	04-Feb-03
	9200	Apple Valley	92308	05-Feb-03
	9200	Lucern Valley	92356	05-Feb-03
	9200	Hinkley	92347	11-Feb-03
	9200	Oak Hills	92345	13-Feb-03
	9200	Phelan	92371	19-Feb-03
	9200	Hesperia	92340	21-Feb-03
	9200	Yermo	92398	13-Mar-03
San Diego	**2850**			
	2850	Ranchita	92066	09-Aug-01
Santa Barbara	**9200**			
	9200	Goleta	93117	30-Oct-02
Tulare	**453.12**			
	453.12	Tulare	93274	16-Jan-02
Ventura	**1166.9**			
	1166.9	Simi Valley	93065	20-Mar-02

San Diego Gas & Electric Company

TOTAL NUMBER OF UNITS COMPLETED: 5

TOTAL INSTALLED CAPACITY (kW): 9.4 kW

COUNTY	INSTALLED CAPACITY (Watts)	CITY	ZIP CODE	DATE COMPLETED
San Diego	**9418.8**			
	444	El Cajon	92019	22-Sep-00
	2850	Warner Springs	92086	28-Nov-00
	2850	El Cajon	92019	24-May-01
	424.8	San Diego	92111	30-Nov-01
	2850	Jamul	91935	19-Nov-02

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Renewable Energy Program
California Energy Commission

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www.awea.org/smallwind.html

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WIND ENERGY

Model Ordinance Options

New York Energy $mart℠
Public Service Commission — NYSERDA

NYSERDA
New York State Energy Research and Development Authority

Available at:
www.powernaturally.org
October 2005
NYS Energy Research & Development Authority
17 Columbia Circle
Albany, NY 12203-6399
www.nyserda.org

Prepared by:
Katherine Daniels, NY Planning Federation

This document is one of a series of reports and guides that are all part of the NYSERDA Wind Energy Tool Kit. Interested parties can find all the components of the kit at: www.powernaturally.org. All sections are free and downloadable, and we encourage their production in hard copy for distribution to interested parties, for use in public meetings on wind, etc.

Any questions about the tool kit, its use and availability should be directed to: Vicki Colello; vac@nyserda.org; 518-862-1090, ext. 3273.

In addition, other reports and information about Wind Energy can be found at www.powernaturally.org in the on-line library under "Large Wind."

NOTICE

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Wind Energy Model Ordinance Options

Introduction

Effective wind ordinance standards should address several objectives, including: ensuring public safety, identifying and minimizing on- and off-site impacts, promoting good land use practice, expressing local preferences, informing and involving the public and providing legal defensibility. Predictable and clear standards and a reasonable timeframe for review provide fairness for towns, wind developers and the public, and help to streamline the review process. Some flexibility is also needed in ordinance language to enable municipalities to respond to unique situations.

Local Review Options

A town does not have to employ zoning to develop and adopt a wind energy ordinance, although it is preferable as it better assures that the town will get the type of development it wants. There are a variety of ways in which towns can review and allow for wind energy facilities, as follows:

- As an outright permitted use
- With a special use permit
- Subject to site plan review
- As an accessory use
- Based on a use variance

These options are discussed further in the Toolkit section titled *Local Government's Role in the Approval Process.* In most cases, towns will probably want to use a combination of the special use permit and/or site plan review, especially for large, commercial wind energy facilities.

Zoning for Wind

A town that uses zoning and also has an up-to-date comprehensive plan that addresses the wind energy resource (see *Comprehensive Plan* discussion paper) is in an excellent position to proactively identify key wind energy areas that could be developed. The existing zoning for these areas could then be amended to allow wind energy facilities, subject to the town's chosen review process. However, sometimes these areas suitable for wind energy facilities are located within parts of multiple zones rather than primarily in one or two zones. In this case, it might make sense to create a *wind energy overlay zone* for application to these areas. An overlay would apply special wind energy review standards to proposed wind energy uses *in addition* to the standards that apply to the underlying zone. Careful attention to potential visual and avian impacts in defining the overlay area can greatly mitigate or even eliminate these issues when wind energy facilities are proposed. The overlay zone should be shown on the town's zoning map and could be an incentive to attract wind developers to the town.

Setbacks and Other Zoning Considerations

Many concerns associated with safety, noise and aesthetics can be addressed by placing distance between wind turbines and people, property lines, roads and certain environmental areas or scenic or historic landscapes. Although there is no consensus on appropriate distances or types of setbacks, there are several common themes that appear in a number of wind energy regulations that various communities have adopted.

Most local government requirements include setbacks for the distance between the wind turbine and residences/other buildings, property lines and roads. Property lines should always be part of the setback formula in order to provide consistency and not endanger future uses on adjacent parcels. A few communities have also defined setbacks from railroads, above-ground transmission lines and other specific uses. The most common way to define a setback distance is in terms of a multiple of the turbine height. Other options are to specify a fixed distance or a combination of a fixed distance and a multiple of the turbine height. Setbacks should be at least as great as the height of the turbine. When specifying the structure height, it is important to define whether the height is considered the top of the tower or the highest point reached by the rotor blade.

Some communities provide that setbacks may be reduced when doing so would enhance aesthetic, noise or safety considerations. Turbines should be exempt from property line setbacks if the adjacent property contains a wind turbine from the same plant or the adjacent property is a participant in the project through a land lease and/or wind access agreement. This is an important consideration since turbine layouts and plant infrastructure can result in many parcels of land being utilized for one project.

Communities may adopt noise regulations that apply to wind facilities. These can involve the use of setbacks. Noise impacts may be measured at the property line or at the location of the affected uses – residences and certain other public uses. Use of property lines in determining setbacks assures that future uses of unbuilt adjacent parcels will not be exposed to unreasonable noise impacts.

When establishing setbacks, the intended protective effect must be balanced with economic considerations for wind projects. For instance, very large setbacks that could be viewed as providing maximum mitigation of adverse noise, visual and environmental impacts could render a sizable percent of a proposed site unusable for wind turbines reducing the overall number of turbines that could be accommodated, and thereby making the project not feasible.

Height restrictions are a part of most zoning ordinances and can also have an adverse, though unintended, impact on wind turbine installations. Many local height restrictions do make exceptions for church spires, silos, cell towers and similar uses. In areas where wind energy facilities are to be permitted, height exceptions should similarly include wind turbines.

Some communities specify a minimum height for the blade tips above ground level. Minimum limits are driven by safety concerns and typically range from 15 to 30 feet. Because today's commercial wind turbines are typically installed on towers of at least 200 feet, minimum levels above ground are unlikely to be an issue. Although small turbines are installed on lower towers, their rotors are also smaller and so these limits should not be an issue.

For a discussion of appropriate review standards for environmental and cultural impacts, see the *Environmental* section of this Toolkit.

Wind Energy Model Ordinance Options

The following is a mix/match menu of options for creating a local wind energy ordinance. Because no two towns are alike, included are a variety of choices for addressing the many issues involved in a review of a proposed wind energy facility. The standards below are drawn primarily from adopted wind energy ordinances in New York State and around the country. They are grouped under general headings that address different aspects of a wind energy ordinance. Typically, a few issues are addressed under each heading. Where there are multiple ways to address the same essential issue, we have provided "or" language to point out the choices. "And" language is used to identify review standards that are linked and should be used together. In some cases, just one sample standard on a particular issue is offered.

While some standards, particularly most of those that address safety concerns and setbacks, are basic and need to be included in any wind energy ordinance, other standards should be considered optional and considered for inclusion based on the particular circumstances, objectives and desires of each town or municipality.

Purpose

Any new wind ordinance standards should be accompanied by a purpose statement that explains the intent of the new provisions. Examples of possible purpose statements are as follows:

- The purpose of this district is to foster the development of the Town's wind power resources while preserving farmlands and adjoining settlements as compatible adjoining uses.

or

- It is the purpose of these amendments to provide a wind power overlay district and certain regulations regarding setbacks and other requirements relative to wind power facilities.

or

- The purpose of the ordinance is to provide a regulatory scheme for the construction and operation of Wind Energy Facilities in the Town, subject to reasonable restrictions, which will preserve the public health and safety.

Findings

A brief statement of findings provides a rationale for the purpose of the ordinance. The following is a sample findings statement:

- The Town finds that wind energy is an abundant, renewable and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on nonrenewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Wind energy systems also enhance the reliability and power quality of the power grid, reduce peak power demands and help diversify the state's energy supply portfolio.

Definitions

Wind energy facilities should be specifically defined in municipal zoning ordinances to ensure that the language of the ordinance legally applies to them. While some existing broad definitions for uses such as 'public or semi-public utilities,' 'industrial uses' or even 'accessory uses' might be argued to include some types of wind energy facilities, they are not likely to apply to the full range of wind energy facilities, including small to large applications. A specific definition of wind energy facilities also provides Towns with a basis for the adoption of approval and siting standards that are specific to this use. The following are examples of definitions for this use.

- Wind Energy Facility: An energy facility that consists of one or more wind turbines or other such devices and their related or supporting facilities that produce electric power from wind and are a) connected to a common switching station or b) constructed, maintained or operated as a contiguous group of devices.

or

- Wind Power Generating Facility: Facilities at which wind is converted to another form of energy and distributed to a customer or customers.

or

- Wind Energy Facility: An electricity-generating facility consisting of one or more wind turbines under common ownership or operating control that includes substations, MET towers, cables/wires and other building accessories to such facility, whose main purpose is to supply electricity to off-site customer(s).

Information to be Submitted

Some of the following information may already be required to be submitted as part of a special use permit or site plan review. However, there may be a need to require the submission of some additional information, depending on the ordinance standards that towns adopt. The following are types of information that towns could request:

- The applicant and landowner's name and contact information.
- The tax map numbers, existing use and acreage of the site parcel.

- A survey map at an appropriate scale showing the proposed location of the wind energy facility (including access roads) as it relates to the boundaries of the parcel, adjacent ownerships and existing residences/schools, churches, hospitals, or libraries to a distance of 2,000 feet (or other measure).
- A survey map at an appropriate scale showing any federal, state, county or local parks, recognized historic or heritage sites, state-identified wetlands or important bird areas as identified in federal, state, county, local or New York Audubon's GIS databases or other generally-available documentation.
- Standard drawings of the wind turbine structure, including the tower, base and footings, drawings of access roads, and including an engineering analysis and certification of the tower, showing compliance with the applicable building code.
- Data pertaining to the tower's safety and stability, including safety results from test facilities.
- Proposal for landscaping and screening.
- A completed Environmental Assessment Form.
- A project visibility map, based on a digital elevation model, showing the impact of topography upon visibility of the project from other locations, to a radius of three miles from the center of the project. The scale used shall depict the three-mile radius as no smaller than 2.7 inches, and the base map used shall be a published topographic map showing man-made features, such as roads and buildings.
- No fewer than four, and no more than the number of proposed individual wind turbines, plus three color photos, no smaller than 3" by 5", taken from locations within a three-mile radius from the site and to be selected by the Planning Board, and computer-enhanced to simulate the appearance of the as-built site facilities as they would appear from these locations.

Approval Standards

The standards chosen must be integrated into whatever local review process is used by the town. The standards that follow may be used in addition to existing special use permit and site plan review standards, if the town feels they are applicable, or the following may be used to create a stand-alone set of review standards that substitute for any existing review standards.

Typical site plan review standards for a wind energy facility would be those that assure proper design and site layout. This would cover most safety, setback and siting and installation issues. Typical special use permit issues for wind energy facilities are those that assure compatibility of the use with and minimal adverse impacts on neighboring properties. This would cover nuisance and most environmental and visual issues. A town that uses both the site plan review process and the special use permit will be in the best position to fully consider all aspects of proposed wind energy facilities.

A town that wishes to allow small wind energy facilities through an outright permitting or accessory use process with minimal review may still use some of the following standards, provided that compliance can be readily determined by the town's code enforcement office.

Safety:

- The minimum distance between the ground and any part of the rotor blade system shall be thirty (30) feet.

- To limit climbing access, a fence six feet high with a locking portal shall be placed around the facility's tower base or the tower climbing apparatus shall be limited to no lower than 12 feet from the ground, or the facility's tower may be mounted on a roof top.

or

- Wind turbine towers shall not be climbable up to 15 feet above ground level.

and

- All access doors to wind turbine towers and electrical equipment shall be lockable.

and

- Appropriate warning signage shall be placed on wind turbine towers, electrical equipment and wind energy facility entrances.

- Towers shall be equipped with air traffic warning lights and shall have prominent markings on the rotor blade tips of an international orange color where the total height of the tower exceeds 175 feet.

or

- Use the minimum lighting necessary for safety and security purposes and use techniques to prevent casting glare from the site, except as otherwise required by the FAA or other applicable authority.

or

- Wind energy facilities shall not be artificially lighted, except to the extent required by the FAA or other applicable authority.

- All wind turbines shall have an automatic braking, governing or feathering system to prevent uncontrolled rotation, overspeeding and excessive pressure on the tower structure, rotor blades and turbine components.

- Prior to issuance of a building permit, the applicant shall provide the town proof of a level of insurance to be determined by the Town Board in consultation with the Town's insurer, to cover damage or injury that might result from the failure of a tower or towers or any other part or parts of the generation and transmission facility.

- Any wind energy system found to be unsafe by the local enforcement officer shall be repaired by the owner to meet federal, state and local safety standards or removed within six months. If any wind energy system is not operated for a

continuous period of 12 months, the Town will notify the landowner by registered mail and provide 45 days for a response. In such a response, the landowner shall set forth reasons for the operational difficulty and provide a reasonable timetable for corrective action. If the Town deems the timetable for corrective action as unreasonable, they must notify the landowner and such landowner shall remove the turbine within 120 days of receipt of notice from the Town.

Siting and Installation:

- Use existing roads to provide access to the facility site, or if new roads are needed, minimize the amount of land used for new roads and locate them so as to minimize adverse environmental impacts.

- Combine transmission lines and points of connection to local distribution lines.

- Connect the facility to existing substations, or if new substations are needed, minimize the number of new substations.

- All wiring between wind turbines and the wind energy facility substation shall be underground.

or

- Electrical controls and control wiring and power lines shall be wireless or underground except where wind farm collector wiring is brought together for connection to the transmission or distribution network, adjacent to that network.

- The wind power generation facility, if interconnected to a utility system, shall meet the requirements for interconnection and operation as set forth in the electric utility's then current service regulations applicable to wind power generation facilities.

- Any construction involving agricultural land should be done according to the NYS Department of Agriculture and Market "Guidelines for Agricultural Mitigation for Wind Power Projects" (which can be found at: www.agmkt.state.ny.us, "construction projects affecting farmland.")

Setbacks:

- The minimum setback distance between each wind turbine tower and all surrounding property lines, overhead utility or transmission lines, other wind turbine towers, electrical substations, meteorological towers, public roads and dwellings shall be equal to no less than 1.5 times the sum of proposed structure height plus the rotor radius.

or

- Each wind turbine shall be set back from the nearest residence, school, hospital, church or public library a distance no less than the greater of (a) two (2) times its total height or (b) one thousand (1,000) feet.

or

- All wind power generating facilities shall be located at least 50 feet plus the height of the structure from roads and side and rear lot lines.

or

- Setbacks for wind power generating facilities shall be 100 feet plus the height of the structure from lot lines and 1,500 feet from existing residential structures.

or

- The wind energy system shall be set back a distance equal to one hundred ten (110) percent of the height of the tower plus the blade length from all adjacent property lines and a distance equal to one hundred and fifty (150) percent of the tower height plus blade length from any dwelling inhabited by humans on neighboring property.

or

- Each wind turbine shall be set back from the nearest property line a distance no less than 1.1 times its total height, unless appropriate easements are secured from adjacent property owners.

and

- Each wind turbine shall be set back from the nearest public road a distance no less than 1.1 times its total height, determined at the nearest boundary of the underlying right-of-way for such public road.

and

- Each wind turbine shall be set back from the nearest above-ground public electric power line or telephone line a distance no less than 1.1 times its total height, determined from the existing power line or telephone line.

Nuisance:

- Individual wind turbine towers shall be located so that the level of noise produced by wind turbine operation shall not exceed 55 dBA, measured at the site property line.

or

- Audible noise due to wind energy facility operations shall not exceed fifty (50) dBA for any period of time, when measured at any residence, school, hospital, church or public library existing on the date of approval of the wind energy facility.

- The applicant shall minimize or mitigate any interference with electromagnetic communications, such as radio, telephone or television signals caused by any wind energy facility.

or

- No individual tower facility shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the link's operation.

and

- No individual tower facility shall be installed in any location where its proximity with fixed broadcast, retransmission or reception antenna for radio, television or

wireless phone or other personal communications systems would produce electromagnetic interference with signal transmission or reception.

Environmental and Visual:

- Brand names or advertising associated with any installation shall not be visible from any public access.

or

- Wind turbines shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the wind energy facility.

- Colors and surface treatment of the installation shall minimize visual disruption.

or

- Wind turbines shall be painted a non-reflective, non-obtrusive color.

or

- The design of the buildings and related structures shall, to the extent reasonably possible, use materials, colors, textures, screening and landscaping that will blend the facility into the natural setting and existing environment.

- Appropriate landscaping shall be provided to screen accessory structures from roads and adjacent residences.

- Where wind characteristics permit, wind towers shall be set back from the tops of visually prominent ridgelines to minimize the visual contrast from any public access.

and/or

- Towers shall be designed and located to minimize adverse visual impacts from neighboring residential areas, to the greatest extent feasible.

and/or

- The tower shall not significantly impair a scenic vista or scenic corridor as identified in the Town's comprehensive plan or other published source.

or

- No individual tower facility shall be installed at any location that would substantially detract from or block the view of the major portion of a recognized scenic vista, as viewed from any public road right-of-way or publicly-accessible parkland or open space within the Town.

- Avoid, to the extent practicable, the creation of artificial habitat for raptors or raptor prey, such as a) electrical equipment boxes on or near the ground that can provide shelter and warmth, b) horizontal perching opportunities on the towers or related structures or c) soil where weeds can accumulate.

- Wind turbines shall be set back at least 2,500 feet from Important Bird Areas as identified by New York Audubon and at least 1,500 feet from State-identified wetlands. These distances may be adjusted to be greater or lesser at the discretion

of the reviewing body, based on topography, land cover, land uses and other factors that influence the flight patterns of resident birds.

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UW Extension

Small Wind Energy System Model Ordinance — An Overview

Written by: Sherrie Gruder

Small wind turbines are being installed to supply power to a variety of sites -- including farms, businesses and schools. A small-scale wind energy system can help make a home or business energy-independent. A grid-connected wind system provides the benefits of wind energy and the consistency of the utility. An off-grid system has no connection to utility lines, so it is very useful in isolated locations. Installing a wind turbine is a productive way of offsetting high utility costs while making a commitment to the community and the environment.

The most significant barrier to small wind turbine installation can be local zoning. This has been an incidental result of uncertainty about large wind farms by some communities. To help educate local officials, Focus on Energy and UW-Extension have developed a small wind energy system model ordinance for local towns and counties. The ordinance complies with the relevant state statute, WI s.s. 66.0401, governing a municipality's ability to regulate wind systems.

There are several ways a town or county can use the small wind energy system model ordinance. It can be adopted as-is, or it can be used as the basis for a conditional-use permit. For example, the Town of Ahnapee in Kewaunee County took out the standards, abandonment, and permit requirements sections and put them into a conditional-use permit. The Town of Merton in Waukesha County is doing the same thing. Alternatively, Calumet County adopted many of the recommendations in the small wind energy model ordinance and placed it into the overall county wind ordinance that also includes large wind.

For further assistance with small scale wind energy systems and issues, go to the Focus on Energy Web site at www.focusonenergy.com/renewableenergy or call 800 762-7077. With specific questions on zoning issues related to wind, contact Mick Sagrillo through Focus on Energy or directly at (920) 837-7523, msagrillo@itol.com.

focus on energy
The power is within you.

With staff in Green Bay, Madison, Milwaukee and Stevens Point, SHWEC has been providing quality environmental education and technical assistance throughout Wisconsin since 1990. To contact a SHWEC Specialist go to

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University of Wisconsin, United States Department of Agriculture and Wisconsin Counties Cooperating. UW-Extension provides equal opportunities in employment and programming including Title IX and ADA.

Small Wind Energy System Ordinance

Note: This ordinance was funded in part through the Focus on Energy Program

The following agencies provided input for the development of the Small Wind Energy System Ordinance:

Focus on Energy
National Renewable Energy Laboratory
Public Service Commission of Wisconsin
University of Wisconsin-Extension Service
Wisconsin Division of Energy
Wisconsin Towns Association

The following people helped develop, gave legal input as appropriate, and reviewed the Small Wind Energy System Ordinance:

David Blecker, 7th Generation Energy Systems
Alex DePillis, Renewable Energy Engineer, Wisconsin Division of Energy
Jim Green, National Renewable Energy Laboratory
Sherrie Gruder, University of Wisconsin-Extension Service
Paul C. Helgeson, Senior Engineer, Public Service Commission of Wisconsin
John Hippensteel, Lake Michigan Wind & Sun
Larry Krom, Focus On Energy Renewable Energy Program
Shelly Laffin, Focus On Energy Renewable Energy Program
Carol Nawrocki, Legal Counsel, Wisconsin Towns Association
Brian Ohm, Legal Specialist, University of Wisconsin-Extension Service
Cheryl Rezabek, Chief of Planning and Evaluation, Wisconsin Division of Energy, Department of Administration
Mick Sagrillo, Wind Energy Specialist, Focus On Energy Renewable Energy Program
Michael Vickerman, Focus On Energy Renewable Energy Program
Patrick Walsh, Energy and Environmental Specialist, University of Wisconsin-Extension Service
Don Wichert, Director, Focus On Energy Renewable Energy Program

The Small Wind Energy System Ordinance was developed as a permitted use ordinance, as we were advised that this would be the more difficult ordinance to draft. The ordinance can be simply used as a conditional use permit for a small wind turbine by inserting sections into the permit:

00.05 Standards
00.06 Permit Requirements.
00.07 Abandonment.

Small Wind Energy System Ordinance

00.01 Title.

This ordinance may be referred to as the Small Wind Energy System Ordinance.

00.02 Authority.

This ordinance is adopted pursuant to authority granted by:
For counties: Wis. Stat. § 59.69 and 66.0401
For towns and villages: Wis. Stat. § 60.61 or 60.62 and 62.23(7), or 60.22(3) and 66.0401

00.03 Purpose.

The purpose of this ordinance is to:

(1) Oversee the permitting of small wind energy systems

(2) Preserve and protect public health and safety without significantly increasing the cost or decreasing the efficiency of a small wind energy system (per Wis. Stat. §. 66.0401).

00.04 Definitions.

In this ordinance:

(1) "Administrator" means the (County or Town) of _____ Land Use Administrator or Planning and Zoning Administrator

(2) "Board" means the (County or Town) of _____ Board of Supervisors.

(3) "Meteorological tower" (met tower) is defined to include the tower, base plate, anchors, guy cables and hardware, anemometers (wind speed indicators), wind direction vanes, booms to hold equipment anemometers and vanes, data logger, instrument wiring, and any telemetry devices that are used to monitor or transmit wind speed and wind flow characteristics over a period of time for either instantaneous wind information or to characterize the wind resource at a given location.

(4) "Owner" shall mean the individual or entity that intends to own and operate the small wind energy system in accordance with this ordinance.

(5) "Rotor diameter" means the cross sectional dimension of the circle swept by the rotating blades.

(6) "Small wind energy system" means a wind energy system that
(a) is used to generate electricity;
(b) has a nameplate capacity of 100 kilowatts or less; and
(c) has a total height of 170 feet or less.

(7) "Total height" means the vertical distance from ground level to the tip of a wind generator blade when the tip is at its highest point.

(8) "Tower" means the monopole, freestanding, or guyed structure that supports a wind generator.

(9) "Wind energy system" means equipment that converts and then stores or transfers energy from the wind into usable forms of energy (as defined by Wis. Stat. §. 66.0403(1)(m). This equipment includes

any base, blade, foundation, generator, nacelle, rotor, tower, transformer, vane, wire, inverter, batteries or other component used in the system.

(10) “Wind generator” means blades and associated mechanical and electrical conversion components mounted on top of the tower.

00.05 Standards.

A small wind energy system shall be a permitted use in all zoning districts subject to the following requirements:

(1) Setbacks. A wind tower for a small wind system shall be set back a distance equal to its total height from:

(a) any public road right of way, unless written permission is granted by the governmental entity with jurisdiction over the road;

(b) any overhead utility lines, unless written permission is granted by the affected utility;

(c) all property lines, unless written permission is granted from the affected land owner or neighbor.

(2) Access.

(a) All ground mounted electrical and control equipment shall be labeled or secured to prevent unauthorized access.

(b) The tower shall be designed and installed so as to not provide step bolts or a ladder readily accessible to the public for a minimum height of 8 feet above the ground.

(3) Electrical Wires. All electrical wires associated with a small wind energy system, other than wires necessary to connect the wind generator to the tower wiring, the tower wiring to the disconnect junction box, and the grounding wires shall be located underground.

(4) Lighting. A wind tower and generator shall not be artificially lighted unless such lighting is required by the Federal Aviation Administration.

(5) Appearance, Color, and Finish. The wind generator and tower shall remain painted or finished the color or finish that was originally applied by the manufacturer, unless approved in the building permit.

(6) Signs. All signs, other than the manufacturer’s or installer’s identification, appropriate warning signs, or owner identification on a wind generator, tower, building, or other structure associated with a small wind energy system visible from any public road shall be prohibited.

(7) Code Compliance. A small wind energy system including tower shall comply with all applicable state construction and electrical codes, and the National Electrical Code.

(8) Utility notification and interconnection. Small wind energy systems that connect to the electric utility shall comply with the Public Service Commission of Wisconsin’s Rule 119, “Rules for Interconnecting Distributed Generation Facilities.”

(9) Met towers shall be permitted under the same standards, permit requirements, restoration requirements, and permit procedures as a small wind energy system.

00.06 Permit Requirements.

(1) Building Permit. A building permit shall be required for the installation of a small wind energy system.

(2) Documents: The building permit application shall be accompanied by a plot plan which includes the following:

(a) Property lines and physical dimensions of the property
(b) Location, dimensions, and types of existing major structures on the property
(c) Location of the proposed wind system tower
(d) The right-of-way of any public road that is contiguous with the property;
(e) Any overhead utility lines;
(f) Wind system specifications, including manufacturer and model, rotor diameter, tower height, tower type (freestanding or guyed)
(g) Tower foundation blueprints or drawings
(h) Tower blueprint or drawing

(3) Fees. The application for a building permit for a small wind energy system must be accompanied by the fee required for a building permit for a Permitted Accessory Use.

(4) Expiration. A permit issued pursuant to this ordinance shall expire if:

(a) The small wind energy system is not installed and functioning within 24-months from the date the permit is issued; or,

(b) The small wind energy system is out of service or otherwise unused for a continuous 12-month period.

00.07 Abandonment.

(1) A small wind energy system that is out-of-service for a continuous 12-month period will be deemed to have been abandoned. The Administrator may issue a Notice of Abandonment to the owner of a small wind energy system that is deemed to have been abandoned. The Owner shall have the right to respond to the Notice of Abandonment within 30 days from Notice receipt date. The Administrator shall withdraw the Notice of Abandonment and notify the owner that the Notice has been withdrawn if the owner provides information that demonstrates the small wind energy system has not been abandoned.

(2) If the small wind energy system is determined to be abandoned, the owner of a small wind energy system shall remove the wind generator from the tower at the Owner's sole expense within 3 months of receipt of Notice of Abandonment. If the owner fails to remove the wind generator from the tower, the Administrator may pursue a legal action to have the wind generator removed at the Owner's expense.

00.08 Building Permit Procedure.

(1) An Owner shall submit an application to the Administrator for a building permit for a small wind energy system. The application must be on a form approved by the Administrator and must be accompanied by two copies of the plot plan identified in 00.06 (2) above.

(2) The Administrator shall issue a permit or deny the application within one month of the date on which the application is received.

(3) The Administrator shall issue a building permit for a small wind energy system if the application materials show that the proposed small wind energy system meets the requirements of this ordinance.

(4) If the application is approved, the Administrator will return one signed copy of the application with the permit and retain the other copy with the application.

(5) If the application is rejected, the Administrator will notify the applicant in writing and provide a written statement of the reason why the application was rejected. The applicant may appeal the Administrator's decision pursuant to Chapter 68 Wis. Statutes. The applicant may reapply if the deficiencies specified by the Administrator are resolved.

(6) The Owner shall conspicuously post the building permit on the premises so as to be visible to the public at all times until construction or installation of the small wind energy system is complete.

00.09 Violations.

It is unlawful for any person to construct, install, or operate a small wind energy system that is not in compliance with this ordinance or with any condition contained in a building permit issued pursuant to this ordinance. Small wind energy systems installed prior to the adoption of this ordinance are exempt.

00.10 Administration and Enforcement.

(1) This ordinance shall be administered by the Administrator or other official as designated.

(2) The Administrator may enter any property for which a building permit has been issued under this ordinance to conduct an inspection to determine whether the conditions stated in the permit have been met.

(3) The Administrator may issue orders to abate any violation of this ordinance.

(4) The Administrator may issue a citation for any violation of this ordinance.

(5) The Administrator may refer any violation of this ordinance to legal counsel for enforcement.

00.11 Penalties.

(1) Any person who fails to comply with any provision of this ordinance or a building permit issued pursuant to this ordinance shall be subject to enforcement and penalties as stipulated in ch. ___ section ___ of the zoning code.

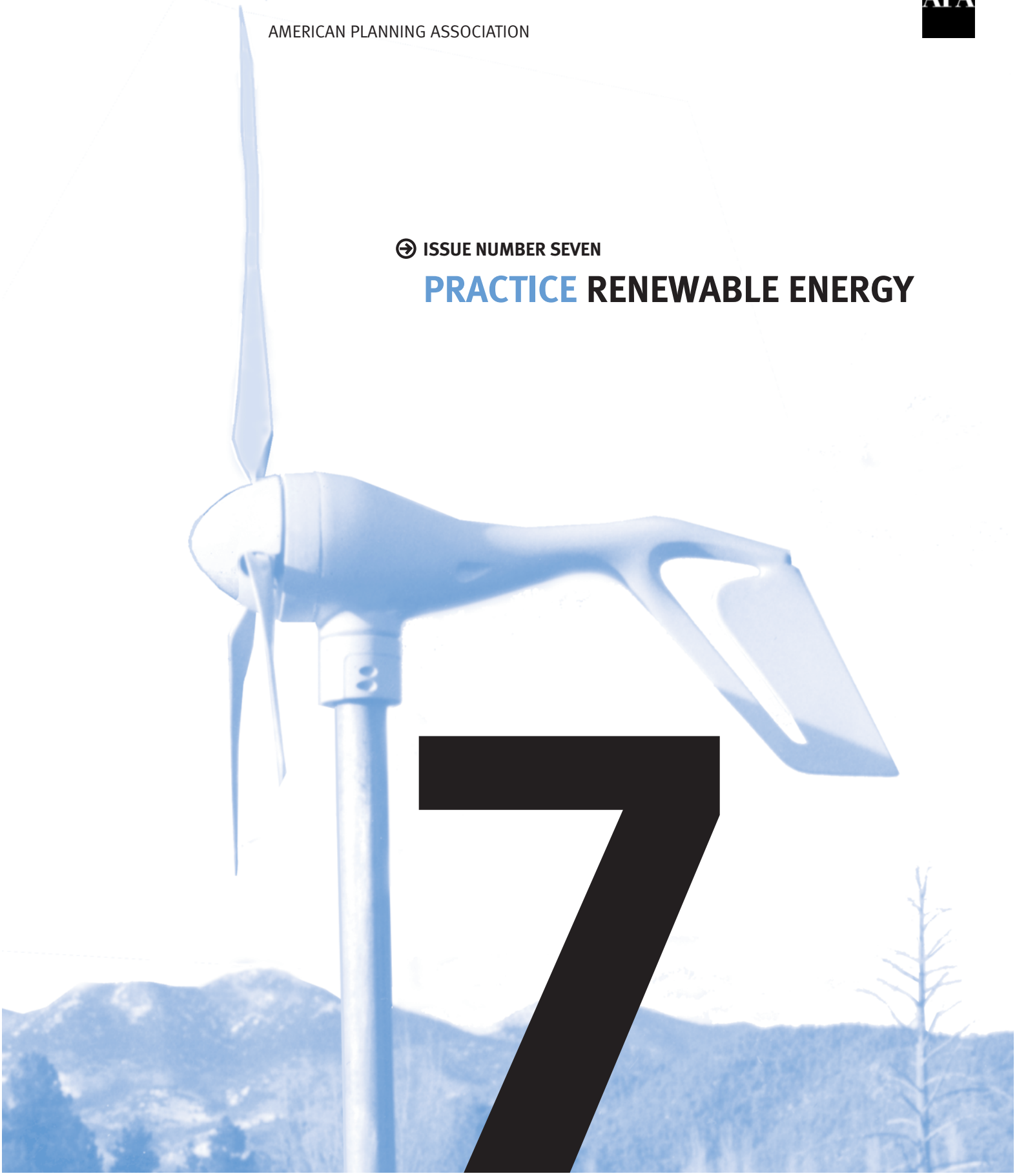
(2) Nothing in this section shall be construed to prevent the (County or Town) Board from using any other lawful means to enforce this ordinance.

00.12 Severability.

The provisions of this ordinance are severable, and the invalidity of any section, subdivision, paragraph, or other part of this ordinance shall not affect the validity or effectiveness of the remainder of the ordinance.

ZONINGPRACTICE July 2008

AMERICAN PLANNING ASSOCIATION



ISSUE NUMBER SEVEN

PRACTICE RENEWABLE ENERGY

7

Urban Wind Turbines

By Erica Heller

Wind is an abundant renewable resource in much of the U.S.

Courtesy of DOE/NREL–International Brotherhood of Electrical Workers

This turbine at the International Brotherhood of Electrical Workers Local 103 in Dorchester, Massachusetts, represents the upper limit of small wind energy conversion systems.

As wind power development expands, technologies are being developed and improved to increase efficiency and reduce impacts. A range of new turbines (wind energy conversion systems, or WECs) enable wind power to be harnessed in a much wider variety of settings than ever before, including in urban and suburban settings.

Many local governments that have never processed an application for a wind turbine permit may find themselves needing to review one in coming years. In fact, most of these communities are unprepared to review these permits and lack the standards to ensure safe installation in compatible locations. This can result in lengthy, costly public review processes that yield mixed results.

SMALL WIND

"Small wind" refers to turbines rated 100 kW or less that can be used to power farms, homes, or businesses. The vast majority of nonrural applications for wind are small WECs, sited as accessory uses to a primary business or residential use. The photo on the left shows a 100 kW WEC located at the offices of the International Brotherhood of Electrical Workers Local 103 in Dorchester, Massachusetts—this is as big as "small" wind gets. A WEC used at a residence (such as that shown on page 4) is typically smaller—up to 10 kW and about 50 to 80 feet high (depending on a number of factors, as will be discussed). Even smaller WECs may be used for targeted applications, such as the systems shown on page 5, which are mounted on light poles to offset power used by the lights in a shopping center parking lot in Lakewood, Colorado. Rooftop models, often used in rows, are a newer type of small wind that is growing in popularity for commercial applications and urban areas.

URBANIZED SETTINGS

This article focuses on incorporating small WECs in urbanized settings. The science of small wind is the same across urban and rural settings, and the discussion here may also be useful for planners in rural areas. However, this article does not specifically address rural settings. Within urbanized settings, there are a variety of zoning districts in which WECs may be appropriate, including industrial, commercial, and even residential neighborhoods, as the images in this article depict. Successful integration of WECs in densely built environments requires careful examination of potential impacts and thoughtful standards that balance mitigation against the cost effectiveness of installing a turbine.

POWER FROM SMALL WECS

Planners often ask if small WECS produce enough energy to justify both installation

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About the Author
Erica Heller is an associate with Clarion Associates based in Denver, Colorado. She has six years of experience working on community and neighborhood plans, development codes, and airport land use plans. Prior to joining Clarion, she was a long-range planner for Lakewood, Colorado. Heller recently presented at the APA National Conference in Las Vegas on the topic of zoning standards for wind turbines.

costs and potential land-use impacts. Because WECs can be controversial, it is reasonable to ask if they are effective. The answer depends partly on planners and local officials. A small WEC can produce impressive amounts of power, but only with access to good wind, which is largely a function of proper siting and adequate height—factors that zoning regulations impact mightily.

UNDERSTANDING LOCAL WIND RESOURCES

The U.S. Department of Energy (DOE) and National Renewable Energy Laboratory (NREL) provide state-level wind resource maps for nearly every state in the U.S., and some state governments provide more detailed maps. Wind resource maps show the average strength of the wind at 50 meters, with a ranking between 1 (weakest) and 7 (strongest). Most utility wind developers today look for areas with steady Class 4 or 5 winds, but Class 2 or 3 winds, which are found in much of the U.S., can power small WECs.

Large-scale wind maps are a free resource that can help a community understand generally if wind energy potential is likely to exist. To determine the actual wind power generation potential of a given site, a site-specific wind resource assessment by a qualified professional is needed. Site-specific assessments are typically the responsibility of the property owner.

FACTORS THAT INFLUENCE ENERGY PRODUCTION

How much energy a WEC will produce depends primarily on three factors:

(1) The engineered design of the turbine, which determines efficiency of power transfer. Modern WECs are highly engineered and most are very efficient.

(2) The size of the rotor. Capacity increases with "swept area," meaning the total area of the spinning rotor blades. Area, and thus capacity, increases geometrically with blade length.

(3) The speed and consistency of the wind. Power output increases exponentially with wind speed, but gusty or turbulent winds can damage turbines. Variations in topography and obstructions such as buildings and trees slow the wind and add turbulence near the ground. Therefore, adequate height is a critical factor in WEC effectiveness. In order to function well, the lowest part of the rotor blades must be a minimum of 25 to 35 feet higher than surrounding obstructions. Height regulations that do not achieve such separation eliminate the benefits of investing in a WEC.

The National Renewable Energy Laboratory provides estimates of yearly energy generation potential for small wind turbines. Using these figures, it is possible to estimate the power generation potential for various turbine sizes and wind classes and to gauge the number of average U.S. homes that can be powered. The table below illustrates the variation by wind speed and rotor size (assuming good wind access). Depending on such factors, a residential turbine can often supply about one-third to one-half of an average U.S. home's energy demand and a substantially greater percentage if the home is energy efficient. Larger "small" WECs can supply consumers with higher energy demand, such as commercial or public facilities.

CARBON EMISSION REDUCTIONS FROM WIND-GENERATED ENERGY

Using 100 percent wind-generated energy versus typical utility energy can reduce annual carbon emissions by eight tons for a U.S. home with typical energy demand. This is equivalent to the carbon emissions produced annually by 1.4 typical U.S. passenger cars. Thus, for an average two-car household, converting the

MEDIAN NUMBER OF HOMES POWERED BY SELECTED WECS SIZES AND WIND CLASSIFICATIONS

	Wind Strength					
Rotor Diameter	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
3 m	0.3	0.3	0.3	0.4	0.4	0.5
5 m	0.7	1.0	1.2	1.3	1.5	1.9
7 m	1.4	2.0	2.3	2.6	3.0	3.7
10 m	2.9	4.1	4.8	5.4	6.1	7.5
12 m	4.1	5.9	6.9	7.7	8.8	10.8

Estimated NREL median yearly energy production figures, expressed as kWh per square meter of swept area, are multiplied by swept area, then divided by U.S. national average annual home energy usage to estimate the number of average homes powered

Robin Wilson

A small 10 kW residential turbine in San Francisco's Mission District.

home to 100 percent wind power reduces carbon emissions as much as driving one car 40 percent less and not using the other car at all! If we take the need to reduce carbon emissions seriously—as many studies and recent global events strongly suggest that we should—then incorporating WECs into our communities may be a more practical approach than radical changes to our driving behavior. Communities should seriously consider how and where to allow WECs to ensure that regulations are not so strict as to eliminate their potential for effective energy production.

THE CASE FOR LOCAL ACTION

In addition to reducing CO_2 emissions, there are several important reasons that local governments should draft reasonable standards for WECs:

(1) *Respond to community desires.* Ultimately, permitting decisions are local decisions. Permitting takes public time and resources, especially when uses must be approved through discretionary approvals. Good zoning standards that address potential impacts can allow WECs to be permitted as by-right uses, at least in some districts, reducing public cost and NIMBY battles.

(2) *Maintain local autonomy.* In several windy states, state legislatures have restricted the ability of local governments to deny permits for WECs. By proactively adopting reasonable, locally appropriate standards, local governments reduce the likelihood that states will override local control.

(3) *Protect local resources.* Many states offer incentives such as rebates or buy-down programs for WECs. Where public funds are used to encourage WECs, standards should ensure that this money is well spent.

(4) *Diversify energy supply.* Small-scale WECs can help diversify energy supply. Many small WECs are less vulnerable to attack than a centralized plant. If a storm, system overload, or terrorism event shuts down energy grids, small WECs can provide dispersed backup power.

One of the least expensive alternatives for small increases in grid energy capacity is to allow small-scale producers, since they, rather than the utility, purchase and maintain the infrastructure. Such investments may delay or reduce the need for major capital investments by the utility.

COMMUNITIES ALLOWING TURBINES IN SUBURBAN AND URBAN SETTINGS

- Brewster, Massachusetts (www.town.brewster.ma.us)
- Centennial, Colorado (www.centennialcolorado.com)
- Chicago (www.cityofchicago.org)
- Duluth, Minnesota (www.duluthmn.gov)
- Fairfield, California (www.ci.fairfield.ca.us)
- Mason City, Iowa (www.masoncity.net)
- Saco, Maine (www.sacomaine.org)
- San Francisco (www.ci.sf.ca.us)

Note: Not all communities fully conform to the recommendations in this article.

LAND-USE IMPACTS AND RESPONSIVE STANDARDS

Wind turbines can have impacts on surrounding property owners and land uses. Permit requests for wind turbines may be controversial—particularly in residential areas—due to both real and perceived impacts. Impacts can be grouped in four categories: noise impacts (normal and storm conditions); safety impacts (electrical and structural safety, potential for climbing, and avian impacts); aesthetic impacts (appearance and visibility); and property value impacts. Each of these categories is discussed below, along with zoning tools and standards to address them.

In this discussion the assumed goal is to adequately address impacts in a way that is responsive to realistic concerns but not onerous to the turbine owner. Time and cost requirements for permitting are among the biggest hurdles for many potential turbine owners and can quite easily determine whether a WEC is cost effective. For this reason, local governments should strive to keep requirements to the minimum necessary to address impacts.

NOISE IMPACTS AND STANDARDS

Although noise is often a first concern of neighbors, small WECs are less noisy than most people expect and rather easy to regulate. The noise from a modern small WEC that would be used in a residential setting (up to about 10 kW) can be compared to a flag flapping in the wind. To further illustrate, the noise level measured 50 feet away from a WEC on an 80-foot tower is approximately 45 decibels—quieter than standing next to a kitchen refrigerator. When operating in extremely

Due to variation in noise performance of different turbine models, standards to address noise that specify turbine size may produce varied results, and local governments should adopt a standard for noise measured at the property line.

windy conditions, noise levels may be slightly higher, but so will ambient wind-related noise, such as that made by wind in trees. Noise levels are reduced by a factor of four for each doubling of distance (as measured from the turbine to the listener). Thus, off-property noise intrusion from a residential WEC is typically very limited.

Due to variation in noise performance of different turbine models, standards to address noise that specify turbine size may produce varied results, so local governments should adopt a standard for noise measured at the property line. In general, it is appropriate to use the same standard for "nuisance noise" that the community applies to all other activities in the zoning district. Adding the caveat "or 10 decibels above ambient noise levels" gives some leeway to turbine owners during very windy conditions when ambient noise levels rise and neighbors are less likely to be outdoors. This caveat also helps if the neighborhood is already impacted by another noise source, such as a freeway. By measuring noise at the property line, the turbine owner can limit it by using a quieter model, increasing setbacks, adding a fence or hedge along the property line, or other techniques.

Belmar, a large mixed use redevelopment in Lakewood, Colorado, has wind turbines on top of street lights, solar-powered parking meters, and some of the most energy-efficient commercial buildings in the Denver area.

Erica Heller

SAFETY IMPACTS AND STANDARDS

Safety is, of course, an important concern. Local governments should address three main issues when writing zoning and permitting standards for WECs: structural failure, electrical failure, and climbing potential. This section concludes with a brief discussion of safety-related issues associated with windfarms. Although risks for small wind are minimal, opponents often raise safety concerns, and planners should be aware of these concerns and be prepared to respond.

Structural Failure

One concern with wind turbines near property boundaries is that the supporting pole or tower could fall down. However, structural failure in a WEC is extremely unlikely. A turbine is a significant investment, as are the engineered towers and poles on which they are installed. WECs are not sold as do-it-yourself appliances. Rooftop models must be installed on structures that are engineered to accommodate the additional weight and stress. The likelihood of structural failure in a properly installed WEC is not more likely than for a flag pole, and is much less likely than for trees. Even so, a setback requirement of 1.1 to 1.5 times the total height of the WEC (i.e., tower or pole height plus rotor radius) is a reasonable requirement. Such setbacks address a range of potential impacts including safety, noise, and aesthetics, and can give neighbors peace of mind.

In most cases the local building inspector can verify that installation conforms to approved plans. It is not necessary to require an engineer to certify installation, except in cases where a reduced setback is to be approved with recorded consent of the adjacent property owner.

Because WECs are installed by professionals, additional certifications add unnecessary expense for a small WEC owner. Soil testing is generally unnecessary and is often cost prohibitive; it should only be required if soils are so weak as to merit testing for

AeroVironment, Inc.

The Adventure Aquarium in Camden, New Jersey, uses a modular, rooftop-mounted turbine system that eliminates the need for stand-alone support towers.

similar structures, such as flag poles or cell towers.

Finally, it is reasonable that, as for billboards and cell towers, local regulations require an owner of an abandoned WEC to remove it from the property. Over time, an abandoned system might become a structural hazard.

Electrical Failure

Electrical failure is highly unlikely in a modern WEC. Like individual furnace units, these systems are factory certified by engineers for electrical integrity, and thus third-party inspection for an individual turbine is unnecessary. Modern systems also come equipped with manual override brakes so that in the event of an electrical outage the turbine may be shut down. To make sure that the property owner installs a WEC that meets modern standards, local governments should require a permit applicant to submit the manufacturer's electrical drawings and require that the system is equipped with manual braking.

Climbing Potential

WECs on towers may raise the concern that children will try to climb supporting structures and fall, causing injury or death. Many pole-mounted turbines lack climbable features (they are designed to be lowered to the ground for servicing) or have removable climbing features below 12 feet. Local governments should only require fences around WECs if equivalent regulations apply to similar uses; designs that lack climbing features should be exempt.

Safety and Nuisance Issues of Large WECs

Neighbors may express the following concerns that are associated with large, utility WECs. Planners should be ready to respond.

- *Effects on birds.* The effects of WECs on birds has received much attention due to documented bird kills at a windfarm in Altamont Ridge, California, which is located in a major raptor migration corridor. A small WEC kills fewer birds than a single domestic cat or sliding glass door. Except perhaps in critical endangered bird species habitats, where even very small population losses are unacceptable, WECs should not be restricted based on avian impacts.
- *Acoustical interference.* The slow-spinning blades on large WECs can cause thumping vibro-acoustical effects or cast flickering shadows. Faster rotating, smaller WECs do not cause the same effects. Radio signal interference is also associated with some large turbines. Modern small-scale wind turbine blades are not metal, so they are "invisible" to radio frequency transmissions.
- *Ice buildup.* A concern about turbines in northern climates is that they can accumulate and then throw off ice. This has been observed occasionally in windfarms. However, chunks of ice on the surface of the lightweight blades of small WECs alter aerodynamics so much as to slow or stop the blades from turning until most ice has melted. English and German scholars in a 1998 study used physics to calculate that the risk of personal or property damage from flying ice from a small WEC is lower than the risk of being hit by lightning.

AESTHETIC IMPACTS AND STANDARDS

The appearance of wind turbines is a serious issue in many communities. Opinions vary widely about whether WECs are attractive, based largely on personal taste. Urban environments are not visually pristine, and many of the concerns about aesthetics may sound familiar to planners who have already dealt with aesthetic opposition to satellite dishes, cell towers, and even modern archi-

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tecture. Visibility and appearance are two major issues related to wind turbine aesthetics.

Visibility

WECs are usually quite visible because they must be placed high enough to access good wind. Sometimes, height can actually decrease their visibility from the street. More often, though, a community has to decide if the aesthetic impact is serious enough to enforce height standards that would compromise a system's functionality. Small WECs must be mounted at least 25 to 35 feet above surrounding objects—between 50 to 120 feet (the higher the better) in order to perform well. At lower heights, even if there is a lot of wind, it will be so turbulent that the turbine will wear out quickly, before installation costs can be recouped. In densely built environments, where there are many objects at varying heights creating turbulence, height becomes even more important. A local jurisdiction with standards that allow WECs but severely restrict heights can inadvertently undermine the effectiveness of the system, its potential sustainability benefits, and the substantial investment of the turbine owner.

Appearance

The appearance of a turbine is an aesthetic issue, and one that is readily and easily controlled without impacting effectiveness. Sound responses to appearance issues include the following:

- *Color.* Do not require special colors to blend with trees. Studies show that the light gray factory color of most turbines is the best for blending into a range of sky conditions.
- *Signs.* Clarify that WECs cannot be used as, or used to support, signage that is not otherwise approved through the sign ordinance.
- *Removal.* Require removal of abandoned WECs. If a system is not productive, the visual impact should be eliminated.
- *Lighting.* Do not require special lighting except in airport districts. Structures less than 500 feet in height are not considered flight hazards unless located in close proximity to an airport.
- *Restrictions.* Consider restricting WECs in specific unique areas. The aesthetic impact of wind turbines may be unacceptable in historic and character districts or in special view corridors.

PROPERTY VALUE IMPACTS

One concern that resonates with local officials is the potential impact of wind turbines on surrounding residential property values. Although there have been no statistical studies of the impact of small WECs on property values, most available evidence suggests that adjacent property values and sale prices do not decrease. In fact, values may *increase* because the WEC signals a positive community attitude toward renewable energy and because adjacent owners recognize the potential benefits of a turbine on their own property. The likely effect from small systems can also be inferred from studies of large WECs. The only longitudinal study of property values near windfarms shows that on average, after an initial dip during the farm's construction, the value of properties within sight of a windfarm actually increased faster than similar properties.

On properties where windfarms had detectable nuisance impacts (such as noise), value does decrease. It is important that local standards protect against any nuisance impacts of small WECs, but communities should not assume that aesthetic impacts alone lower adjacent property values.

SUMMARY

While turbines can have a variety of potential impacts in urban areas, most are easily remedied through reasonable standards. Local standards should strive to protect neighbors from nuisance or safety impacts without restricting property owners who wish to install WECs. Performance standards such as permissible noise levels, setback requirements, height limitations, and exceptions can ensure that one man's turbine is not another man's migraine.

Local standards and requirements should consider the impacts of permit costs or regulations that substantially reduce the ability of WECs to effectively serve their purpose. The aesthetic impact of turbines is a real concern for many residents, but aesthetics alone do not appear to have a measurable effect on neighboring property values. The impacts of WECs should be compared to similar structures that are allowed to create visual impacts in our urban settings, particularly those associated with power generation and transmission. Ultimately, each community will need to decide if the benefits of clean, local power generation are valuable enough to justify the visual impact of turbines in some zoning districts.

> A community has to decide if the aesthetic impact of a WEC is serious enough to enforce height standards that would compromise a system's functionality.

Cover photo: Small wind turbines like this AIR 403 from Southwest Windpower can be used to recharge recreational vehicle batteries or reduce residential energy. Courtesy of DOE/NREL—Southwest Windpower

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IS YOUR COMMUNITY READY FOR SMALL WIND?

7

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Planning and Zoning for Wind Power Facilities

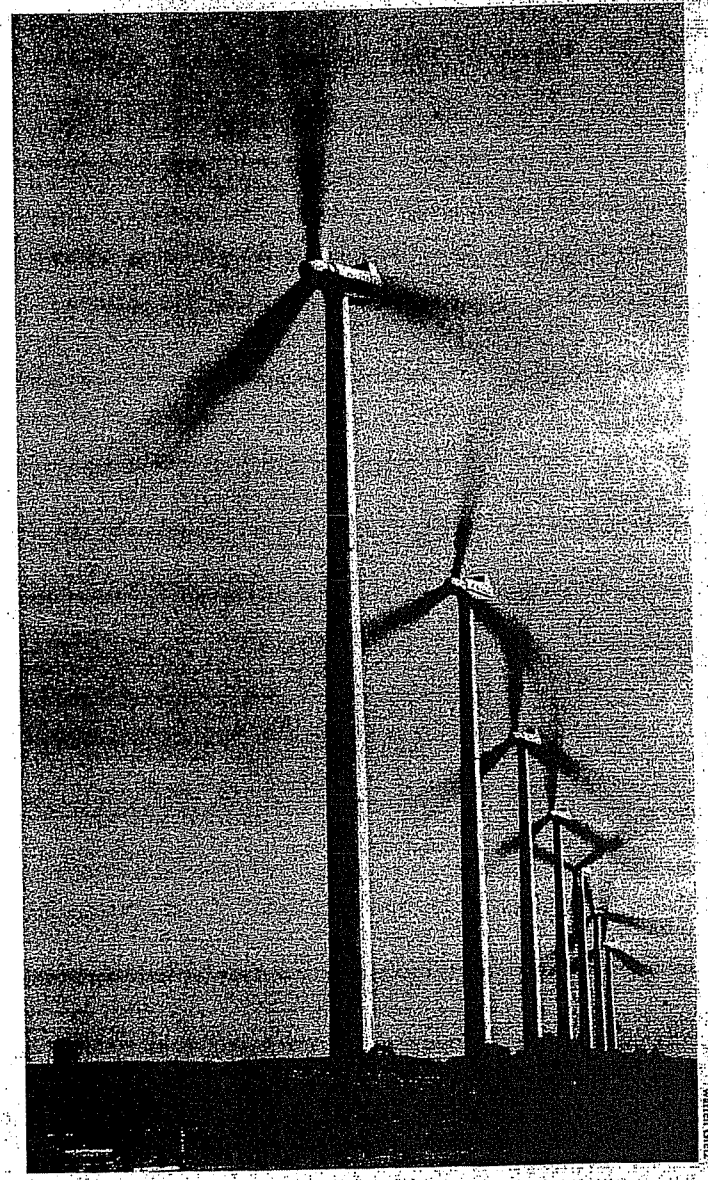
By Erin Kilpatrick and Mark Wyckoff, FAICP

Towering kinetic sculptures topped by giant whirling blades are altering America's pastoral landscape. "Spurred by the desire for an environmentally clean and renewable fuel to help meet growing demand for electricity, wind energy development is also seen as a potential source of economic benefits," according to the Minnesota State Department of Commerce's report *Harvesting the Wind: Minnesota's Growing Wind Energy Industry*. Along with solar energy farms, wind turbine farms are the most promising source of "green" or renewable energy, although waste-to energy, landfill gas, and hydroelectric power also will be important renewable energy sources in some locales.

Alternative energy production has far fewer pollutants and may replace coal-burning power plants over time, but what should a planning commission or professional planner be concerned about with wind power? This issue of *Zoning News* examines siting criteria and major impacts of wind turbines in the context of local planning and zoning.

Wind Turbine Facilities

Wind energy systems use the wind to turn a set of aerodynamic blades attached to an electric generator or turbine. When the wind blows, the blades turn, spinning a shaft that creates electricity in a generator. Wind turbines currently being manufactured have power ratings ranging from 250 to two million watts (2 MW). For example, Traverse City Light and Power in northern Michigan has a 600 kW (600,000 watts) wind generator that provides power for approximately 160 households.



Warren Gretz

Wind source of public service company—Public Service of Colorado Ponnequin Wind Farm. Each turbine can generate 700,000 watts of energy, or enough electricity to meet the needs of 225 homes.

Siting Criteria

As might be expected, wind facility siting and permitting has similar considerations that would concern the siting of any other large energy facility. The three major criteria for siting windmills are just what one might guess: steady wind, close proximity to the power transmission grid, and large open land area. Generally, wind energy companies will set up test towers to determine the wind speed and direction. Naturally, areas at higher elevations are often best as the wind blows there more consistently. Because wind turbines produce less energy than natural gas powered facilities, and therefore bring in less revenue, it is preferable to locate the windmills one mile or less from the transmission grid (in order to

ASK THE AUTHOR

. . . about this article. Join us online!

During March 3-14, go online to participate in our "Ask the Author" forum, an interactive feature of *Zoning News*. Mark Wyckoff, FAICP, will be available to answer questions about this article. Go to the APA website at www.planning.org and follow the links to the "Ask the Author" section. From there, just submit your questions about the article using an e-mail link. The author will reply, posting the answers cumulatively on the website for the benefit of all subscribers. This feature will be available for selected issues of *Zoning News* at announced times. After each online discussion is closed, the answers will be saved in an online archive available through the APA *Zoning News* webpages.

WHY THE CURRENT BOOM IN WIND TURBINE ELECTRIC GENERATION IN AMERICA?

- American energy use is high and continues to rise.
- The U.S., with about 4.7 percent of the world's population, accounts for 25 percent of the world's total energy consumption.
- Between 1991 and 2000, world energy consumption increased by 13.8 percent while U.S. consumption grew by 17.2 percent.
- The U.S. has been a net importer of energy since the 1950s, and imports have risen dramatically in that time. Nearly all U.S. energy imports are oil. Threats of war in the Mideast greatly put these imports at risk.
- Largely because of technical improvements in blade design, materials, and computerized controls, wind turbines have begun to be a competitive option for power (often less than 6 cents a kilowatt hour).
- Electric energy deregulation is enhancing competition in energy production—this creates an opening for small electric generation facilities.
- Some states provide financial and tax incentives for wind energy.
- Climate change has focused attention on air pollution; renewable energy sources shine compared to coal or natural gas-fired power plants.

Source: Based on research by Joe Schultz, Managing Editor, *Technology and Culture*, and data assembled by the U.S. Energy Information Administration. Full source citations for each point are found in the October 2002 issue of *Planning & Zoning News*, pages 6-11, Planning & Zoning Center, Inc., 715 N. Cedar Street, Lansing, MI 48906.

avoid costs of long connecting wires). Bay Windpower, which has developed several wind turbine facilities in Michigan, also has had to reinforce the electrical grid at the connecting substations. This can be a large additional cost to the producer.

In Denmark, one of the world leaders in wind energy production and in producing wind turbines, many wind-generating facilities have been located offshore. This minimizes the surface roughness, or obstacles in the terrain that deflect and inhibit wind patterns. A major offshore wind energy project is currently pending in Cape Cod. That project has generated enormous controversy because of its large scale (potentially dozens of wind turbines), visual impact, and possible avian impact.

According to the National Wind Coordinating Committee, an organization with representation from both public and private stakeholder groups, wind generation facilities tend to be located in rural or remote areas, unlike most energy facilities, and are "land-intrusive rather than land-intensive." Thus, they may extend over a very large area and have a broad area of influence, but physically occupy only three to five percent of this acreage for the turbine towers, associated structures, and access roads. The rest of the acreage may be left largely undisturbed and available for other compatible purposes. For this reason, wind turbines are often located on farmland, where landowners may continue to raise crops or graze stock on pastureland. This can be a huge financial advantage for farmers and ensures the long-term protection of farmland.

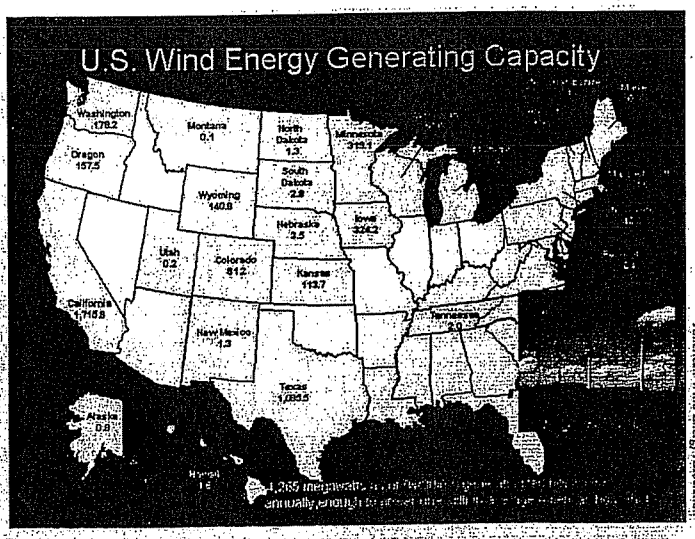
Wind Turbine Impacts

As stated on a Danish informational website on wind power, "Wind turbines are always highly visible elements in the landscape. Otherwise they are not located properly from a meteorological point of view." The structures are large and somewhat gawky in appearance on vast plains of open land. While this break in aesthetic continuity bothers some, others enjoy the sleek grandeur of the modern windmills. Steve Schnell, AICP, a community planner in Mackinaw City, Michigan, says visitors are impressed with the way the wind turbines look and many go to the village offices to inquire about the facilities.

There is some noise associated with the wind turbines. But Schnell testifies, "You can't hear the turbines, upwind, from more than 500 feet away. Downwind you can hear them, but if the wind is blowing, it just sounds a little stronger." The American Wind Energy Association, offers the following insights:

> "Noise," when one is talking about wind energy projects, basically means "any unwanted sound." Whether a noise is objectionable will vary depending on its type (tonal, broadband, low-frequency, impulsive, etc.) and the circumstances and sensitivity of the individual who hears it (often referred to as the "receptor").
>
> As with beauty, often said to be "in the eye of the beholder," the degree to which a noise is bothersome or annoying is largely in the ear of the hearer. What may be a soothing and relaxing rhythmic swishing sound to one person may be quite troublesome to another.
>
> Because of this, there is no completely satisfactory and impartial way to measure how upsetting a noise may be to a given person. Still, it is possible to objectively measure how loud a noise is [using a decibel meter].

Animal protection groups have expressed concern over avian collisions with the windmill blades. They claim the Bald Eagle Protection Act of 1940 and the Migratory Bird Treaty Act of 1918 are not being adequately enforced on the wind energy industry at the present time. Biologist Robert Haussler, of the California Energy Commission, says "wind turbine projects have the potential to result in bird collision problems if they are built close to areas



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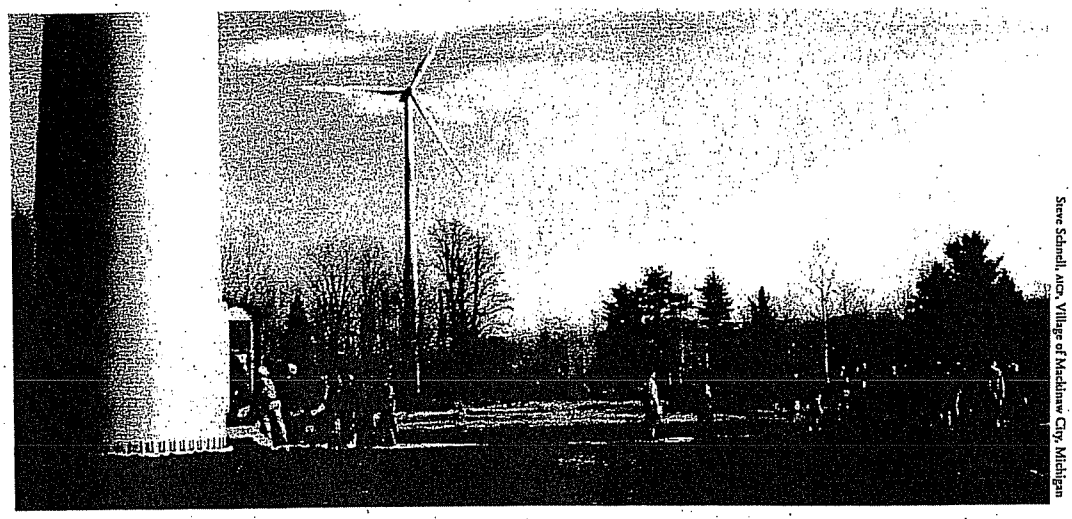
where birds concentrate (see *Avian Mortality at Wind Turbine Facilities in California*, California Energy Commission, 1980). These findings may warrant an avian habitat and population survey prior to wind energy facility construction. The industry has published many reports on both siting considerations and conducting a proper avian survey to avoid avian mortality.

Siting Process

As regions determine their compatibility with wind turbines for energy production, communities also have begun to assess local market interests for green power, according to the Renewable Energy Policy Project website. If community leaders feel there is suitable demand to purchase alternative energy, they will seek out green power producers, who will subsequently bid on projects like any other public works activity to determine potential output at a given site. Once a producer is selected, the permitting and approval process begins. Incidentally, wind tower developers also approach communities with project proposals.



Steve Sidnell, AICP, Village of Mackinaw City, Michigan

A crowd gathers at opening day ceremonies for a new wind turbine in Mackinaw City, Michigan, December 2001.

Approval and Permitting

Unlike natural gas or coal burning facilities, where regulation occurs at the state level, wind power facility regulation happens locally, and most states do not require permits. Any impacts that would need mitigation are generally confined to a local area because wind turbines generally have no impact beyond their circumference of visibility. However, state permits may be required when facilities impact wetlands, sand dunes, or other sensitive environments.

The National Wind Coordinating Committee suggests the following guidelines for structuring a permitting process to allow for efficient agency review, meaningful public involvement, and timely and defensible decisions:

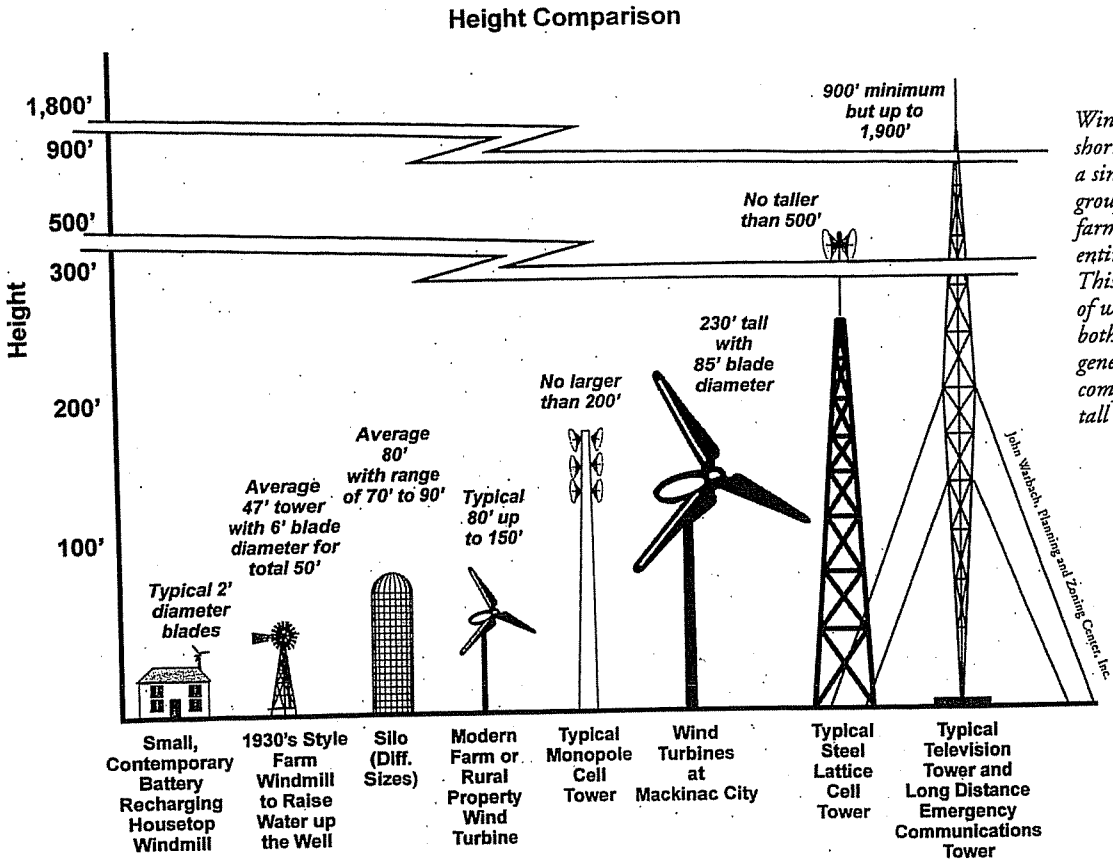
- *Significant public involvement.* Providing opportunities for early, significant, and meaningful public involvement is crucial to a successful process, but no one simple formula to achieve this exists.
- *Issue-oriented process.* Understanding the most important issues facing each wind project and using the permitting process to help in resolving them will save time and decrease the likelihood of litigation.
- *Clear decision criteria.* Decision-making criteria should be clear and consistently applied, and made known from the outset to all participants and interested parties.
- *Coordinated permitting process.* Where more than one agency has jurisdiction over permitting, agencies are encouraged to coordinate so that project review can proceed simultaneously and that redundant, conflicting, or inconsistent requirements, standards, and processes can be avoided.
- *Reasonable time frames.* Unnecessary delays and associated uncertainties can be minimized if permitting agencies specify reasonable time frames for each of the major phases of the permitting process.
- *Advance planning.* Both developers and agencies should know as much as possible about the project, the process, the participants, and the issues prior to commencing the formal permitting process.
- *Efficient administrative and judicial review.* Following established procedures designed to systematically narrow the issues of concern and produce factually based decisions can significantly limit appeals and allow them to proceed more efficiently if they do occur.
- *Active compliance monitoring.* Most agencies include specific conditions in their permits that must be met during construction, operation, and project closure. These conditions can best be implemented if they are specific, measurable, agreed upon by all parties, realistic, set within reasonable time frames, and enforceable.

Planning and Zoning Considerations

As with all projects, review the zoning ordinance and the master plan to ensure compatibility. The master plan should address issues of community character and where wind power and other electric generating facilities should be located. Ideally, the plan should identify areas that are appropriate for locating wind energy facilities and those that are not. The text should separate discussion of the community character impacts that exist when there is a single wind turbine on a property (such as a farm) and when there are a large number of such facilities (usually much taller) as part of a wind energy farm. The height of wind turbines varies dramatically.

When silo height wind turbines are scattered on farms across a rolling landscape, they have an aesthetic effect that is dramatically less than a single 300-foot wind turbine, or the combined effect of many wind turbines on a wind energy farm. The master plan should specify whether wind turbines would be allowed in agricultural, forested, or industrial areas, and specify proximity (or separation distance) from residential areas.

Correspondingly, the zoning ordinance should specify tower height, the number of wind turbines permitted on a property in



Wind turbines can be short or tall and power a single farm, or be grouped into wind farms that can power entire communities. This illustrates a range of wind turbines by both size and power generating capacity, and compares them to other tall rural structures.

each zone, and whether they are permitted by right, by special use permit, or as part of a PUD. Small wind turbines on individual farms and similar rural properties are likely to increase in number in the next decade. Wind energy farms with many tall structures also will increase as the public grows more accustomed to them and understands the environmental benefits. The zoning ordinance should clearly present the relevant standards that address the issues that are important to the community. Many of these standards will parallel those used to regulate cellular communication towers. Zoning standards for wind towers typically address the following:

- Allowing test towers to determine the wind speed and direction
- Maximum permitted height and height of blade from the ground
- Number of permitted wind turbines
- Specify whether regulated as a use by right or by special or conditional use permit (may vary with tower height and number of towers)
- Site plan review requirements
- Minimum site size (may vary with tower height and number of towers)
- Setbacks from property line and inhabited structures
- Noise limits (in decibels at a particular distance from the tower)
- Ground vibration requirements at the property line
- Lighting requirements
- Security measures around the tower base
- Removal requirements if the facility is abandoned
- Exceptions for small-scale wind turbines serving an individual property

THEORETICAL WIND ENERGY POTENTIAL OF THE TWENTY WINDIEST STATES

Rank	State	Annual Energy Potential in Billions of kWhs
1	North Dakota	1,210
2	Texas	1,190
3	Kansas	1,070
4	South Dakota	1,030
5	Montana	1,020
6	Nebraska	868
7	Wyoming	747
8	Oklahoma	725
9	Minnesota	657
10	Iowa	551
11	Colorado	481
12	New Mexico	435
13	Idaho	73
14	Michigan	65
15	New York	62
16	Illinois	61
17	California	59
18	Wisconsin	58
19	Maine	56
20	Missouri	52

Source: An Assessment of the Available Windy Land Area and Wind Energy Potential in the Contiguous United States, Pacific Northwest Laboratory, 1991.

When sited in the appropriate use areas or zoning districts, it may be necessary to determine appropriate mitigative measures. The National Wind Coordinating Committee suggests considering the following impacts:

- *Land use.* Depending on the site, size, and design of the project, wind development may be compatible with a variety of other land uses, including agricultural and open space and those related to habitat preservation or grazing.

  Other land uses and resource values need to be considered when siting large multi-tower wind projects in remote areas. Stakeholders need to understand the full range of land-use issues associated with a site before getting locked into development plans, permit conditions, or other requirements.

- *Noise.* Because noise emitted by wind turbines tends to be masked by the ambient (background) noise of the wind and falls off sharply with distance, noise-related concerns are likely to center on residences closest to the site, particularly those sheltered from prevailing winds. Advanced turbine technology and preventive maintenance can help minimize noise during project operation. Typically, noise from a large wind turbine is about 45 to 60 decibels.

Wind source of public service company—Public Service of Colorado Ponnequin Wind Farm.

- *Birds and other biological resources.* The potential for collisions between birds and wind energy facilities has been controversial. Biological resource surveys can help to determine if serious conflicts are likely to occur. In many cases, the impact on birds and other sensitive biological resources can be adequately mitigated. If not, wind facilities may not be appropriate for the location.

- *Visual resources.* Visual impacts near important public lands and other scenic vistas should be given special consideration. There are a number of ways to reduce the visual impact of wind turbine projects, but there also are tradeoffs to consider. One of the best tools for assessing project impact is the use of visual simulations. By inserting an image of the proposed wind turbine(s) onto existing photos of the site from a variety of different viewing locations, it is often much easier for the public and decision makers to imagine what the site would look like if the wind turbine(s) were approved. This type of visual simulation can be crudely done with off-the-shelf software, or in the hands of a skilled computer artist and the best software, made to look almost real.

- *Soil erosion and water quality.* Wind projects entail both temporary and permanent soil disturbance, and some care must be taken to estimate and control both runoff and erosion from the site, particularly where access roads and facilities are located in steep terrain.

- *Public health and safety.* Most of the safety issues associated with wind energy projects can be dealt with through adequate setbacks, security, safe work practices, and the implementation of a fire control plan. (Adequate setbacks are generally agreed to be–at a minimum–equal to the height of the tower including the blade in its vertical position.)

- *Cultural and paleontological resources.* During project design and site development, important cultural and fossil resource sites should be avoided and protected, or a mitigation plan developed. Special care may need to be taken to preserve the confidentiality as well as the integrity of certain sensitive resources or sites sacred to Native Americans.

- *Socioeconomic/Public services/Infrastructure.* Developers and permitting agencies should coordinate with local public service agencies to determine how the project may affect the community's fire protection and transportation systems, nearby airports, and communications systems. Communities should work with wind project developers to ensure that any financial burden placed on the community will be compensated through appropriate property taxes or other revenues.

- *Solid and hazardous wastes.* Solid wastes need to be collected from dispersed sites and properly disposed of; non-hazardous fluids should be used where possible, and a hazardous materials waste plan drawn up if their use cannot be avoided. Problems can be avoided by performing major maintenance and repair work off-site.

- *Air quality and climate.* Wind projects produce energy without generating many of the pollutants associated with fuel combustion. Temporary, local emissions associated with project construction and maintenance can be minimized, and micro-climatic impacts should be insignificant.

Lighting and ground vibration also may be concerns. All structures more than 200 feet in height must have aircraft warning lights and comply with Federal Aviation Administration (FAA) requirements. These lights can be objectionable, particularly in rural areas. According to the American Wind Energy Association, the wind power industry is

RESOURCES

American Wind Energy Association, www.awea.org

Danish Wind Turbine Manufacturers Association, www.windpower.dk

Minnesota Environmental Quality Board, www.mnplan.state.mn.us/EQB

National Wind Coordinating Committee, www.nationalwind.org

A Practical Guide to Wind Energy Development for Municipal Utilities. Minnesota Municipal Utilities Association, 12805 Highway 55, Suite 212, Plymouth, MN 55441

Renewable Energy Policy Project, www.crest.org

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, www.eren.doe.gov

Windustry Project, www.windustry.com

working on a compromise with the FAA to enhance flying safety while also allowing for continued wind energy development. The simplest way to address these issues in the zoning ordinance is to require conformance with FAA lighting requirements and to prohibit human-detectable ground vibrations at the property line of the wind power site.

Some states, including Minnesota and California, have approved dozens of wind turbines. Even more local units of government have adopted zoning standards for wind towers and conditionally approved projects. For a more complete listing of zoning standards see appendix B in *Permitting of Wind Energy Facilities: A Handbook*, by the National Wind Coordinating Committee, March 1998.

For examples of recent exhaustive conditions on wind energy projects by a state agency, see draft site permits for actual wind energy projects posted on the Minnesota Environmental Quality Board website at www.mnplan.state.mn.us/EQB.

News Briefs

Mixed-Use Libraries: Lessons from the West Coast

By Roberto Requejo

Several Pacific Coast cities are using progressive planning principles to maximize urban space by incorporating residential, retail, and other uses into public libraries. Portland, Seattle, and San Francisco, have taken this novel idea and made it viable through partnerships with the public, private, and nonprofit sectors.

The pioneer is Portland, with its newly renovated Hollywood Library. This branch of the Multnomah County Public Library System opened last May as a mixed-use complex that includes a 13,000 square-foot library, an 815 square-foot ground-floor café, and 47 mixed-income apartments on three upper floors. The project is a joint venture between the county (which owns the library space) and the developer, Sockeye Development LLC, which owns the retail and residential space. Not just a fine example of mixed-use development, the Hollywood Library is a state-of-the-art "green building" featuring an energy-conserving reflective roof, low-toxic water-based paint, and energy efficient appliances. It is also a model affordable housing project, with 19 dwelling units (40 percent of the apartments) available to renters who are at or below 60 percent of the area median income. The library is within walking distance to public transportation and nearby retail. Speaking of the project in the October issue of *Metropolis*, John Warner, finance coordinator of the Portland Development Commission, says "mixed-use development allows people to live near the services they want to enjoy while providing higher residential density and favoring the increase on transit ridership."

Seattle has set in motion Libraries for All, an ambitious $239.5 million library expansion plan that includes the replacement or renovation of the Central Library and 22 branches, as well as the construction of five new libraries. Some of the new facilities incorporate the concept of mixed-use development. For example, the International Branch Library will be part of a five-story complex known as International District Village Square II. Apart from a 4,000 square-foot library, the complex includes 57 units of low-income housing, a community center, retail space, and underground parking. The

> "Mixed-use development allows people to live near the services they want to enjoy while providing higher residential density and favoring the increase on transit ridership."
>
> —John Warner, Finance Coordinator
> Portland Development Commission

project will be developed in partnership with the Seattle Chinatown/International District Preservation and Development Authority. Financing the project will take longer than originally expected, delaying the projected opening date of the facility. Also in Seattle is the more modest Delridge branch project. The $3 million library has 19 low-income apartments occupying the upper two floors of the building. Delridge was completed two years earlier than projected.

San Francisco also has added the mixed-use library concept to its planning agenda. The Glen Park Marketplace project (soon to break ground) includes an 8,759 square-foot public library to replace the existing branch library, a 7,037 square-foot neighborhood grocery store, and a 22,520 square-foot apartment block of 15 two-bedroom units. The proposed project will include 15 off-street residential parking spaces and two loading spaces, and will result in the removal of 25 existing metered public parking spaces. The proposal will likely be approved due to strong support shown by the local neighbors association and the San Francisco-based Transportation For a Livable City, despite concerns that the project—built partially on an existing parking lot—will not replace some of the lost parking spaces.

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3/5/07

Michigan Siting Guidelines for Wind Energy Systems

INTRODUCTION

These guidelines have been developed by the Energy Office, Michigan Dept. of Labor and Economic Growth to assist local governments to develop siting requirements for wind energy systems. These guidelines are not intended to apply in urban areas that already have height, noise, setback and other requirements that can be applied to wind energy systems. These guidelines have been developed with the intention of striking an appropriate balance between the need for clean, renewable energy resources and the necessity to protect the public health, safety, and welfare. The guidelines represent recommended zoning language for local governments to use if they amend their zoning ordinance to address wind energy systems. The Energy Office, DLEG has no authority to issue regulations related to siting wind energy systems.

Electricity generation is responsible for 36% of carbon dioxide pollution, 64% of sulfur dioxide pollution, 26% of nitrogen oxide pollution, and 34% of mercury pollution in the U.S. Electricity generation from clean, renewable energy resources will reduce air pollution, increase the fuel diversity of our electric system, save natural resources, and provide a hedge against increases in the price of fossil fuels used for electric generation.

Different requirements are recommended for On Site Use (generally small) and Utility Grid (generally large) wind energy systems. On Site Use wind energy systems are sized to primarily serve the needs of a home, farm, or small business. Usually there is a single turbine – in contrast to a large, utility-scale wind farm that may include dozens or even hundreds of turbines. Utility Grid wind energy systems are sized to provide power to wholesale or retail customers using the electric utility transmission and distribution grid to transport and deliver the wind generated electricity. On Site Use wind energy systems can have towers up to 40 meters and Utility Grid wind energy systems can have towers up to 90 meters.

The guidelines have been developed with input from members of the Michigan Wind Working Group. The members of the Michigan Wind Working Group have not endorsed these guidelines. Professor Robert Fletcher, Ph.D. and Daniel Alberts, graduate student from Lawrence Technological University helped in the development of these guidelines by providing briefings on technical issues related to siting. Mr. Alberts also helped by conducting a modified Delphi study related to wind energy siting issues. For the Delphi study final report see:
http://www.ltu.edu/engineering/mechanical/delphi_wind.asp .

Comments or questions are welcome and should be directed to John Sarver, Energy Office at 517-241-6280 or jhsarve@michigan.gov.

RECOMMENDED LANGUAGE FOR LOCAL ZONING ORDINANCES

A. Definitions
   1. Ambient: Ambient is defined as the sound pressure level exceeded 90% of the time or L_{90}.
   2. ANSI: American National Standards Institute.
   3. dB(A): The sound pressure level in decibels. Refers to the "a" weighted scale defined by ANSI. A method for weighting the frequency spectrum to mimic the human ear.
   4. Decibel: The unit of measure used to express the magnitude of sound pressure and sound intensity.
   5. IEC: International Electrotechnical Commission. The IEC is the leading global organization that prepares and publishes international standards for all electrical, electronic and related technologies.
   6. ISO: International Organization for Standardization. ISO is a network of the national standards institutes of 156 countries.
   7. On Site Use Wind Energy Systems: An On Site Use wind energy system is intended to primarily serve the needs of the consumer.
   8. Rotor: An element of a wind energy system that acts as a multi-bladed airfoil assembly, thereby extracting through rotation, kinetic energy directly from the wind.
   9. SCADA Tower: A freestanding tower containing instrumentation such as anemometers that is designed to provide present moment wind data for use by the supervisory control and data acquisition (SCADA) system.
   10. Shadow Flicker: Alternating changes in light intensity caused by the moving blade of a wind energy system casting shadows on the ground and stationary objects, such as a window at a dwelling.
   11. Sound Pressure: Average rate at which sound energy is transmitted through a unit area in a specified direction. The pressure of the sound measured at a receiver.
   12. Sound Pressure Level: The sound pressure mapped to a logarithmic scale and reported in decibels (dB).
   13. Utility Grid Wind Energy Systems: A Utility Grid wind energy system is designed and built to provide electricity to the electric utility grid.
   14. Wind Energy System: A wind energy conversion system which converts wind energy into electricity through the use of a wind turbine generator and includes the turbine, blades, and tower as well as related electrical equipment. This does not include wiring to connect the wind energy system to the grid.
   15. Wind Site Assessment: An assessment to determine the wind speeds at a specific site and the feasibility of using that site for construction of a wind energy system.

B. On Site Use Wind Energy Systems: An On Site Use wind energy system is intended to primarily serve the needs of the consumer. An On Site Use wind energy system with a tower higher than 20 meters shall be considered a Special Land Use. On Site Use wind energy systems with no towers or towers 20 meters or less shall be a Permitted Use in all zoning classifications where structures of any sort are allowed subject to the following requirements. Anemometer towers more than 20 meters in height used to conduct a wind site assessment for possible installation of an On Site Use wind energy system shall also be a Special Land Use.

Prior to the installation of an On Site Use wind energy system with a tower higher than 20 meters, an application for a Special Land Use permit shall be filed with the local government that will include 1) applicant identification, 2) a site plan, 3) documentation that sound pressure level, construction code, tower, interconnection (if applicable), and safety requirements have been met, and 4) proof of the applicant's public liability insurance.

Prior to the installation of an anemometer tower more than 20 meters in height, an application for a Special Land Use permit shall be filed with the local government that will include 1) applicant identification, 2) a site plan, 3) a copy of that portion of the applicant's lease with the land owner granting authority to install the Met tower and requiring the applicant to remove all equipment and restore the site after completion of the wind site assessment and 4) proof of the applicant's public liability insurance.

Commentary: Another way to differentiate between On Site Use and Utility Grid wind energy systems is size of the generators. Early drafts of the siting guidelines made a distinction between a small wind energy system which has a rated capacity of not more than 300 kW and a large wind energy system greater than 300 kW. It was decided that use rather than size was a better way to classify wind energy systems for siting purposes.

1. Property Set-back: The distance between an On Site Use wind energy system and the owner's property lines shall be at least 1 ½ times the height of the wind energy system tower including the top of the blade in its vertical position. The distance between an anemometer tower and the owner's property lines shall be at least 1 ½ times the height of the tower. No part of the wind energy system structure, including guy wire anchors, may extend closer than ten feet to the owner's property lines.

   Commentary: The property set-back requirement is designed to protect neighbors in the unlikely event of a tower failure.

2. Sound Pressure Level: On Site Use wind energy systems shall not exceed 55 dB(A) at the property line closest to the wind energy system. This sound pressure level may be exceeded during short-term events such as utility outages and/or severe wind storms. If the ambient sound pressure level exceeds 55 dB(A), the standard shall be ambient dB(A) plus 5 dB(A).

   Commentary: Normal conversation is in the range of 50-65 dB(A). There is more commentary under the Utility Grid section of this document.

3. Construction Codes, Towers, & Interconnection Standards: On Site Use wind energy systems including towers shall comply with all applicable state construction and electrical codes and local building permit requirements. On Site Use wind energy systems including towers shall comply with Federal Aviation Administration requirements, the Michigan Airport Zoning Act (Public Act 23 of 1950, MCL 259.431 et seq.), the Michigan Tall Structures Act (Public Act 259 of 1959, MCL 259.481 et seq.), and local jurisdiction airport overlay zone regulations. An interconnected On Site Use wind energy system shall comply with Michigan Public Service Commission

and Federal Energy Regulatory Commission standards. Off-grid systems are exempt from this requirement.

4. Safety: An On Site Use wind energy system shall have automatic braking, governing, or a feathering system to prevent uncontrolled rotation or over speeding. All wind towers shall have lightning protection. If a tower is supported by guy wires, the wires shall be clearly visible to a height of at least six feet above the guy wire anchors. The minimum vertical blade tip clearance from grade shall be 20 feet for a wind energy system employing a horizontal axis rotor.

   Commentary: Safety issues are addressed by reference to state construction and electrical codes and federal and state requirements related to towers. Safety issues are also addressed by provisions related to property set-backs, lowest point of blade, wind energy system controls, lightning protection, guy wire visibility, and interconnection standards.

C. Wind Site Assessment for Utility Grid Wind Energy Systems: Prior to construction of a Utility Grid wind energy system, a wind site assessment is conducted to determine the wind speeds and the feasibility of using the site. Installation of anemometer towers also known as meterological or "Met" towers shall be considered a Special Land Use. Prior to the installation of the tower, an application for a Special Land Use permit shall be filed with the local government that will include 1) applicant identification, 2) a site plan, 3) a copy of that portion of the applicant's lease with the land owner granting authority to install the Met tower and requiring the applicant to remove all equipment and restore the site after completion of the wind site assessment, and 4) proof of the applicant's public liability insurance. The distance from the center of a Met tower and the property lines between the leased property and the non-leased property shall be at least the height of the Met tower. Leased property can include more than one piece of property and the requirement shall apply to the combined properties.

D. Utility Grid Wind Energy Systems: A Utility Grid wind energy system is designed and built to provide electricity to the electric utility grid. Utility Grid wind energy systems shall be considered a Special Land Use. Prior to the installation of a Utility Grid wind energy system, an application for a Special Land Use permit shall be filed with the local government and shall include the following:

   Commentary: Utility Grid wind energy systems may be treated as Special Land Uses under local zoning ordinances. Zoning Boards may also decide to enter into a "Development Agreement" with a wind energy company that also incorporates suitable conditions or may develop a "Wind Overlay Zone" as an addition to or amendment of their existing zoning ordinances. For example, Huron County has developed a Wind Energy Conversion Facility Overlay Zoning Ordinance.

   1. Applicant Identification: Applicant name, address, and contact information.
   2. Project Description: A general description of the proposed project including a legal description of the property or properties on which the project would be located and an anticipated construction schedule.
   3. Site Plan: The site plan shall include maps showing the physical features and land uses of the project area, both before and after construction of the proposed project.

The site plan shall include 1) the project area boundaries, 2) the location, height, and dimensions of all existing and proposed structures and fencing, 3) the location, grades, and dimensions of all temporary and permanent on-site and access roads from the nearest county or state maintained road, 4) existing topography, 5) water bodies, waterways, wetlands, and drainage channels, and 6) all new infrastructure above ground related to the project.

4. Insurance: Proof of the applicant's public liability insurance.
5. Consent Documents: Copies of any written waivers from neighboring property owners.
6. Sound Pressure Level: Copy of the modeling and analysis report.
7. Certifications: Certification that applicant has complied or will comply with all applicable state and federal laws and regulations. Copies of all such permits and approvals that have been obtained or applied for at time of the application.
8. Visual Impact: Visual simulations of how the completed project will look from four viewable angles.
9. Environmental Impact: Copy of the Environmental Impact analysis.
10. Avian and Wildlife Impact: Copy of the Avian and Wildlife Impact analysis.
11. Shadow Flicker: Copy of the Shadow Flicker analysis.
12. Manufacturers' Material Safety Data Sheet(s): Documentation shall include the type and quantity of all materials used in the operation of all equipment including, but not limited to, all lubricants and coolants.
13. Decommissioning: Copy of the decommissioning plan.
14. Complaint Resolution: Description of the complaint resolution process.

An applicant shall remit an application fee in the amount specified in the fee schedule adopted by the local government. This schedule shall be based on the cost of the application review and may be adjusted from time to time.

The Utility Grid wind energy system project shall meet the following standards and requirements:

1. Overlay Zone: If the site of the proposed project is subject to an overlay zone, the proposed project shall meet or exceed the applicable standards in the overlay zone.

2. Property Set-Back: The distance between a Utility Grid wind energy system and the property lines of adjacent non-leased properties including public rights of way shall be at least the height of the wind energy system tower including the top of the blade in its vertical position. Where property is leased on both sides of a public right of way, a wind energy system may be placed no closer than one rotor radius from the closest edge of the right of way. Leased property can include more than one piece of property and the requirement shall apply to the combined properties.

   SCADA (supervisory control and data acquisition) or meteorological (Met) towers shall also comply with the property set-back requirement. The set-back shall be at least the height of the SCADA or Met tower. An Operations and Maintenance Office building, a sub-station, or ancillary equipment shall comply with any property set-back requirement that may be applicable to that type of building or equipment. Overhead transmission lines and power poles shall comply with the set-back requirements applicable to public utilities.

Commentary: The property set-back requirement is designed to protect neighbors in the unlikely event of a tower failure.

3. Sound Pressure Level: The sound pressure level generated by a Utility Grid wind energy system shall not exceed 55 dB(A) measured at the property lines between leased and non-leased property. This sound pressure level shall not be exceeded for more than 3 minutes in any hour of the day. If the ambient sound pressure level exceeds 55 dB(A), the standard shall be ambient dB(A) plus 5 dB(A).

   As part of the application and prior to installation, the applicant shall provide modeling and analysis that will confirm that the Utility Grid wind energy system will not exceed the maximum permitted sound pressure levels. Modeling and analysis shall conform to IEC 61400 and ISO 9613. After installation of the Utility Grid wind energy system, sound pressure level measurements shall be done by a third party, qualified professional according to the procedures in the most current version of ANSI S12.18. All sound pressure levels shall be measured with a sound meter that meets or exceeds the most current version of ANSI S1.4 specifications for a Type II sound meter. Documentation of the sound pressure level measurements shall be provided to the local government within 60 days of the commercial operation of the project.

   Commentary: Noise issues are complex and many communities do not have any detailed noise standards. Normal conversation is in the range of 50-65 dB(A). Noise standards may consider the potential for bodily injury, long term health effects, interference with speech and other activities, and sleep disturbance. EPA and World Health Organization documents indicate that 55 dB(A) is too low to produce hearing loss or long-term health effects.[1&2] Related to speech interference, would 55 dB(A) interfere with speech at the property line? EPA has estimated that the distance between persons would have to be 4 meters before there would be any interference.[1] Related to sleep disturbance, the World Health Organization notes that "80-90% of the reported cases of sleep disturbance in noisy environments are for reasons other than noise originating outdoors" and "habituation to night-time noise events occurs."[2] EPA has noted that the typical sound level reduction of buildings in cold climates is 17 dB (windows opened) and 27 dB (windows closed) so 55 dB would be reduced to at least 28-38 dB indoors.[1]

   References
   1. EPA, 1974. Protective Noise Levels: Condensed Version of EPA Levels Document.
   2. World Health Organization, 1999. Guidelines for Community Noise.

   The guidelines recommend basic standards for sound pressure levels. The standards can be more detailed and sophisticated. Separate standards can be developed for infranoise and low-frequency sound pressure levels. Separate standards can be developed for residential and non-residential areas. Sound pressure levels characterized as tonal can have lower limits. For example, the Huron County ordinance reduces their standard by 5 dB(A) in the event audible noise from the wind energy system contains a steady pure tone. Local governments who desire a more refined standard may want to consider developing a noise ordinance that would cover all generators of sound pressure levels in a fair and consistent manner.

4. Construction Codes, Towers, and Interconnection Standards: Utility Grid wind energy systems including towers shall comply with all applicable state construction and electrical codes and local building permit requirements. Utility Grid wind energy systems including towers shall comply with Federal Aviation Administration requirements, the Michigan Airport Zoning Act (Public Act 23 of 1950, MCL 259.431 et seq.), the Michigan Tall Structures Act (Public Act 259 of 1959, MCL 259.481 et seq.), and local jurisdiction airport overlay zone regulations. The minimum FAA lighting standards shall not be exceeded. All tower lighting required by the FAA shall be shielded to the extent possible to reduce glare and visibility from the ground. The tower shaft shall not be illuminated unless required by the FAA. Utility Grid wind energy systems shall comply with applicable utility, Michigan Public Service Commission, and Federal Energy Regulatory Commission interconnection standards.

5. Safety: All Utility Grid wind energy systems shall be designed to prevent unauthorized access to electrical and mechanical components and shall have access doors that are kept securely locked at all times when service personnel are not present. All spent lubricants and cooling fluids shall be properly and safely removed in a timely manner from the site of the wind energy system. A sign shall be posted near the tower or Operations and Maintenance Office building that will contain emergency contact information. Signage placed at the road access shall be used to warn visitors about the potential danger of falling ice. The minimum vertical blade tip clearance from grade shall be 20 feet for a wind energy system employing a horizontal axis rotor.

   Commentary: Safety issues are addressed by reference to state construction and electrical codes and federal and state requirements related to towers. Safety issues are also addressed by provisions related to property set-backs, lowest point of blade, interconnection standards, falling ice, access doors, and handling of materials.

6. Visual Impact: Utility Grid wind energy system projects shall use tubular towers and all Utility Grid wind energy systems in a project shall be finished in a single, non-reflective matte finished color. A project shall be constructed using wind energy systems of similar design, size, operation, and appearance throughout the project. No lettering, company insignia, advertising, or graphics shall be on any part of the tower, hub, or blades. Nacelles may have lettering that exhibits the manufacturer's and/or owner's identification. The applicant shall avoid state or federal scenic areas and significant visual resources listed in the local unit of government's comprehensive plan.

   Commentary: Visual impact issues are difficult to address. Individuals seem to either like or dislike the look of wind energy systems. The guidelines try to address visual impact issues by providing some design standards and by restricting commercial advertising.

7. Environmental Impact: The applicant shall have a third party, qualified professional conduct an analysis to identify and assess any potential impacts on the natural environment including, but not limited to wetlands and other fragile ecosystems, historical and cultural sites, and antiquities. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the

analysis. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

The applicant shall comply with applicable parts of the Michigan Natural Resources and Environmental Protection Act (Act 451 of 1994, MCL 324.101 et seq.) including but not limited to Part 31 Water Resources Protection (MCL 324.3101 et seq.), Part 91 Soil Erosion and Sedimentation Control (MCL 324.9101 et seq.) , Part 301 Inland Lakes and Streams (MCL 324.30101 et seq.), Part 303 Wetlands (MCL 324.30301 et seq.), Part 323 Shoreland Protection and Management (MCL 324.32301 et seq.), Part 325 Great Lakes Submerged Lands (MCL 324.32501 et seq.), and Part 353 Sand Dunes Protection and Management (MCL 324.35301 et seq.). The applicant shall be responsible for making repairs to any public roads damaged by the construction of the Utility Grid wind energy system.

Commentary: Environmental issues are complex. The guidelines identify areas that should be addressed in an environmental impact analysis but do not specify how the analysis should be conducted. Site specific issues should determine which issues are emphasized and studied in depth in the analysis. There are a number of state and federal laws that may apply depending on the site.

8. Avian and Wildlife Impact: The applicant shall have a third party, qualified professional conduct an analysis to identify and assess any potential impacts on wildlife and endangered species. The applicant shall take appropriate measures to minimize, eliminate or mitigate adverse impacts identified in the analysis. The applicant shall identify and evaluate the significance of any net effects or concerns that will remain after mitigation efforts.

   Sites requiring special scrutiny include wildlife refuges, other areas where birds are highly concentrated, bat hibernacula, wooded ridge tops that attract wildlife, sites that are frequented by federally and/or state listed endangered species of birds and bats, significant bird migration pathways, and areas that have landscape features known to attract large numbers of raptors.

   At a minimum, the analysis shall include a thorough review of existing information regarding species and potential habitats in the vicinity of the project area.. Where appropriate, surveys for bats, raptors, and general avian use should be conducted. The analysis shall include the potential effects on species listed under the federal Endangered Species Act and Michigan's Endangered Species Protection Law.

   The analysis shall indicate whether a post construction wildlife mortality study will be conducted and, if not, the reasons why such a study does not need to be conducted. Power lines should be placed underground, when feasible, to prevent avian collisions and electrocutions. All above-ground lines, transformers, or conductors should comply with the Avian Power Line Interaction Committee (APLIC, http://www.aplic.org/) published standards to prevent avian mortality.

   Commentary: These guidelines identify areas that should be addressed in an avian and wildlife impact analysis but do not specify how the analysis should be conducted. Site

specific issues should determine which issues are emphasized and studied in depth in the analysis. To assist applicants to minimize, eliminate, or mitigate potential adverse impacts, the U.S. Fish and Wildlife Service has developed Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines which can be found at http://www.fws.gov/habitatconservation/wind.pdf. If the local government desires more structure to the analysis requirements, the Potential Impact Index developed by the U.S. Fish and Wildlife Service provides a framework for evaluating a project's impact on wildlife

Applicants must comply with applicable sections of the federal Endangered Species Act and Michigan's Endangered Species Protection Law. The applicant should be aware that taking of these species is prohibited by State and/or Federal law unless the proper permits or exemptions are acquired. Early coordination with state and federal agencies is recommended. The applicant or the applicant's impact analyst should contact the U.S. Fish and Wildlife Service's East Lansing Field Office regarding federally-listed species and the Michigan Dept. of Natural Resources for state-listed species.

9. Electromagnetic Interference: No Utility Grid wind energy system shall be installed in any location where its proximity to existing fixed broadcast, retransmission, or reception antennae for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception unless the applicant provides a replacement signal to the affected party that will restore reception to at least the level present before operation of the wind energy system. No Utility Grid wind energy system shall be installed in any location within the line of sight of an existing microwave communications link where operation of the wind energy system is likely to produce electromagnetic interference in the link's operation unless the interference is insignificant.

10. Shadow Flicker: The applicant shall conduct an analysis on potential shadow flicker at occupied structures. The analysis shall identify the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sun-rise to sun-set over the course of a year. The analysis shall identify problem areas where shadow flicker may affect the occupants of the structures and describe measures that shall be taken to eliminate or mitigate the problems.

11. Decommissioning: The applicant shall submit a decommissioning plan. The plan shall include: 1) the anticipated life of the project, 2) the estimated decommissioning costs net of salvage value in current dollars, 3) the method of ensuring that funds will be available for decommissioning and restoration, and 4) the anticipated manner in which the project will be decommissioned and the site restored.

12. Complaint Resolution: The applicant shall develop a process to resolve complaints from nearby residents concerning the construction or operation of the project. The process may use an independent mediator or arbitrator and shall include a time limit for acting on a complaint. The process shall not preclude the local government from acting on a complaint. During construction the applicant shall maintain and make available to nearby residents a telephone number where a project representative can be reached during normal business hours.

Wind Power – Sample Ordinances

17-17-0310 Building Wall Separation

17-17-0310-A Measurement

Required building separations are to be measured between the furthermost projection of the structures, not including those projections and features allowed within such setback pursuant to Sec. 17-17-0309.

17-17-0310-B Permitted Obstructions/Encroachments

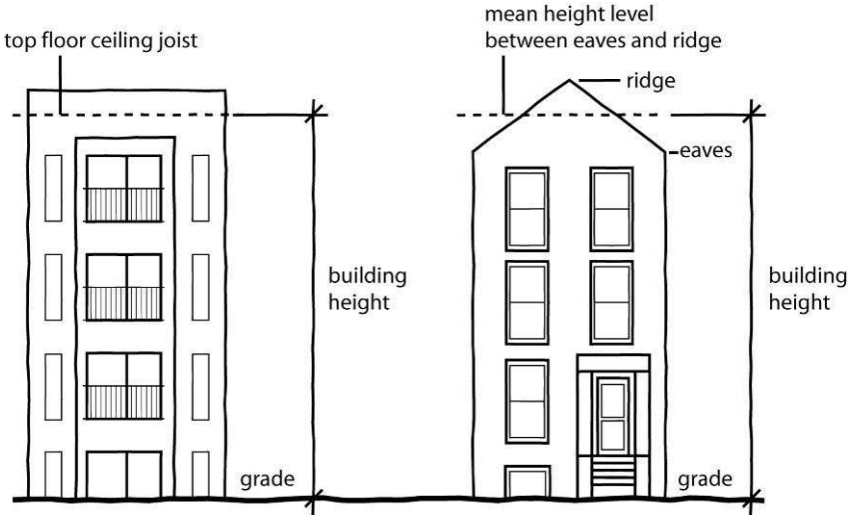
Required separations must be unobstructed and unoccupied from the ground to the sky except as expressly allowed in Sec. 17-17-0309.

17-17-0311 Building Height

17-17-0311-A Measurement

The b*uilding height* of any principal or accessory building is measured as the vertical distance from *grade* to the highest point of the underside of the top floor's ceiling joist on a building with a flat roof or to the mean height level between eaves and ridge of a gable, hip, mansard, or gambrel roof. For purposes of this provision, "floor" means any enclosed area with a floor-to-ceiling height of 6 feet 9 inches or more.

Figure 17-17-0311-A



[amended: 03/09/2005, Council Journal: p. 44470; 09/13/2006, Council Journal: p. 84911]

17-17-0311-B Limitations on Rooftop Features in R Districts

1. Stairway enclosures and elevator penthouses in R districts are allowed to exceed the maximum *building height*, provided:
   (a) they are set back at least 20 feet from the front *building line*, and
   (b) do not exceed 9 feet in overall height or extend more than 5 feet above the building *parapet*, whichever results in a lesser height.
2. Stairway enclosures in R districts may not contain habitable space and may not exceed 170 square feet in area.
3. Elevator penthouses in R districts may not contain habitable space and may not exceed 465 square feet in area.

4. Rooftop wind energy systems shall be considered permitted accessory structures within all districts provided they comply with the height limits and setbacks established in this Section. A rooftop energy conversion system shall consist of a wind turbine(s) and associated equipment for converting wind energy to power. Wind energy conversions systems shall be permitted as rooftop accessory structures provided such structures:

(a) are set back at least 20 feet from the front building line, or in the case of corner lots, at least 15 feet from the front and side building line.

(b) are limited to a height of no more than 15 feet above the roof or top of the parapet, whichever is greater.

(c) comply with all noise limitations of the Chicago Municipal Code.

(d) are safely and securely attached to the rooftop in compliance with the Chicago Building Code.

[amended: 03/09/2005, Council Journal: p. 44470; 03/29/2006, Council Journal: p. 73936]

[End of Chapter]

Legislative Code of the City of Duluth, Minnesota
Adopted 1959; revised through through Ord. No. 9815, adopted January 16, 2007

CHAPTER 50. ZONING.

Article I. In General.

Sec. 50-1. Definitions.

Sec. 50-1.75. Wind energy conversion systems (WECS).

An aggregation of parts including the base, tower, generator, rotor, blades, supports, guy wires and accessory equipment such as utility interconnect and battery banks, etc., in such configuration as necessary to convert the power of wind into mechanical or electrical energy, i.e., wind charger, windmill or wind turbine. (Ord. No. 9284, 12-11-1995, § 2.)

Article II. Height and Area Requirements.

Sec. 50-21. Exceptions to article--height.

(a) The height regulations prescribed in this Article shall not apply to television and radio towers, church spires, belfries, monuments, tanks, water and fire towers, stage towers, or scenery lofts, cooling towers, ornamental towers and spires, chimneys, elevator penthouses, air conditioning penthouses, skylights, smokestacks, conveyors, storage elevators and facilities, flagpoles and wind energy conversion systems;

Article IV. Special Uses.

Sec. 50-35. Enumerated.

The following are the special uses for which the city council may issue a special permit, as provided in Section 50-32:

(ee) Wind energy conversion systems. Wind energy conservation systems (WECS) shall be permitted, provided; tower height shall not exceed 200 feet; that existing or future uses permitted within adjacent properties are not adversely effected by noise, electronic signal interference or safety conditions; that satisfactory visual screen buffers be provided at the edges of the property to mitigate aesthetic impacts upon the neighborhood if located within "R" districts; and that WECS be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower unless it can be demonstrated that tower failure would not damage adjacent public or private interests;

Article VII. Suburban Districts.

Division 1. S Suburban Districts.

Sec. 50-52. Permitted uses.

(o) Accessory building or use, customarily incident to the above uses; provided, that any such accessory building erected prior to the construction of the principal building shall comply with the following conditions:

One wind energy conversion system shall be permitted as an accessory use, provided that the tower shall be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower, but in no case shall tower height exceed 130 feet;

Division 2. S-2 Suburban Residential Districts.

Sec. 50-55.1. Permitted uses.

(j) One wind energy conversion system shall be permitted as an accessory use, provided that the tower shall be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower, but in no case shall tower height exceed 130 feet;

Article XIV. C-1 Commercial District.

Sec. 50-80. Permitted uses.

(o) Accessory buildings and uses; provided, that any such accessory building shall be erected at the same time or after the construction of the principal building and subject to the following restrictions:

(1) One wind energy conversion system shall be permitted as an accessory use, provided that the tower shall be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower, but in no case shall tower height exceed 130 feet;

Article XXII. IP Industrial Park District.

Sec. 50-123. Permitted uses.

(c) Accessory building or use customarily incidental and secondary in use and area to any of the above uses; provided, that any such accessory building shall be erected at the same time or after the construction of the principal building. One wind energy conversion system shall be permitted as an accessory use, provided that the

tower shall be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower, but in no case shall tower height exceed 130 feet;

Article XXVIII. I-T Industrial-Technology District.

Sec. 50-196. Permitted uses.

(c) Accessory buildings or uses customarily incidental and secondary in use and area to any of the above uses; provided, that any such accessory building shall be erected at the same time or after the construction of the building for the principal use. One wind energy conversion system shall be permitted as an accessory use, provided that the tower shall be set back from all property lines a distance equal to or greater than the tower height as measured from the base of the tower, but in no case shall tower height exceed 130 feet. (Ord. No. 9371, 5-11-1998, § 1.)

CHAPTER 150
ZONING

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§ 150-57. Zoning Description

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Schedule I: Dimensional Requirements
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(History: Adopted by the Town Board of the Town of Henderson 11-13-1991 by L.L. No. 3-1991. Amendments noted where applicable.)

GENERAL REFERENCES

Unsafe buildings - See Chapter 76
Fair housing - See Chapter 82
Fire prevention and building construction - See Chapter 90
Flood damage prevention - See Chapter 94
Junk, junkyards and junk automobiles - See Chapter 103
Subdivision of Land - See Chapter 135

TOWN OF HENDERSON ZONING LAW
JEFFERSON COUNTY, NEW YORK

ARTICLE I
Introductory Provisions

§ 150-1. Purpose and authority.

This chapter is established for the purpose of promoting the public health, safety and welfare, and the most desirable use for which the land in the town may be adopted; for conserving the value of buildings and for enhancing the value of land throughout the town, pursuant to the authority conferred by Article 16 of the Town Law and Section 10 of the Municipal Home Rule Law and the Comprehensive Land Use Plan of the Town of Henderson. Reasonable consideration is given to the best planned use of each district and its peculiar suitability for particular uses.

§ 150-2. Short title.

This chapter shall be known and may be cited as "The Town of Henderson Zoning Law."

§ 150-3. Amendments.

A. The Town Board may from time to time on its own motion or on petition, amend, supplement, or repeal the regulations and provisions of this law after appropriate public notice and hearing, as required by Law.

B. The Town Board may refer any proposed amendments to the Planning Board for their review and recommendation, but the failure to so receive a recommendation within a reasonable period of time shall not deprive the Town Board of the power to adopt or reject such proposed amendment.

§ 150-4. Coordination/review of actions.

A. The Town Board, Planning Board and Zoning Board of Appeals shall refer all amendments, site plans, special permits, and variances that fall within those areas specified under General Municipal Law, Article 12-B, Section 239 to the County Planning Board prior to the Board's vote thereon.

B. The Town Board, Planning Board and Zoning Board of Appeals shall comply with the

requirements of the New York State Environmental Quality Review Act (SEQR) for all amendments, site plans, variances and other "actions" as defined by SEQR.

§ 150-5. Interpretation.

A. Interpretation and application of the provisions of this Law shall be held to be minimal requirements, adopted for the promotion of the public health, safety, or the general welfare. Whenever the requirements of the Law differ with the requirements of any other lawfully adopted rules, regulations or ordinances, the most restrictive, or that imposing the most demanding standards shall govern.

ARTICLE II
Terminology

§ 150-6. Word usage; definitions.

A. Except where specifically defined herein, all words used in this chapter shall carry their customary meanings. When used in this chapter, words in the present tense include the future, and words of one gender include all genders. The term “shall” is intended to be mandatory. Whenever a word or term is defined to “include” certain items or matters, such inclusion is intended to be by way of specification, not of limitation.

B. As used in this chapter, the following terms shall have the meanings indicated:

ACCESSORY BUILDING, USE OR STRUCTURE: A building, use, or structure, which is customarily incidental and subordinate to that of a principal building or use and which is located on the same lot as that occupied by the principal building or use. Notwithstanding the foregoing, an accessory building, use or structure may be located on another noncontiguous unoccupied and undeveloped lot owned by all of the same owners which is in close proximity to the lot on which the principal building, use or structure is located, but in no event shall the two lots at their closest points be more than 500 feet apart. However, as a condition of granting the special use permit, the Planning Board shall require the owners of the noncontiguous lots to file and record in the Jefferson County Clerk’s office, after review and approval by the town’s attorneys, restrictive covenants running with the affected lots which prohibit the sale, lease, mortgage, gift, devise, bequeath, or other change of ownership interests of the lots separately, without complying with the requirements of the Chapter 135, Subdivision of Land, of the Code of the Town of Henderson, as if the lots were one contiguous unsubdivided lot.

ADMINISTRATIVE EXPENSES: All actual expenses and liabilities incurred by the town or any of its officers or agencies in processing and reviewing applications or appeals hereunder and ensuring compliance with this chapter and all other applicable laws or regulations, including but not limited to engineering fees and disbursements, legal fees and disbursements, publication expenses, actual charges of the Zoning Enforcement Officer, administrative expenses and any other actual expenditures incurred or accrued by the town.

ADULT USE-The use of an establishment consisting of, including, or having the characteristics of any or all of the following:

accessory, site plan review or special use permit uses), but which is interpreted by the Planning Board as similar to a listed permitted, accessory, site plan review or special permit use, and not otherwise prohibited in this Chapter

.

USE: The specific purpose for which any land, building or structure is designed, arranged, intended, or occupied.

VARIANCE, AREA: A modification of the dimensional requirements of this chapter.

VARIANCE, USE: An exception granted to utilize land for a use not permitted in a district.

VIEWSHED: An elevated or unobstructed location, position or area that permits an unhindered panoramic vista of particular interest or pleasure or unique view to or from a particular point.

WALL: See definition for “fence.”

WAREHOUSE: A facility that stores goods for future transportation, including self-storage units and truck terminals.

WATERFRONT PROPERTY: Property which abuts Lake Ontario, its bays and coves, Crystal Lake, and that portion of Stony Creek south and west of the bridge crossing Stony Creek on County Route 152.

WATERFRONT PROPERTY LINE: Along waterfront property, the waterfront property line shall be determined as the mean high water level elevation.

WIND TURBINE GENERATING FACILITY (COMMERCIAL WIND FARM): Wind generating facilities which generate original power on site to be transferred to a transmission system for distribution to customers. The definition of commercial wind power generating facilities shall not include individual wind power generating facilities erected and used primarily for private use.

WIND TURBINE, ROOF MOUNTED: A relatively small wind generating facility which generates original power on-site for on-site use by the property owner or home-owner, mounted on the principle building's roof and with a maximum height no greater than ten (10) feet.

WIND TURBINE TOWER: Wind generating facility which generates original power on-site.

WIND TURBINE TOWER, PRIVATE: An individual wind turbine tower used to generate power for on-site use by the property owner or home-owner, except for the required electrical current feed-back to the power company.

YARD: The area of a lot surrounding the principal structure and bounded by the lot lines.

(1) YARD, FRONT: The space located between the front lot line and the front building line of the principal structure and extending the full width of the lot. For the purpose of this chapter, the front yard of waterfront property shall be the yard between the waterfront property line and the front building line.

(2) YARD, REAR: The space located between the rear lot line and the rear building line of the principal structure and extending the full width of the lot

(3) YARD, SINGLE SIDE: The area bounded by the side lot line, the front building line of the principal structure, the rear building line of the principal structure and the principal structure

(4) TOTAL SIDE YARD: Sum of two side yards.

ZONING BOARD OF APPEALS (ZBA): The Zoning Board of Appeals of the Town of Henderson.

ZONING ENFORCEMENT OFFICER (ZEO): The Zoning Enforcement Officer is the person appointed by the Town Board to carry out the requirements of this chapter, or his duly appointed assistant.

ZONING PERMIT: A permit issued under this chapter by the Zoning Enforcement Officer evidencing compliance with the requirement of this chapter prior to any change in use or construction, alteration, demolition or removal of any structure.

Article III
Establishment of Zoning District

§ 150-7. Zoning Districts.

The Town of Henderson is hereby divided into the following zoning districts:

A. Lakefront (LF). Purpose: To encourage controlled waterfront single family residential uses and private recreational uses while preserving scenic and natural views of and along the lake or river.

B. Island (I). Purpose: To allow for controlled development of existing islands, while preventing overcrowding and obstruction of water views.

C. Agriculture and Rural Residence (AR-40). Purpose: To encourage the continuation of agricultural use in harmony with large-lot single family development; to permit appropriately sited commercial services and allow for unobtrusive light industrial facilities.

D. Business (B). Purpose: To encourage commercial/service development along the major traffic arterial, while moderating the proliferation of access points and preventing the obstruction of lake vistas.

E. Business Residential (BR). Purpose: To allow both residential and a variety of office or compatible commercial development within the district to foster pedestrian accessible residential areas that incorporate support services within reasonable walking distance.

F. Residential (R-15). Purpose: To encourage a mix of residential and compatible small commercial uses in a medium-density hamlet setting.

G. Harbor (H). Purpose: To allow a mix of residential and water dependent/water enhancing uses in a high density setting, while preserving visual and physical access to Lake Ontario.

H. Planned Development District – Overlay**.** Purpose: To enable the Town to establish Planned Development Districts at designated specific locations by amending this chapter so as to encourage a mix or variety of compatible uses such as residential, affordable residential, office, commercial and/or recreational with building types that compliment each other within a single district where such combined uses might not be allowed under ordinary zoning district standards. Also to provide for the development of these mixed use projects in a comprehensive manner instead of piecemeal to save open space that otherwise would be lost or wasted, and to promote more efficient use of land while protecting natural resources and priority character and view shed areas.

I. Corridor Overlay District – Overlay**.** Purpose: To retain the agricultural and visual character and maintain the natural and scenic quality of and area while fostering residential, character sensitive commercial and agricultural related development where appropriate. It is also the intent within the district to preserve the arterial function of the state highways that comprise the corridor. When considering development in this area, proposed developments should be consistent with the overall Town planning vision, goals and strategies found in the Compressive Land Use Plan as well as this Law and the Town of Henderson Subdivision Law.

J. Open Development District – Overlay. Purpose: To permit the issuance of building permits in areas of the Town where direct access to a public road is not possible, thus satisfying the requirements of New York State Town Law, § 283a.

§ 150-8. Zoning Map Certification.

A. The above titled zoning districts are bounded as shown on the map entitled "Town of Henderson Zoning and Overlay District Map" dated _____, which map is filed in the Town Clerk's Office and is hereby adopted and declared to be part of this chapter.

B. In the event of any change in district boundaries or other matter shown on the map, a new map shall be promptly prepared with a note and description of the nature and date of the change. The new map shall be filed in the Town Clerk's office together with all previous Zoning maps.

§ 150-9. Interpretation of district boundaries.

A. Where uncertainty exists with respect to the exact boundaries of districts as shown on the Zoning Map, the final decision shall be made by the Town Zoning Board of Appeals.

B. District boundary lines in general follow, or parallel at set distances, street lines, existing lot lines, and other man-made or natural features. The Zoning Enforcement Officer shall be given the authority to scale these districts from the Zoning Map and relate them to accurate ground points.

C. Where a lot is located in two zoning districts as shown on the Town of Henderson Zoning Map, the standards and requirements for each district shall apply as directed by Article IV of this Law,

committing the tower or facility owner, and his/her successors in interest, to notify the enforcement officer within 30 days of the discontinuance of use of the tower or facility. This letter shall be filed with the enforcement officer prior to issuance of a permit. Obsolete or unused towers, facilities or accessory structures shall be removed from the site within four months of such notification or five months from discontinuance of use, whichever shall first occur. Failure to notify and/or remove the obsolete or unused tower or facility in accordance with these regulations shall be in a violation of this law. Town may also remove said tower or facility upon failure of owner to remove as provided herein and the expiration of ten (10) days after written notice of intent to remove is delivered to the U. S. postal service for first class delivery to the owner thereof, if known, and to the owner of real property on which tower or facility is located as identified on the latest assessment roll of the Town. The reasonable cost of removal incurred by the town shall be a lien on the real property on which the facility or tower is located and may be levied and collected by the town in the same manner as the real property taxes of the Town or in any other manner permitted by law.

I. Inter-municipal Notification. In order to keep neighboring municipalities informed, and to facilitate the possibility of directing that any existing tall structures or existing towers in a neighboring municipality be considered for shared use, the Planning Board shall require that an applicant who proposes a tower or facility shall notify in writing the legislative body of each municipality within the Town and each municipality that borders the Town, the Jefferson County Planning Department and the Director of Jefferson County Emergency Services. Notification shall include the exact location of the proposed tower or facility, and a general description of the project including, but not limited to, the height of the tower or facility and its capacity for future shared use. Documentation of this notification shall be submitted to the Planning Board at the time of application.

J. Zoning Permits. When a zoning permit is obtained, the applicant shall provide to the town, financial security in cash, surety bond or other security acceptable to the Town for the anticipated cost of removal of the telecommunications facility and property restoration of the site in the event the town shall be required to remove such on failure of owner to remove as required herein. The amount of security shall be approved by the Planning Board, but shall not be less than $50,000. When the permit is renewed or modified, the Board may adjust the required amount of the required financial security to adequately cover increases in the cost of removal of the telecommunication facility and property restoration.

ARTICLE IX
WIND GENERATION FACILITIES

§ 150-51. PURPOSE.

The Town Board of the Town of Henderson recognizes the increased demand for alternative energy generating facilities and the need for more inexpensive power that wind turbine facilities may provide. Often these facilities require the construction of single or multiple wind turbines. The purpose of these supplemental regulations is to protect the community's interest in properly siting wind turbine towers in a manner consistent with sound land use planning, while also allowing private and commercial providers to meet their power generating objectives.

§ 150-52. PERMITTED AND PROHIBITED USES.

A. Roof mounted wind turbines are permitted uses within all zoning districts.

B. Private Wind Turbine Towers are permitted upon granting of a special use permit within the Residential (R-15), Business (B), Business-Residential (BR) and Agriculture and Rural Residence (AR-40) zoning districts, but are not permitted within the Lakefront (LF), Island (I), and Harbor (H) zoning districts.

C. Commercial Wind Power Generating Facilities are permitted upon granting of a special use permit within the AR-40 zoning district, but are not permitted within the Corridor Overlay Zone or the R-l 5, B, LF, I, and H zoning districts.

§ 150-53. ADDITIONAL STANDARDS: SPECIAL USE PERMIT CRITERIA.

A. No special use permit shall be granted for a Private Wind Turbine Tower or a Commercial Wind Power Generating Facilities and/or transmission system unless it is determined by the Planning Board that the proposed use meets all of the following criteria, in addition to the special use permit and site plan review criteria in § 150-20 and § 150-25 respectively in the Town of Henderson Zoning Law:

B. No experimental, homebuilt, or prototype wind turbines shall be allowed without documentation by the applicant of their maximum probable blade throw distance in the event of failure and determination by the Planning Board of appropriate setback distances on the basis of that documentation.

C. The minimum required setback distance between each Wind Turbine Tower and all surrounding property lines, overhead utility lines, any dwellings or other buildings for occupancy, and any other wind turbine towers, above-ground generation facilities, shall be no less than 1.5 times the proposed structure height plus the rotor radius.

D. No Wind Turbine Tower facilities shall be installed in any location along the major axis of an existing microwave communications link where its operation is likely to produce electromagnetic interference in the link's operation.

E. No Wind Turbine Tower facilities shall be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antenna (including residential reception antenna) for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception.

F. Use of nighttime, and overcast daytime condition, stroboscopic lighting to satisfy tower facility lighting requirements for the FAA shall be subject to on-site field testing before the Planning Board as a prerequisite to that Board's approval with specific respect to glare to existing residential uses within 2000' of each tower for which such strobe lighting is proposed.

G. No Wind Turbine Tower facilities shall be installed in any location that would substantially detract from or block view of a portion of a recognized scenic view shed, as viewed from any public road right-of way, public body of water, or publicly owned land within the Town of

Henderson or that extends beyond the border of the Town of Henderson.

H. Wind Turbine Tower facilities shall be located with relation to property lines so that the level of noise produced during wind turbine operation shall not exceed 50 dbA, measured at the boundaries of all of the closest parcels that are owned by non-site owners and that abut either the site parcel (s) or any other parcels adjacent to the site parcel held in common by the owner of the site parcel as those boundaries exist at the time of the issuance of any special permit for such facilities.

I. No Wind Turbine Tower facilities shall be permitted that lack an automatic braking, governing, or featuring system to prevent uncontrolled rotation, overspeeding, and excessive pressure on the tower structure, rotor blades, and turbine components.

J. The minimum distance between the ground and any part of the rotor blade system shall be 30 feet, unless a fence enclosure is provided to limit unauthorized or accidental access to the spinning rotors.

K. All power transmission lines from the Wind Turbine Tower facilities to on-site substations shall be underground.

L. Procedures acceptable to the Planning Board for emergency shutdown of power generation units shall be established and posted prominently and permanently on at least one location on the road frontage of each individual unit site.

§ 150-54. LIABILITY INSURANCE.

Prior to issuance of a Building Permit for a Wind Turbine Tower and continuing after construction until such facility is removed from the site, the applicant shall provide documentation satisfactory to the Town and at such reasonable intervals as determined by the Town of the existence of liability insurance coverage with reasonable limits as determined by the Town Board in consultation with the Town's insurer, for property damage, injury or death resulting from the construction, placement, use, maintenance, operation of a Wind Generation Facility, by the owner of the Site.

§ 150-55. REMOVAL OF OBSOLETE COMMERCIAL WIND TURBINE FACILITIES.

A. Obsolete or unused wind turbines and accessory structures shall be removed from any site within four months of the discontinuance of the use thereof. Owner of the site shall notify the Town in writing within ten (10) days of the discontinuance of the use of such Turbine Tower or facility. Failure to notify and/or remove the obsolete or unused tower or facility in accordance with these regulations shall be a violation of this law. The Town Board may remove such facilities after 60 days and treat the cost as a tax lien on the property.

B. When the zoning permit is obtained for a commercial wind turbine facility, the applicant must provide and maintain a performance bond issued by a surety licensed in New York State in form acceptable to Town or such other security acceptable to the Town for removal of the wind turbines and property restoration, in an amount approved by the Planning Board, but not less than $50,000.

C. When a zoning permit is renewed or modified, the Board may adjust the required amount of the financial security bond to adequately cover increases in the cost of removal of the wind turbine facility and property restoration.

§ 150-56. SPECIAL USE PERMIT AND SITE PLAN PROCEDURES/SUBMITTAL REQUIREMENTS.

A. The procedure for obtaining special permit or site plan approval hereunder and the information to be provided by an applicant hereunder shall be as provided respectively in Articles V and VI of the Code and as set forth hereafter.

B. A digital elevation model-based project visibility map showing the impact of topography upon visibility of the project from other locations throughout the region, to a distance of 5 miles from the center of the project shall be provided. The scale used shall depict a 3-mile radius no smaller than 2.7 inches, and the base map shall be a published topographic map showing cultural features and other landmarks.

C. Color photographs, at least 3 inches x 5 inches, taken from locations selected by the Planning Board within a three-mile radius of the boundaries of the facility site, shall be provided. Said photographs shall be computer enhanced to simulate the appearance of the as-built aboveground site facilities as such would appear from said locations. The number of photographs to be submitted shall be equal to the number of proposed individual wind turbines plus three, but in no event less than four.

ARTICLE X
PLANNED DEVELOPMENT DISTRICT (pdd)
Association Island Planned Development District

§ 150-57. Zoning Description.

A. The zoning designation of Association Island in the Town of Henderson is hereby amended to change it from Island District to Planned Development District, and the Town's Zoning Map is hereby amended accordingly. The legal description of said parcel is Exhibit A (refer to zoning map)

B. The new Planned Development District shall hereafter be known as the Association Island Planned Development District and the uses allowed thereon are as set forth on the maps as listed on Exhibit B hereto and shall consist of the uses set forth as Exhibit C. (Exhibit B is on file in the office of the Town Clerk)

C. The water distribution system shall be constructed in accordance with the New York State Department of Health Permit issued therefore. The sewage treatment and collection facilities shall be in accordance with the New York State Department of Environmental Conservation SPEDES Permit issued therefore.

D. The applicant shall comply with all Town, County, State and Federal regulations regarding the

Schedule II – Permitted Principal, Permitted Accessory & Special Uses

	Zoning Districts							
Uses	**LF**	**I**	**AR-40**	**B**	**BR**	**R-15**	**H**	**Corridor Overlay**
Convenience store, retail	NP	NP	NP	SP	NP	NP	NP	UD
Dock	PA	PA	NP	NP	NP	NP	PA	UD
Dwelling, Single Family	PP	PP	PP	PP	PP	PP	PP	UD
Dwelling, Two-Family	NP	PP	PP	PP	PP	PP	PP	UD
Dwelling, Multi-family	NP	SP	SP	SP	SP	SP	NP	UD
Dwelling, Multiple	NP	SUP	SUP	NP	SUP	NP	NP	UD
Fuel storage/supply	NP	SUP	SUP	SUP	NP	NP	SUP	UD
Gasoline Service Station	NP	NP	NP	SUP	NP	NP	NP	UD
Home Occupation	PA	PA	PA	PA	PA	PA	PA	UD
Institutional use	NP	NP	SP	SP	SP	SP	SP	UD
Junkyard	NP	NP	SUP	NP	NP	NP	NP	UD
Keeping of Domestic Animals	NP	NP	SUP	NP	NP	SUP	NP	UD
Kennel	NP	NP	SUP	NP	NP	NP	NP	UD
Light industrial use	NP	NP	NP	SP	NP	NP	NP	UD
Marina	SP	SP	NP	NP	NP	NP	SP	UD
Mobile home, or Mobile home park	NP	NP	SUP	NP	NP	NP	NP	UD
Motel/hotel	NP	SUP	SUP	SUP	NP	NP	SUP	UD
Motor vehicle repair shop	NP	NP	NP	SUP	NP	NP	NP	UD
Nursing home	NP	NP	SP	NP	SP	SP	NP	UD
Professional office	NP	NP	SP	SP	SP	SP	SP	UD
Public utility	SUP	NP	SUP	NP	NP	SUP	NP	UD
Quarry	NP	NP	SUP	NP	NP	NP	NP	UD
Recreation, outdoor	NP	SP	SP	SP	NP	NP	NP	UD
Recreation, indoor	NP	SP	SP	SP	NP	NP	NP	UD
Retail, large product	NP	NP	NP	SP	NP	NP	NP	UD
Restaurant	NP	SP	SP	SP	NP	NP	SP	UD
Roof Mounted Wind Turbine Tower, Private	PA	PA	PA	PA	PA	PA	PA	PA

Schedule II – Permitted Principal, Permitted Accessory & Special Uses

	Zoning Districts							
Uses	**LF**	**I**	**AR-40**	**B**	**BR**	**R-15**	**H**	**Corridor Overlay**
Senior citizen home	NP	NP	SP	SP	SP	SP	NP	UD
Shopping center	NP	NP	NP	SUP	NP	NP	NP	UD
Social Organization	SP	SP	SP	SP	SP	SP	SP	UD
Storage building <1,250 square feet	NP	SP	PA	PA	SP	PA	SP	UD
Storage building > or = 1,250 square feet	NP	NP	SP	SP	NP	NP	NP	UD
Telecommunications Tower, un-camouflaged (refer to Article 8, Section 150-43, paragraph E.)	NP	NP	SUP	SUP	NP	NP	NP	NP
Telecommunications Tower, camouflaged or co-located (refer to Article 8, Section 150-43, paragraph E.)	SUP	SUP	SUP	SUP	SUP	SUP	SUP	UD
Warehouse	NP	NP	NP	SP	NP	NP	NP	UD
Wind Turbine Tower, Private	NP	NP	SUP	SUP	SUP	SUP	NP	NP
Commercial Wind Power Generating Facility (Wind Farm)	NP	NP	SUP	NP	NP	NP	NP	NP
On premise sale/service of farm goods	NP	NP	SP	NP	SP	NP	NP	UD

KEY: UD = Refer to underlying district
NP = Not permitted within the district
PP = Permitted Principle Use
PA = Permitted Accessory Use
SUP = Special Use Permit required.
SP = Site Plan Review required.

Permitted Accessory uses common to all districts: Boat ramps, decks, fences, walls, hedges, garages carports, personal recreation, guest accommodations, satellite dish/antenna, signs, storage sheds, storage of unoccupied recreational vehicles.

Laketon Township

Zoning Ordinance

January 2006

Street, Major – A public dedicated right-of-way, which collects traffic from local streets. Major Township streets include: Giles Road, River Road, Fenner Road, Memorial Drive, Scenic Drive, Whitehall Road, and Buys Road.

Street, Private – A privately controlled dedicated or undedicated, and improved or unimproved, maintained easement or other interest in land that provides the means of access from a public road right-of-way for ingress and egress to three (3) or more lots or parcels. The term "street" shall be synonymous with the terms road, avenue, place, way, drive, lane, boulevard, highway or other thoroughfare.

Street, Public – An improved right of way under certification of the Road Commission. The term "street" shall be synonymous with the terms road, avenue, place, way, drive, lane boulevard, highway or other thoroughfare.

Stop Work Order – An administrative order which is either posted on the property or mailed to the property owner which directs a person not to continue, or not to allow the continuation of an activity which is in violation of this Ordinance.

Structure – Anything constructed or erected with a fixed location on the ground, or attached to something having a fixed location on the ground.

SECTION 2.21 DEFINITIONS – T

Temporary Building, Structure, or Use – A structure or use permitted by the Zoning Administrator to exist during periods of construction of the main building or for special events, which period may not exceed six (6) months in a twelve (12) month time period.

SECTION 2.22 DEFINITIONS – U (RESERVED FOR FUTURE USE)

SECTION 2.23 DEFINITIONS – V

Variance – A relaxation of the terms and uses of the Zoning Ordinance where authorized by the Zoning Board of Appeals in accordance with the requirements of this Ordinance.

Vehicle, Commercial – All motor vehicles used for the transportation of passengers for hire, or constructed or used for transportation of goods, wares or merchandise, and/or all motor vehicles designed and used for drawing other vehicles.

SECTION 2.24 DEFINITIONS – W

Wireless Communications Tower, Commercial – A structure designed and constructed to support one or more antennas used for licensed telecommunications services including cellular, personal communication services (PCS), specialized mobilized radio (SMR), enhanced specialized mobilized radio (ESMR), paging, and similar services that are marketed to the general public.

Wind Energy Conversion System (WECS)

A. Wind Energy Conversion System (WECS) – shall mean a combination of:

1. A surface area, either variable or fixed, for utilizing the wind for electrical powers; and
2. A shaft, gearing, belt, or coupling utilized to convert the rotation of the surface area into a form suitable for driving a generator, alternator, or other electricity-producing device; and
3. The generator, alternator, or other device to convert the mechanical energy of the surface area into electrical energy; and
4. The tower, pylon, or other structure upon which any, all, or some combination of the above are mounted; and
5. Building or equipment accessory thereto.

B. Survival Wind Speed – The maximum wind speed, as designated by the WECS manufacturer, at which a WECS, in unattended operation (not necessarily producing power) is designed to survive without damage to any structural equipment or loss of the ability to function normally.

C. Wind Farm – Clusters (2 or more) of WECS towers placed upon land with the intent to sell or provide electricity to others. These towers may or may not be owned by the owner of the property upon which the towers are placed.

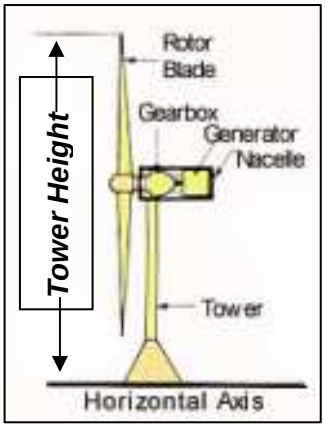
D. Single WECS for Commercial Purposes – A WECS tower placed upon land with the intent to sell or provide electricity to others. The tower may or may not be owned by the owner of the property upon which the tower is placed.

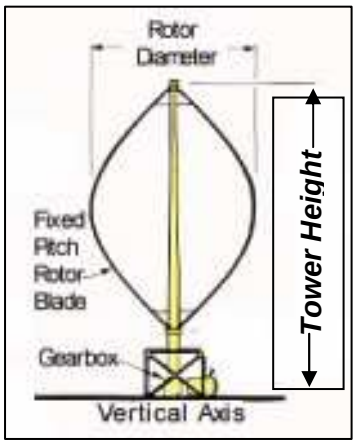
E. Interconnected WECS – A WECS, which is electrically connected to the local electrical power utility system and can feed power back into the local electrical power utility system.

F. WECS Testing Facility – A structure and equipment used to determine the potential for the placement of a WECS.

G. WESC Tower Height

1. Horizontal Axis Wind Turbine Rotors – The distance between the ground and the highest point of the WECS, as measured from the ground, plus the length by which the rotor blade on a horizontal mounted WECS exceeds the structure which supports the rotor and blades;
2. Vertical Axis Wind Turbine – The distance between the ground and the highest point of the WECS.





CHAPTER 5
R-1 RESIDENTIAL DISTRICT

SECTION 5.01 STATEMENT OF PURPOSE

To provide for a suitable residential environment for homes set on larger lots, and intended to preserve the rural character and natural features of the District. The uses allowed are basically limited to single-family dwellings together with certain other uses such as schools, parks and playgrounds. In keeping with the purpose, development is regulated to low densities.

SECTION 5.02 PERMITTED USES

Land and/or buildings in the R-1 Residential District may be used for the following purposes as Permitted Uses:

A. Accessory buildings, structures and uses customarily incidental to any of the Permitted Uses in accordance with the provisions of Section 3.18.

B. Day care family facilities.

C. General farming.

D. Single-family dwellings, including home occupations as regulated by Section 3.21.

E. State licensed family care facilities.

SECTION 5.03 SPECIAL LAND USES

Land and/or buildings in the R-1 Residential District may be used for the following purposes following review by the Township Board as a Special Land Use as regulated by Chapter 17:

A. Bed and breakfast establishments.

B. Boat and canoe/kayak yards.

C. Campgrounds, public or private.

D. Cemeteries.

E. Religious institutions.

F. Golf course or country clubs.

G. Governmental buildings, libraries, and museums not requiring outdoor storage of materials.

H. Open Space Preservation Developments (clustering) on a minimum of forty (40) acres.

I. Home based businesses.

J. Horse stable and training facilities.

K. Mineral removal.

L. Private or charter schools

M. Utility and public service buildings, without storage yards but not including essential services.

N. Commercial wireless communication towers.

O. Wind Energy Conversion Systems (WECS)

SECTION 5.04 SITE DEVELOPMENT REQUIREMENTS

A. No lot, main building, or structure, nor the enlargement of any main building or structure, shall be hereafter erected unless all of the following setback requirements are met and maintained in connection with the use of the lot, main building, structure, or enlargement.

R-1 DISTRICT REGULATIONS	
Minimum Lot Area	3 acres
Maximum Lot Area	5 acres
Minimum Lot Width	200 feet
Minimum Front Yard Setback	50 feet, 100 feet from major street
Minimum Side Yard Setback	15 feet
Minimum Rear Yard Setback	25 feet
Maximum Lot Coverage (includes driveways, decks, etc.)	35 percent
Maximum Building Height	2 ½ stories; or 35 feet, whichever is higher
Minimum Dwelling Unit Size	1 – story, 1,200 square feet Bi-level – 1,400 square feet Tri- level and 1 ½ story -1,500 square feet 2-story residence - 1,800 square feet The first floor area for a tri-level shall not be less than 960 square feet, for bi-level, 1½, and 2-story dwellings, minimum first floor area shall not be less than 1,000 square feet

B. Off-Street Parking and Loading: See Chapter 16.

C. Signs: See Chapter 18.

D. Site Plan Review: See Chapter 15.

CHAPTER 6
R-2 SINGLE-FAMILY RESIDENTIAL DISTRICT

SECTION 6.01 STATEMENT OF PURPOSE

To provide for a suitable residential environment for families typically with children, the following uses are basically limited to single-family dwellings together with certain other uses such as schools, parks and playgrounds, which provide a neighborhood environment. In keeping with the purpose, development is regulated to a moderate density. Commercial and other uses tending to be incompatible with the purpose of this district are prohibited.

SECTION 6.02 PERMITTED USES

Land and/or buildings in the R-2 District may be used for the following purposes as Permitted Uses:

A. Accessory buildings, structures and uses customarily incidental to any of the Permitted Uses or Special Land Uses in accordance with the provisions of Section 3.18.

B. Day care family facilities.

C. Single-family dwellings, including home occupations as regulated by Section 3.21.

D. State licensed family care facilities.

SECTION 6.03 SPECIAL LAND USES

Land and/or buildings in the R-2 District may be used for the following purposes following review by the Township Board as a Special Land Use as regulated by Chapter 17:

A. Bed and breakfast establishments.

B. Boat and canoe/kayak yards.

C. Campgrounds, public or private.

D. Cemeteries.

E. Religious institutions.

F. Day care group facilities.

G. Golf course or country clubs.

H. Home based businesses.

I. Horse stable and training facilities.

J. Open Space Preservation Developments (clustering) on a minimum of twenty (20) acres.

K. Private or charter schools

L. Utility and public service buildings, without storage yards, but not including essential public services such as poles, wires, and underground utility systems.

M. Commercial wireless communication towers.

N. Wind Energy Conversion Systems (WECS).

SECTION 6.04 SITE DEVELOPMENT REQUIREMENTS

A. No lot, main building, or structure, nor the enlargement of any main building or structure, shall be hereafter erected unless all of the following setback requirements are met and maintained in connection with the use of the lot, main building, structure, or enlargement.

R-2 DISTRICT REGULATIONS		
Minimum Lot Area	Without public sewer	2 acres
	With public sewer	20,000 square feet
Maximum Lot Area	With or without sewer	5 acres
Minimum Lot Width	Without public sewer	200 feet
	With public sewer	100 feet
Minimum Front Yard Setback	50 feet, 100 feet from a major street	
Minimum Side Yard Setback	12 feet	
Minimum Rear Yard Setback	25 feet	
Maximum Lot Coverage (includes driveways, decks, etc.)	35 percent	
Maximum Building Height	2 ½ stories; or 35 feet, whichever is higher	
Minimum Dwelling Unit Size	1 – story, 1,200 square feet Bi-level – 1,400 square feet Tri- level and 1 ½ story -1,500 square feet 2-story residence - 1,800 square feet The first floor area for a tri-level shall not be less than 960 square feet, for bi-level, 1½, and 2-story dwellings, minimum first floor area shall not be less than 1,000 square feet	

B. Off-Street Parking and Loading: See Chapter 16.

C. Signs: See Chapter 18.

D. Site Plan Review: See Chapter 15.

CHAPTER 17
SPECIAL LAND USES

SECTION 17.01 SCOPE

This Chapter provides a set of procedures and standards for uses of land or structures, which because of their unique characteristics require special consideration in relation to the welfare of adjacent properties and the community as a whole. The regulations and standards, herein, are designed to allow, on one hand, practical latitude for the applicant, but at the same time maintain adequate provision for the protection of the health, safety, convenience, and general welfare of Laketon Township. For purposes of this Ordinance, all Special Land Uses within the various Districts are subject to the conditions and standards of this Chapter. In addition, the following uses shall conform to the specific requirements cited in Section 17.05, as applicable.

SECTION 17.02 APPLICATION AND REVIEW PROCEDURES

A. An application shall be submitted through the Zoning Administrator, accompanied by:

1. the payment of a fee as established by the Township Board;
2. an completed application form, as provided by the Township; and
3. copies of a complete site plan as specified in Chapter 15.

B. Applications for a Special Land Use permit shall be submitted at least thirty (30) days prior to the next Planning Commission meeting at which the application is to be considered.

C. The application, along with the required site plan, shall be forwarded to the Planning Commission at its next scheduled meeting.

D. The Planning Commission shall hold a public hearing on the application, providing notice of the hearing in accordance with the Zoning Act. The Planning Commission shall then review the application and other information available to it through the public hearing or from any other sources, including recommendations or reports from the Township planner, engineer, or other party, and shall make a recommendation to the Planning Commission regarding the Special Land Use.

E. The Planning Commission shall approve, approve with conditions, or deny the Special Land Use request, and incorporate the basis for the decision and any conditions which should be imposed in the public record.

F. No petition for Special Land Use approval, which has been disapproved, shall be resubmitted for a period of one (1) year from the date of disapproval, except as may be permitted after learning of new and significant facts or conditions which reasonably might result in favorable action upon resubmittal.

G. A Special Land Use approved pursuant to this Chapter shall be valid for one (1) year from the date of approval. Each development shall be under construction within one (1) year after the date of approval of the Special Land Use, except as noted below.

1. The Planning Commission may grant one (1) six (6) month extension of the approval, provided the applicant requests the extension prior to the date of the expiration of the Special Land Use approval.
2. The extension shall be approved if the applicant presents reasonable evidence to the effect that the development has encountered unforeseen difficulties beyond the control of the applicant, and the project will proceed within the extension period.
3. If neither of the above provisions are fulfilled or the six (6) month extension has expired prior to construction, the Special Land Use approval shall be null and void.

H. The Planning Commission shall have the authority to revoke any Special Land Use approval after it has been shown that the holder of the approval has failed to comply with any of the applicable requirements of this Chapter, other applicable sections of this Ordinance, or conditions of the Special Land Use approval. Prior to revocation, the Planning Commission shall conduct a public hearing following the notification procedures for the original approval.

SECTION 17.03 EXISTING SPECIAL LAND USES

Uses of land and/or development projects granted Special Land Uses status by the Township prior to the adoption of this Zoning Ordinance may continue this status provided the rules, regulations, requirements, and conditions under which the Special Land Use was approved are met.

SECTION 17.04 GENERAL STANDARDS

A. In addition to the standards established for specific uses herein, an application for a Special Land Use shall be reviewed for compliance with the review standards for approval of site plans in Section 15.07. Additional conditions, as authorized in Section 17.04, C, may be placed upon a Special Land Use.

B. Each application shall be reviewed for the purpose of determining that the proposed Special Land Use will:

1. Be designed, constructed, operated and maintained so as to be harmonious and appropriate in appearance, with the existing or intended character of the general vicinity and that such a use will not change the essential character of the area in which it is proposed;
2. Be served adequately by essential public facilities and services such as highways, approved public or private streets, police, fire protection, drainage structures, refuse disposal, water and sewage facilities;
3. Not create excessive additional requirements at public cost for public facilities and services; and
4. Not involve uses, activities, processes, materials, and equipment or conditions of operation that will be detrimental to any persons, property, or the general welfare by reason of production of traffic, noise, smoke, fumes, glare, or odors.

C. The Planning Commission may stipulate any additional conditions and safeguards deemed necessary to accomplish the following purposes. Failure to comply with these conditions may result in the revocation of the Special Land Use approval, pursuant

to17.02; H. Conditions imposed shall be those necessary to ensure that the proposed Special Land Use will:

1. Meet the intent and purpose of the Zoning Ordinance.
2. Relate to the standards established in the Ordinance for the land use or activity under consideration.
3. Ensure compliance with those standards.
4. Protect the general welfare.
5. Protect individual property rights.
6. Ensure that the purposes of this Ordinance will be observed.

SECTION 17.05 SPECIAL LAND USE SPECIFIC REQUIREMENTS

The General Standards of Section 17.04, B, are basic to all Special Land Uses. The specific and detailed requirements set forth in this Section relate to particular uses and are requirements which must be met by those uses in addition to the foregoing General Standards. The following Special Land Uses have specific requirements that must be met.

A. Amusement parks, fair grounds and flea markets.

B. Bed and breakfast establishments.

C. Boat and canoe and kayak yards.

D. Campgrounds, public or private.

E. Cemeteries.

F. Commercial storage warehouses.

G. Commercial wireless communication towers.

H. Day care group facilities.

I. Drive-through establishments including financial institutions, dry cleaners, pharmacies, and similar service.

J. Drive-thru restaurants.

K. Elderly housing.

L. Funeral homes and mortuaries.

M. Golf course or country clubs.

N. Governmental buildings, libraries, and museums not requiring outdoor storage of materials.

O. Home based businesses.

P. Horse stable and training facilities.

Q. Hotel/motels.

R. Marinas.

S. Mineral removal.

T. Motor vehicle repair garages.

U. Motor vehicle wash facilities.

V. Nursing or convalescent homes.

W. Open air businesses.

X. Open Space Preservation Developments (clustering).

Y. Private and Charter Schools

Z. Religious Institutions.

AA. Restaurants, exclusive of drive-through facilities.

BB. Utility and public service buildings, without storage yards, but not including essential public services such as poles, wires, and underground utility systems.

CC. Veterinary hospitals.

DD. Wind Energy Conversion Systems (WECS).

A. Amusement parks, fair grounds and flea markets.

1. The minimum lot size shall be twenty (20) acres.
2. The lot shall be located so at least one (1) side abuts a paved primary road or State trunk line and all access shall be from that street(s).
3. Access to the site shall be located at least one hundred (100) feet from any intersection as measured from the nearest right-of-way line to the nearest edge of the intersection.
4. Entry drives and parking areas shall be a minimum of one hundred (100) feet from adjacent property lines.
5. The main and accessory buildings shall not be located nearer than two-hundred (200) feet to any residential dwelling located on adjacent property.
6. Maximum lot coverage shall be twenty-five percent (25%).
7. Any amusement enterprises located within five hundred (500) feet of any dwelling shall not be open later than 10:00 p.m., unless approved by the Planning Commission.
8. The entire premises shall be surrounded by a six (6) foot cyclone fence at or near the boundary property lines.
9. A landscaped area of at least twenty five (25) feet in width shall be maintained around the periphery of the property. Screening which complies with the

EE. Wind Energy Conversion Systems (WECS).

1. These facilities may be permitted as a principal use or an accessory use on a parcel.
2. A minimum lot size of two (2) acres and minimum lot width of two hundred (200) feet is required.
3. In addition to the requirements for site plan application and review outlined in Section 15.04, the following information shall be include with any application of a Special Land Use for a WECS:

    a. Location of overhead electrical transmission or distribution lines.
    b. Location and height of all buildings, structures, towers, guy wires, guy wire anchors, security fencing, and other above ground structures associated with the WECS.
    c. Locations and height of all adjacent buildings, structures, and above ground utilities located within three hundred (300) feet of the exterior boundaries of the site housing the WECS. The boundaries to include the outermost locations upon which towers, structures, fencing, facilities, and other items associated with a WECS are placed. Specific distances to other on-site buildings, structures, and utilities shall be provided.
    d. A buffer or greenbelt to screen the use from any adjacent Residential District or use and the public road as required in Section 3.23.
    e. Existing and proposed setbacks of all structures located on the property in question.
    f. Sketch elevation of the premises accurately depicting the proposed WECS and its relationship to all structures within three hundred (300) feet. For wind farms in which numerous towers of similar height are planned, sketches are necessary only at borders of proposed project and when adjacent to other established structures within three hundred (300) feet.
    g. Access road to the WECS with detail on dimensions, composition, and maintenance.
    h. Planned security measures to prevent unauthorized trespass and access.
    i. WECS maintenance programs shall be provided that describes the methods to be used to maintain the WECS, including removal when determined to be obsolete.

4. A copy of the manufacturer's installation instruction shall be provided. Included as part of or as an attachment to the installation instructions shall be standard drawings of the structural components of the wind energy conversion system and support structures, including base and footings provided along with engineering data and calculations to demonstrate compliance with the structural design provisions of the State Building Code; drawings and engineering calculations shall be certified by a registered engineer licensed to practice in the State of Michigan.
5. Each WECS shall be grounded to protect against natural lightning strikes in conformance with the National Electrical Code. Additionally, WECS electrical equipment and connections shall be designed and installed in adherence to the National Electrical Code as adopted by the Township.
6. A minimum of a six (6)-foot tall fence shall be provided around the perimeter of the WECS, or in the case of several WECS, around the perimeter of the site.

7. No part of a WECS (including guy wire anchors) shall be located within or above any required front, side or rear yard setback of the zoning district in which it is located. WECS towers shall be set back from the closest property line one (1) feet for every one (1) foot of system height.
8. WECS shall not be located within thirty (30) feet of an above ground utility line.
9. The permitted maximum height of a WECS shall be less than two hundred (200) feet.
10. Colors and surface treatment of the WECS and supporting structures shall minimize disruption of the natural characteristics of the site. No part of the structure shall be used for signs or advertising.
11. All WECS rotors shall not have rotor diameters greater than twenty-six (26) feet.
12. Blade-arcs created by the WECS shall have a minimum of thirty (30) feet of clearance over any structure, land or tree within a two hundred (200) foot radius of the tower.
13. Each WECS shall be equipped with both a manual and automatic braking device capable of stopping the WECS operation in high winds (40 MPH or greater).
14. To prevent unauthorized climbing, WECS towers must comply with one of the following provisions:

    a. Tower climbing apparatus shall not be located within twelve (12) feet of the ground.
    b. A locked anti-climb device shall be installed on the tower.
    c. Tower capable of being climbed shall be enclosed by a locked, protective fence at least six (6) feet high.

15. Each WECS shall have one (1) sign, not to exceed two (2) square feet in area posted at the base of the tower. The sign shall contain the following information:

    a. Warning high voltage.
    b. Manufacturer's name.
    c. Emergency phone number.
    d. Emergency shutdown procedures.

16. WECS facilities shall not have affixed or attached any lights, reflectors, flashers or any other illumination, except for illumination devices required by Federal regulations.
17. WECS facilities shall be designed and constructed so as not to cause radio and television interference.
18. Noise emanating from the operation of WECS facilities shall not exceed sixty (60) decibels, as measured on the dBA scale, measured at the nearest property line. Estimates of noise levels shall be provided by applicant for property lines at normal operating conditions.
19. No WECS shall be interconnected with a local electrical utility company until the utility company has reviewed and commented upon it. The interconnection of the WECS with the utility company shall adhere to the National Electrical Code as adopted by the Township.
20. The Township hereby reserves the right upon issuing any WECS or testing facility special land use permit to inspect the premises on which the WECS is located. If a WECS is not maintained in operational condition and poses a potential safety hazard, the owner shall take expeditious action to correct the situation.

21. Any WECS facilities which are not used for six (6) successive months shall be deemed abandoned and shall be dismantled and removed from the property at the expense of the property owner. The Township may require a performance guarantee in accordance with the provisions of Section 20.04 to insure enforcement of this requirement.

Chapter 27.63

SPECIAL PERMITS

Sections:

27.63.010 Procedures.
27.63.020 Action of Planning Commission.
27.63.025 Appeal of Planning Commission Action.
27.63.030 Amendments.
27.63.040 Pre-existing Uses.
27.63.050 Parking Regulations.
27.63.060 Sign Regulations.
27.63.070 Permitted Special Use: Early Childhood Care Facilities.
27.63.075 Permitted Special Use: Private Schools.
27.63.080 Permitted Special Use: Health Care Facilities.
27.63.090 Permitted Special Use: Dwellings For Members of a Religious Order.
27.63.100 Permitted Special Use: Farm Chemicals.
27.63.110 Permitted Special Use: Garden Centers.
27.63.120 Permitted Special Use: Mobile Home Courts.
27.63.125 Permitted Special Use: Mobile Home Subdivisions.
27.63.130 Permitted Special Use: Recreational Facilities.
27.63.140 Permitted Special Use: Outdoor Lighting For Recreational Facilities.
27.63.150 Permitted Special Use: Broadcast Towers.
27.63.160 Permitted Special Use: Extraction of Sand, Gravel, and Soil.
27.63.170 Permitted Special Use: Parking Lots.
27.63.175 Permitted Special Use: Parking Garages in O-1 District.
27.63.180 Permitted Special Use: B-4 District.
27.63.190 Permitted Special Use: Temporary Parking Lots.
27.63.195 Permitted Special Use: Temporary Commercial Parking.
27.63.200 Permitted Special Use: Clubs.
27.63.210 Permitted Special Use: Elderly or Retirement Housing.
27.63.215 Permitted Special Use: Housing Facilities For the Physically Handicapped.
27.63.216 Permitted Special Use: Connection of Single-Family Dwelling to Accessory Building for the Physically Handicapped.
27.63.220 Permitted Special Use: Church Steeples, Towers, and Ornamental Spires.
27.63.225 Permitted Special Use: Public Utility and Cable Television Purposes.
27.63.230 Permitted Special Use: Outdoor Theaters.
27.63.240 Permitted Special Use: Retail Sales and Service.
27.63.250 Permitted Special Use: Permitted Use Exceeding the Maximum Height Permitted in District.
27.63.260 Permitted Special Use: Confined Feeding Facilities.
27.63.270 Permitted Special Use: Campgrounds.

27.63.280 Permitted Special Use: Expansion of Nonconforming Uses.
27.63.290 Permitted Special Use: I-1 District.
27.63.300 Permitted Special Use: Bulk Storage of Petroleum Products.
27.63.310 Permitted Special Use: Mining, Quarrying, and Stone Mill.
27.63.320 Permitted Special Use: Community Unit Plans.
27.63.330 Permitted Special Use: Veterinary Facilities.
27.63.340 Permitted Special Use: Offices.
27.63.350 Permitted Special Use: Sale Barns.
27.63.360 Permitted Special Use: Mining.
27.63.370 Permitted Special Use: Banks.
27.63.380 Permitted Special Use: Flood Plain Construction.
27.63.390 Permitted Special Use: Restaurants, Medical Testing Laboratories, Motels and Hotels.
27.63.400 Permitted Special Use: Historic Preservation.
27.63.405 Permitted Special Use: Windows on Side Lot Lines for Any Use in a Historic Preservation District in B-1, B-3 and B-4 Districts.
27.63.410 Permitted Special Use: Dwellings Above First Story in B-1, B-3 and B-4 Districts
27.63.420 Permitted Special Use: Wind Energy Conversion Systems (WECS).
27.63.430 Permitted Special Use: Greenhouses.
27.63.440 Permitted Special Use: Outdoor Seasonal Sales.
27.63.460 Permitted Special Use: Airport Environs District.
27.63.470 Permitted Special Use: Planned Service Commercial.
27.63.490 Permitted Special Use: Small Batch Concrete Dispensing Units.
27.63.500 Permitted Special Use: Scrap Processing Operations, Salvage Yards, and Enclosed Disassembly Operations.
27.63.510 Permitted Special Use: Cemeteries.
27.63.520 Permitted Special Use: Churches; Increased Lot Coverage.
27.63.530 Permitted Special Use: Domiciliary Care Facilities.
27.63.540 Permitted Special Use: Expansion of Nonstandard Single and Two-family Dwellings Into Required Yards.
27.63.550 Permitted Special Use: Private Landing Strips and Appurtenances.
27.63.560 Permitted Special Use: Limited Landfills.
27.63.570 Permitted Special Use: Race Tracks For Motorized Vehicles.
27.63.580 Permitted Special Use: Nonprofit Religious, Educational and Philanthropic Institutions; R-6, R-7 and R-8 Districts.
27.63.590 Permitted Special Use: Temporary Storage of Construction Equipment and Materials.
27.63.600 Permitted Special Use: Mixed Use Redevelopment Project.
27.63.610 Permitted Special Use: Neighborhood Support Services.
27.63.620 Permitted Special Use: Temporary Shelter for the Homeless.
27.63.630 Permitted Special Use: Theaters.

(2) The appropriateness of the sign or signs and their locations for the landmark and its site; and

(3) The necessity of the sign or signs for the proposed uses. (Ord. 15823 §1; February 11, 1991: prior Ord. 14475 §9; August 18, 1986: Ord. 13529 §1; January 3, 1983: Ord. 13053 §2; November 24, 1980: Ord. 12571 §343; May 8, 1979).

27.63.405 Permitted Special Use: Windows on Side Lot Lines For Any Use in a Historic Preservation District in B-1, B-3 and B-4 Districts.

In historic districts designated in accordance with the Lincoln Municipal Code, windows may be permitted in walls of existing buildings in B-1, B-3 and B-4 districts which do not provide the required side yard under the following conditions:

(a) The proposed windows shall be in buildings existing before November 2, 1953;

(b) The proposed windows shall be separated from any other building or structure by an open space of at least ten feet;

(c) The application shall be accompanied by building plans and specifications, approved by the Building Official, indicating the construction would meet all applicable codes and regulations, if the special permit is issued;

(d) The permittee agrees, by acceptance of the special permit, to protect the permitted windows in accordance with the Building Code within sixty days of receipt of notification from the Building Official of development upon the adjacent property which in any manner reduces the required separation to less than ten feet and to block said windows if the separation is reduced to less than five feet.

(e) The Historic Preservation Commission shall have approved a Certificate of Appropriateness before Planning Commission approval. (Ord. 16287 §1; December 21, 1992).

27.63.410 Permitted Special Use: Dwellings Above First Story in B-1, B-3 and B-4 Districts.

Dwellings above the first story of a building which cannot provide the required yard adjacent to the wall of such building which contains windows for such dwellings may be allowed by special permit in the B-1, B-3, and B-4 zoning districts under the following conditions:

(a) The proposed residential units shall be in buildings existing before January 1, 1990.

(b) The required windows for the dwellings shall be separated from any other building or structure by an open space of at least five feet.

(c) The application shall be accompanied by building plans and specifications, approved by the building official, indicating the construction would meet all applicable codes and regulations, if the special permit is issued.

(d) The permittee agrees, by acceptance of the special permit, to vacate the dwellings authorized by such special permit within sixty days of receipt of notification from the building official of development upon the adjacent property which in any manner reduces the required separation to less than five feet. (Ord. 15782 §6; November 26, 1990).

27.63.420 Permitted Special Use: Wind Energy Conversion Systems (WECS).

In any zoning district, except the AG and AGR, a special permit may be granted to allow wind energy conversion systems (WECS). For purposes of this section, a wind energy conversion system is defined as any device, such as a wind charger, windmill, or wind turbine, which converts wind energy to

a form of usable energy. A special permit may be granted by the City Council subject to the following conditions:

(a) The distance from all lot lines to any tower support base of the WECS shall be determined according to the following WECS setback table. Intermediate rotor size distances shall be interpolated. The City Council may grant a reduction in the specific setback table distance when it finds that such reduction shall not adversely affect surrounding property and is consistent with the intent of this title to promote the public health, safety, and general welfare.

WECS SETBACK TABLE

Rotor Diameter in Feet	Setback Distance
5	100
10	165
15	220
20	270
25	310
30	340
35	365
40	385

(b) The distance from any tower support base of a WECS to any tower support base of another WECS under other ownership shall be a minimum of five rotor distances figured by the size of the largest rotor. The City Council may grant a reduction in this requirement if it finds that such reduction does not adversely affect the operation of either WECS.

(c) The WECS operation shall not cause interference to the radio and television reception on adjoining property.

(d) To limit climbing access to the WECS tower, a fence six feet high with a locking portal shall be placed around the WECS tower base or the tower climbing apparatus shall be limited to no lower than twelve feet from the ground, or the WECS tower may be mounted on a roof top.

(e) Data pertaining to the machine's safety and stability shall be filed with the application. Such data shall include safety results from tests conducted by the Rocky Flats testing facility or other testing facilities.

(f) The applicant shall provide covenants, easements, or similar documentation from the abutting owners providing access to wind sufficient for its adequate operation, unless adequate accessibility to the wind is provided on the site.

(g) The WECS, if interconnected to a utility system, shall meet the requirements for interconnection and operation as set forth in the electric utility's then current service regulations applicable to WECS. (Ord. 13487 §5; November 1, 1982: prior Ord. 12978 §26; August 25, 1980).

Minneapolis (Minnesota), City of. Code of Ordinances.
Current through Ord. No. 2007-Or-089, adopted Oct. 19, 2007.

Title 20 ZONING CODE

CHAPTER 535. REGULATIONS OF GENERAL APPLICABILITY

ARTICLE X. WIND ENERGY CONVERSION SYSTEMS

535.690. Purpose. Regulations governing wind energy conversion systems are established to provide for appropriate locations for wind energy conversion systems, to ensure compatibility with surrounding uses, and to promote safe, effective and efficient use of wind energy conversion systems to increase opportunities for generation of renewable energy. (2007-Or-047, § 2, 6-29-2007)

535.700. Definitions. As used in this article, the following words shall mean:

Institutional use. Educational facilities, golf courses, sports arenas, religious institutions, athletic fields and publicly owned property. For the purpose of this section, parks and cemeteries, whether publicly or privately owned, shall not be included in this definition.

Publicly owned property. Land, buildings or structures owned by any governmental body or public agency including city, county, state or federally owned properties, other than public rights-of-way.

Tower, monopole. A wind energy conversion system tower consisting of a single pole, constructed without guyed wires and anchors.

Wind energy conversion system. Any device, such as a wind charger, windmill, or wind turbine, and associated facilities including the support structure of the system such as a tower, that converts wind energy to electrical energy.

Wind energy conversion system, building mounted. A wind energy conversion system located on a building.

Wind energy conversion system height. The height of a freestanding wind energy conversion system shall be measured as the distance from ground level to the highest point on the tower, including the vertical length of any extensions such as the rotor blade. The height of a building mounted wind energy conversion system shall be measured as the distance from the point where the base of the system is attached to the building or to the lowest point on the wind energy conversion system, whichever is closer to the ground, to the highest

point on the wind energy conversion system, including the vertical length of any extensions such as the rotor blade. (2007-Or-047, § 2, 6-29-2007)

535.710. Permitted uses subject to administrative review and approval. Notwithstanding the height limitations of the zoning district, building mounted wind energy conversion systems shall be permitted in all zoning districts, subject to administrative review and approval by the zoning administrator, as specified in section 535.720, and shall comply with the standards of section 535.750 and the following:

(1) Building mounted wind energy conversion systems shall not exceed fifteen (15) feet in height.

(2) Building mounted wind energy conversion systems shall be prohibited on residential structures less than four (4) stories and forty-two (42) feet in height and structures accessory to residential uses.

(3) On nonresidential buildings less than four (4) stories and forty-two (42) feet in height, building mounted wind energy conversion systems shall be setback at least ten (10) feet from the front, side and rear walls of the structure upon which it would be mounted.

(4) Building mounted wind energy conversion systems on structures over four (4) stories and forty-two (42) feet in height shall be installed above the fourth story.

(5) The structure upon which the proposed wind energy conversion system is to be mounted shall have the structural integrity to carry the weight and wind loads of the wind energy conversion system and have minimal vibration impacts on the structure. (2007-Or-047, § 2, 6-29-2007)

535.720. Administrative review process.

(a) *In general.* The zoning administrator, in consultation with the planning director, shall have up to fifteen (15) working days following the submittal of a complete application to approve or deny such application. The zoning administrator may impose such conditions and require such guarantees deemed reasonable and necessary to protect the public interest and to ensure compliance with the standards and purposes of this zoning ordinance and policies of the comprehensive plan.

(b) *Submittal requirements.* In addition to the general application requirements of Chapter 525, Administration and Enforcement, the applicant shall submit the following:

(1) Scaled schematic drawings and photographic perspectives showing the structure and the placement of the wind energy conversion system.

(2) A written certification from a licensed structural engineer that the structure has the structural integrity to carry the weight and wind loads of the wind energy conversion system and have minimal vibration impacts on the structure.

(3) An analysis from a licensed engineer showing how the wind energy conversion system shall be designed, constructed and operated in compliance with all applicable federal, state, and local laws, codes, standards and ordinances.

(4) A written certification from a licensed engineer confirming that the wind energy conversion system is designed to not cause electrical, radio frequency, television and other communication signal interference.

(5) Sufficient information demonstrating that the wind energy conversion system shall be used primarily to reduce on-site consumption of electricity, including but not limited to a complete listing of on-site electrical demands.

(6) Written evidence that the electric utility service provider that serves the proposed site has been informed of the applicant's intent to install a wind energy conversion system, unless the applicant does not plan, and so states so in the application, to connect the system to the electricity grid.

(7) Written certification from a licensed engineer stating the wind power density for the specific site is Class 2 or greater as defined by the United States Department of Energy.

(c) *Appeals.* Notwithstanding the provisions of Chapter 525, Administration and Enforcement, decisions of the zoning administrator regarding the administrative review of permitted wind energy conversion systems shall be subject to appeal to the city planning commission. (2007-Or-047, § 2, 6-29-2007)

535.730. Conditional uses.

Freestanding wind energy conversion systems may be allowed as a conditional use, subject to the provisions of Chapter 525, Administration and Enforcement, sections 535.740 and 535.750, and the following location and lot size restrictions:

(1) *Residence and office residence districts.* Freestanding wind energy conversion systems in the residence and office residence districts shall only be located on institutional use sites.

(2) *Downtown area.* Freestanding wind energy conversion systems shall be prohibited in the downtown area including all downtown districts and the area bounded by the Mississippi River, I-35W, I-94, I-394, and 3rd Avenue North (extended to the river).

(3) *Minimum lot area.* No freestanding wind energy conversion system shall be established on a zoning lot less than one (1) acre in area. A maximum of one wind energy conversion system per acre of lot area shall be allowed. (2007-Or-047, § 2, 6-29-2007)

535.740. Specific standards for conditional uses.

All wind energy conversion systems requiring a conditional use permit shall be subject to the provisions of Chapter 525, Administration and Enforcement, and the submittal requirements of section 535.720(b). In addition, the applicant shall comply with the following standards and submit written documentation indicating such compliance:

(1) *Tower type.* Towers shall be of a monopole design. The city planning commission may consider the substitution of alternative tower types in cases where structural and design considerations, and location suggests a tower other than a monopole.

(2) *Height of freestanding wind energy conversion systems.*

a. *Residence, office residence and commercial districts.* The height of freestanding wind energy conversion systems located in the residence, office residence and commercial districts shall be no more than sixty (60) feet on zoning lots between one (1) and five (5) acres and shall be no more than one hundred (100) feet on zoning lots of more than five (5) acres in area.

b. *Industrial districts.* The height of freestanding wind energy conversion systems located in the industrial districts shall not exceed one hundred (100) feet.

c. *Minimum height.* The minimum distance between the ground and the vertical length of any extensions such as the rotor blades shall be fifteen (15) feet.

d. *Excess height.* The city planning commission may increase the height of freestanding wind energy conversion systems, provided that in the residence, office residence and commercial districts such increase shall not exceed the maximum height by more than fifty (50) percent. The applicant shall demonstrate to the satisfaction of the city planning commission the following:

1. The surrounding topography, structures, vegetation and other factors make a tower that complies with the district height regulations impractical.

(3) *Encroachments and setbacks.*

a. The base of the tower shall maintain a minimum distance from the nearest residential structure and from any overhead utility lines equal to twice the height of the tower. For the purposes of this article, residential structures shall also

include any parking structure attached to a principal residential structure.

b. The support structure, including any guy wires, shall not be located in any required front, side or rear yard, nor shall they be located between a principal building and a required front or side yard.

(4) *Security.* All sites shall be reasonably protected against unauthorized climbing. The bottom of the tower, measured from ground level to twelve (12) feet above ground level, shall be designed in a manner to discourage unauthorized climbing.

(5) *Electrical wires.* All electrical wires associated with a freestanding wind energy conversion system shall be located within the tower and underground. (2007-Or-047, § 2, 6-29-2007)

535.750. Development standards for all permitted and conditional wind energy conversion systems.

In addition to the standards of sections 535.710, 535.720, 535.730 and 535.740 above, all wind energy conversion systems shall be subject to the following standards:

(1) *Maximum capacity.* Wind energy conversion systems shall have a rated capacity of not more than one hundred (100) kilowatts.

(2) *Shoreland and Mississippi River Critical Area Overlay Districts.* Freestanding and building mounted wind energy conversion systems shall be prohibited in the Shoreland and Mississippi River Critical Area Overlay Districts.

(3) *Encroachments and setbacks.*

a. Wind energy conversion systems shall comply with applicable regulations as established by the Federal Aviation Administration.

b. Wind energy conversion systems shall comply with the minimum yard requirements of the district in which they are located.

c. No part of any wind energy conversion system shall extend across or over any part of a public right-of-way.

(4) *Compatibility with nearby properties.* Wind energy conversion systems shall utilize building materials, colors and textures that are compatible with the existing principal structure and that effectively blend the system facilities into the surrounding setting and environment to the greatest extent possible. Rotor blades shall be non-metallic to prevent communication signal interference. Metal towers shall be constructed of, or treated with, corrosive resistant material. Outside of the industrial districts, unpainted, galvanized metal, or similar towers shall be prohibited, unless a self-weathering tower is determined to be more compatible with the surrounding area.

(5) *Controls and brakes.* All systems shall contain an internal governor or braking device which engages at wind speeds in excess of forty (40) miles per hour and minimizes the potential for wind damage to the equipment.

(6) *Signage.* Advertising or identification of any kind on wind energy conversion systems shall be prohibited, except for applicable warning and equipment information signage required by the manufacturer or by federal, state or local regulations.

(7) *Lighting.* Wind energy conversion systems shall not be illuminated by artificial means, except where the illumination is specifically required by the Federal Aviation Administration or other federal, state or local regulations.

(8) *Noise.* Wind energy conversion systems shall comply with the standards governing noise contained in Chapter 389 of the Minneapolis Code of Ordinances, Noise, and with all other applicable regulations.

(9) *Heritage Preservation Ordinance compliance.* Wind energy conversion systems proposed for any locally designated historic structures or locally designated historic districts shall be subject to all requirements of the city's Heritage Preservation Ordinance.

(10) *Maintenance required.* All wind energy conversion systems shall be kept in good repair and free from rust, damaged supports, framework or other components. (2007-Or-047, § 2, 6-29-2007)

535.760. Abandoned or unused towers.

All abandoned or unused wind energy conversion systems shall be removed within twelve (12) months of the cessation of operations unless an extension is approved by the city planning commission. If an extension is not approved, such wind energy conversion system shall be deemed a nuisance, and the city may act to abate such nuisance and require its removal at the property owner's expense. After the wind energy conversion system is removed, the owner or operator of the site shall restore the site to its original, or to an improved, condition. (2007-Or-047, § 2, 6-29-2007)

THE ZONING ORDINANCE SAN DIEGO COUNTY

IMPORTANT NOTE:
Zoning ordinances are continually undergoing additions, deletions, and alterations. Up-to-date ordinance information is available at the Zoning Information Counter at the Department of Planning and Land Use. Any questions regarding possible changes in zoning ordinances should be directed to the Zoning Information Counter.

COUNTY OF SAN DIEGO
Department of Planning and Land Use

Ordinance No. 5281 (New Series). Adopted October 18, 1978. Effective December 19, 1978.
This edition updated through Ordinance Update No. 74 (May 2007).

ACCESSORY USE REGULATIONS

6150 TITLE AND PURPOSE.
The provisions of Section 6150 through 6199, inclusive, shall be known as the Accessory Use Regulations. The purpose of these provisions is to establish the relationship among the principal and accessory uses and the criteria for regulating accessory uses.

6152 ACCESSORY USES ENCOMPASSED BY PRINCIPAL USE.
In addition to the principal uses expressly included in the Use Regulations, each zone subject to such Use Regulations shall be deemed to include such accessory uses which are specifically identified by these Accessory Use Regulations; and such other accessory uses which are necessarily and customarily associated with, and are appropriate, incidental and subordinate to, such principal uses. When provided by these regulations, it shall be the responsibility of the Director to determine if a proposed accessory use is necessarily and customarily associated with, and is appropriate, incidental, and subordinate to the principal use, based on the Director's evaluation of the resemblance of the proposed accessory use to those uses specifically identified as accessory to the principal uses and the relationship between the proposed accessory use and the principal use. Such determinations which are made by the Director shall be subject to the Administrative Appeal Procedure commencing at Section 7200.

6154 ACCESSORY USES SUBJECT TO CONTROLS.
Accessory uses shall be controlled in the same manner as the principal uses within each zone, except as otherwise provided by these regulations.

6156 RESIDENTIAL AND AGRICULTURAL USE TYPES.
Subject to the restrictions and limitations specified, the following accessory buildings and uses shall be permitted in zones where Residential and Agricultural Use Types are permitted:

a. Attached Private Garages and Carports, Storage Buildings, Workshops, Hobby Shops, and other similar non-habitable uses.

    1. On lots of less than one acre gross, the total area shall not exceed 1,000 square feet or 25% of the living area of the principal residence, whichever is greater. On lots of one acre gross or larger but less than 2 acres, the area shall not exceed 1500 square feet or 25% of the living area of the principal residence, whichever is greater. On lots of 2 acres or larger but less than 4 acres, the area shall not exceed 2000 square feet or 25% of the living area of the principal residence, whichever is greater. On lots of 4 acres or larger, the area shall not exceed 3000 square feet or 25% of the living area of the principal residence, whichever is greater.

3. Owners of property within 300 feet of the exterior boundaries of the proposed large family day care home shall be notified by mail or delivery of the receipt of the application not less than 10 days prior to the date on which the decision will be made. Notwithstanding the Administrative Permit Procedures at Section 7060.d, no hearing is required unless requested by the applicant or other affected person.

   The applicant or other affected person may appeal the decision as provided by the Administrative Appeal Procedure commencing at Section 7200. The appellant shall pay the cost, if any, of the appeal.

4. Every Administrative Permit approved pursuant to this section shall contain a condition that no sound amplification device be permitted in outdoor activity areas.

5. For large family day care homes served by on-site wastewater systems the Director of Environmental Health shall certify the adequacy of the on-site wastewater system for the proposed use.

6. No Administrative Permit shall be required for a large family day care home which qualifies for exemption under Section 1596.792 of the State Health and Safety Code.

z. Wind Turbine Systems, Small. A small wind turbine system, shall be permitted on a parcel of at least one acre and in compliance with the following conditions:

1. Setback. The system shall be set back from property lines and roads at least two times the height of the wind system (to the top of the blade in vertical position) and shall meet the applicable setback requirements of the zone. No part of the system, including guy wire anchors, shall extend closer than 30 feet to the property boundary. The system must also meet fire setback requirements. See Subsection 7 for the exception to this setback requirement.

2. Fencing. Public access to the wind turbines shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable methods.

3. Signs. Suitable warning signs containing a telephone number for emergency calls shall face all approaches to the system. Individual signs shall be between 5 and 16 square feet.

4. Noise. The wind turbine shall be operated in such manner that it does not exceed the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control). See Subsection 7 for the exception to this noise standard.

5. Height. For the purposes of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. Height of a small wind turbine system shall not exceed 60 feet. See Subsection 7 for the exception to this height standard.

6. Any non-operational wind turbines shall be removed within 12 months after becoming non-operational.

7. For any Wind Turbine System that meets the definition of "Small Wind Energy System" as defined by Government Code Section 65892.13 (c)(1), the requirements for setbacks, noise and height are reduced as follows:

   (a) The system shall be set back from property lines at least the height of the wind system. The system must also comply with any applicable fire setback requirements pursuant to Section 4290 of the Public Resources Code.

   (b) Decibel levels for the system shall not exceed the lesser of 60 decibels or the sound limits of the Noise Element of the San Diego County General Plan, as measured at the closest neighboring inhabited dwelling, except during short-term events such as utility outages and severe wind storms.

   (c) Height. Height of a small wind turbine system shall not exceed either of the following:

      (1) Up to 65 feet on parcels less than 5 acres in size, and up to 80 feet on parcels 5 acres or more.
      (2) Height cannot exceed manufacturer's recommendations.

Any waiver or modification of the above requirements shall be allowed only in accordance with the Variance Procedure commencing at Section 7100.

aa. Bed and Breakfast Home. A bed and breakfast home is a permitted accessory use upon issuance of a Minor Use Permit provided the following conditions are complied with:

1. Located in a zone subject to the RR, A70, A72, S90 or S92 use regulations, or in a designated Historic District, or conducted within a structure which was constructed prior to 1936.

2. A maximum of five bedrooms shall be made available for rent. A bed and breakfast home having more than five bedrooms available for rent may be approved if the home is designated a Historic Landmark in accordance with the Historic Landmark Designation procedure commencing at Section 7550.

3. No bed and breakfast home shall be located on a lot closer than 500 feet from any other lot containing a bed and breakfast home. The 500 foot distance shall be measured in a straight line connecting the closest points on the lot lines and without regard for intervening structures.

4. The owner or lessee of the property shall operate the facility and reside in the home or other legal residence on the property. If the owner or lessee resides in a residence separate from the facility, instructions on how to contact the owner/lessee after hours for emergencies shall be posted in each room.

5. One off-street parking space for each room rented and each employee shall be provided in addition to the parking required for single-family occupancy.

MISCELLANEOUS GENERAL REGULATIONS

6900 AMBULANCE SERVICE.
Ambulance services in zones subject to the RU Use Regulations shall comply with the following provisions.

a. Exclusive Use. No business, other than emergency ambulance service, shall be conducted on the premises nor shall any office equipment or signs be located on the premises.

b. Setback. The ambulance service shall be located no farther than 1,500 feet from an improved road which is designated as no less than a Collector Highway by the Circulation Element of the San Diego County General Plan.

c. Use of Warning Equipment. No siren or flashing lights or any other emergency warning equipment shall be used prior to reaching such Collector Highway as described in subsection "b" above.

d. Storage. Ambulance shall be parked or stored entirely within an enclosed building.

6901 CEMETERIES

a. Continued Operation of Previously Existing Cemeteries. By Ordinance No. 7854 (N.S.), Division 6, entitled "CEMETERIES", of Title 8 of the San Diego County Code, was repealed, in recognition that the requirement of this Zoning Ordinance that a major use permit be obtained for the establishment or expansion of a cemetery, substantially satisfied the objectives of said Division 6. Said Division 6 required a cemetery permit for the establishment or maintenance of a cemetery, except for their continued maintenance, development and operation within the boundaries of cemeteries as established on February 24, 1942. Therefore, for purposes of this Zoning Ordinance, cemeteries which were legally established on or before February 24, 1942 and have not discontinued operation pursuant to Section 6865, shall be deemed to be nonconforming uses.

b. Additional Standards for Cemeteries. Before any Major Use Permit for a cemetery may be granted or modified, in addition to the findings required by Section 7358, it shall be found, based upon a financial statement of the applicant and such measures or programs as the applicant may propose, that the cemetery will be established, cared for and maintained in such a manner as to prevent the same from becoming a public nuisance.

(Added by Ord. No. 7850 (N.S.) adopted 1-16-91)

6950

6950 WIND TURBINE SYSTEM, MEDIUM.
A medium wind turbine system, shall be permitted on a parcel of at least one acre and require an Administrative Permit approved in accordance with the Administrative Permit Procedure commencing at Section 7050 and the following requirements:

a. Notification. Notification shall be in accordance with paragraph c of Section 7060.

b. Setback. The wind turbines shall be set back from property lines and roads at least three times the height of the wind turbine (to the top of blade in vertical position) and shall meet the applicable setback requirements of the zone. The system must also meet fire setback requirements. See paragraph i below for the exception to this setback requirement.

c. Fencing. Public access shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable methods.

d. Signs. Suitable warning signs containing a telephone number and an address for emergency calls and informational inquiries shall face all approaches to the project. Individual signs shall be between 5 and 16 square feet.

e. Review. Review shall include an assessment of the impact on adjacent property with regard to:

   1. Location of installation in its relation to topographic features which would constitute an unusual safety hazard.

   2. Sensitivity of adjacent uses to noise and electrical interference and visual impact.

f. Noise. The system shall meet the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control). See paragraph i below for the exception to this noise standard.

g. Height. For the purpose of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. The system shall not exceed 60 feet. See paragraph i below for the exception to this height standard.

h. It shall be a condition of the permit that non-operational wind turbines shall be removed within 12 months after becoming non-operational.

i. For any Wind Turbine System that meets the definition of "Small Wind Energy System" as defined by Government Code Section 65892.13(c)(1), the requirements for setbacks, noise and height are reduced as follows:

   1. The system shall be set back from property lines at least the height of the wind system. The system must also comply with any applicable fire setback requirements pursuant to Section 4290 of the Public Resources Code.

2. Decibel levels for the system shall not exceed the lesser of 60 decibels or the sound limits of the Noise Element of the San Diego County General Plan, as measured at the closest neighboring inhabited dwelling, except during short-term events such as utility outages and severe windstorms.

3. Height of a small wind turbine system shall not exceed either of the following:

   (a) Up to 65 feet on parcels less than 5 acres in size, and up to 80 feet on parcels 5 acres or more.
   (b) Height cannot exceed manufacturer's recommendations.

Any waiver of modification of the above requirements shall be allowed only in accordance with the Variance Procedure commencing at Section 7100.

(Added by Ord. No. 6857 (N.S.) adopted 10-10-84. Opr. 1-1-85)
(Amended by Ord. No. 7117 (N.S.) adopted 4-23-86)
(Amended by Ord. No. 9596 (N.S.) adopted 9-17-03)

6951 WIND TURBINE SYSTEM, LARGE.
Large wind turbine systems, shall be permitted on a parcel of at least five acres and considered a Major Impact Services and Utilities use type requiring a major use permit approved in accordance with the Use Permit Procedure commencing at Section 7350 and the following requirements:

a. Setbacks. The wind turbines shall observe the following setbacks measured from the closest point on the base or support structure. For purposes of calculating setbacks, height of the wind turbines shall mean the distance from ground to the top of blade in vertical position:

   1. From property lines or public road setback 4 times the height.

   2. From all existing residences or buildings occupied by civic use types setback 8 times the height.

   3. From the furthermost property line of adjacent parcels which are vacant setback 9 times the total height.

   4. Setbacks for experimental wind turbines (those which are not produced by an established wind turbine manufacturer on a production basis) may be greater than those specified above based on the discretion of the permit granting authority.

   5. Setbacks may be reduced up to a maximum of 50% with the written consent to the granting of a setback reduction signed by the owner or owners of each lot or parcel affected by the proposed setback reduction.

   See paragraph k below for the exception to this setback requirement.

b. Fencing. Public access shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable methods.

c. Signs. Suitable warning signs containing a telephone number and an address for emergency calls and informational inquiries shall face all approaches to the project. Individual signs shall be between 5 and 16 square feet.

d. Noise. The project shall meet the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control). See paragraph k below for the exception to this height requirement.

e. Height. For the purposes of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. The system shall not exceed 80 feet. See paragraph k below for the exception to this height requirement.

f. Visual. The following measures should be followed whenever possible in order to minimize the visual impact of the project:

    1. Removal of existing vegetation should be minimized.

    2. Internal roads should be graded for minimal size and disruption.

    3. Any accessory buildings should be painted or otherwise visually treated to blend with the surroundings.

    4. The turbines and towers should be painted with non-reflective paint to blend with the surroundings.

g. Turbine Description. The following information shall be specified as part of the permit:

    1. The wind turbine manufacturer, model, power rating and blade dimensions.

    2. The tower manufacturer and model.

h. Non-Operational Wind Turbines. It shall be a condition of the permit that non-operational wind turbines shall be removed:

    1. The project owner shall insure that a copy of all prospectuses shall be placed in the County's permit file.

    2. County staff may, at any time in the future, compare the amount of power stated (in kilowatt hours) in the appropriate prospectus with the actual power sold to the utility (as reported in the California Energy Commissions' "Wind Project Performance Reporting System") and determine if any wind turbine systems meet the definition for "wind turbine non-operational."

    3. County staff may collect other data as necessary to determine if any wind turbine systems meet the definition for "wind turbine non-operational."

Schaumburg, Illinois
Village Code

Current through ordinance 07-72, passed May 22, 2007.

TITLE 15: LAND USAGE
CHAPTER 154: ZONING
SPECIAL USES

§ 154.90 WIND ENERGY CONVERSION SYSTEMS (WECS).

Wind energy conversion systems (WECS) have been found by the village board to be a viable and useful method of localized energy generation. Special use permits to authorize WECS are allowed in all zoning districts. Because of the highly specialized and technical nature of WECS, the following criteria have been established as minimum standards for the recommendation and granting of such permits:

(A) Application: Upon application for a special use permit, the applicant shall file a proposed site plan, scaled to accurate dimensions, showing the location and height of the proposed facilities with respect to the subject site and all structures within a two hundred foot (200') radius. The applicant shall also supply a copy of appropriate manufacturer's specifications and warranties, engineer's calculations and drawings and all such technical documents appropriate to substantiate compliance with the requirements of this chapter and the requirements for a building permit.

(B) Hearing And Procedure: The application procedure, public hearing and approval procedure shall be the same as for all special use permits as governed by other sections of this chapter.

(C) Height Limit: The maximum permissible height of a WECS shall not exceed eighty feet (80') from the established grade. The applicant shall justify his height request with documentation on the relationship of the proposed height to the efficiency of the particular WECS to be used.

(D) Setbacks And Spacing: A WECS shall not be located closer to any of the following than indicated:

(1) Property Line: Tower must be located a minimum distance equal to 1.15 times the total WECS height from any property line.

(2) Adjacent Structure: Tower must be located a minimum distance of twenty feet (20') from any principal structures on a parcel.

(3) Other WECS: Tower must be located a minimum distance equal to five (5) rotor distances, based upon the size of the largest rotor, from any adjacent WECS.

(E) Safety: All applicants must submit the results of electrical and structural safety tests from appropriate testing facilities for the specific WECS applied for.

(1) All WECS must contain an internal governor or braking device which engages at wind speeds in excess of forty (40) miles per hour and minimizes the potential for wind damage to the equipment.

(2) All WECS towers shall be equipped with a minimum of two (2) 5/8-inch diameter ground rods installed to a depth of eight feet (8').

(3) All WECS facilities shall be enclosed in a building or surrounded by a six foot (6') high safety fence with a locking portal.

(4) All climbing apparatus affixed to a WECS tower must terminate twelve feet (12') short of the grounds.

(F) Tower Structures: All WECS structures including towers, buildings and their related foundations, footings, anchors and electrical connections must meet the requirements of the village of Schaumburg building code and electrical code.

(1) All WECS towers shall be embedded in an approved concrete foundation.

(2) All WECS towers shall be designed to withstand a minimum wind velocity of one hundred (100) miles per hour, with an impact pressure of forty (40) pounds per square foot.

(G) Electromagnetic Interference: No WECS shall cause electromagnetic degradation in performance of other electromagnetic radiators or receptors of quality and proper design.

(1) The determination of degradation of performance and of quality and proper design shall be made in accordance with good engineering practices as defined in the latest principles and standards of the American Institute of Electrical Engineers, the Institute of Radio Engineers and Electrical Industries Association. In case of any conflict between the latest standards and principles of these groups, the precedence in the interpretation

of the standards and principles shall be in their order of listing (with the first listed group granted highest priority).

(2) All WECS shall utilize nonmetallic rotor blades unless the applicant can supply documentation from an appropriate testing laboratory certifying that any metallic blade rotor proposed to be used will not cause electromagnetic interference.

(3) The village reserves the right to revoke any special use permit granting a WECS whenever electromagnetic interference from that WECS becomes evident.

(H) Noise: The applicant shall submit documentation to establish that his proposed WECS will not create a nuisance to adjacent uses.

(1) In no event shall the sound pressure level of noise radiated continuously from a WECS exceed, at any lot line, the values listed in the maximum sound level table below in any octave band of frequency:

MAXIMUM SOUND LEVEL TABLE

Frequency Band Cycles Per Second	Sound Pressure Level Decibels e0.0002 dyns/cm2
20 - 75	70
75 - 150	55
150 - 300	48
300 - 600	43
600 - 1,200	38
1,200 - 2,400	35
2,400 - 4,800	33
4,800 - 10,000	31

(2) If the noise is not smooth and continuous, or if nighttime noise, one or more of the corrections below shall be subtracted from each of the decibel levels given in the sound level table above. Only one of the additional corrections may be made for any noise source.

(a) For noise radiated between the hours of nine o'clock (9:00) P.M. and seven thirty o'clock (7:30) A.M., five (5) decibels must be subtracted.

(b) If the noise is of a periodic character (varying hum, screech, etc.), five (5) decibels must be subtracted.

(3) Measurement of noise shall be made with a sound level meter and octave band analyzer meeting the standards prescribed by the American Standards Association. The instruments shall be maintained in calibration and good working order. Octave band corrections may be employed in meeting the response specifications. A calibration check shall be made of the system at the time of any noise measurement. Measurements recorded shall be taken so as to provide a proper representation of the noise source. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured noise. A windscreen for the microphone shall be used when required. Traffic, aircraft and other transportation noise sources and other background noises shall not be considered in taking measurements except where such background noise interferes with the primary noise being measured.

(4) Impulsive and periodic type noises shall be subject to the sound level standards of those noises capable of being accurately measured with the equipment specified in the paragraph above. Noises capable of being so measured, for the purpose of this section, shall be those noises which cause rapid fluctuations of the needle of the sound level meter with a variation of not more than plus or minus two (±2) decibels. Noises incapable of being so measured, but objectionable because of intermittence, beat, frequency or shrillness, shall be muffled and controlled so as not to become a nuisance to adjacent uses.

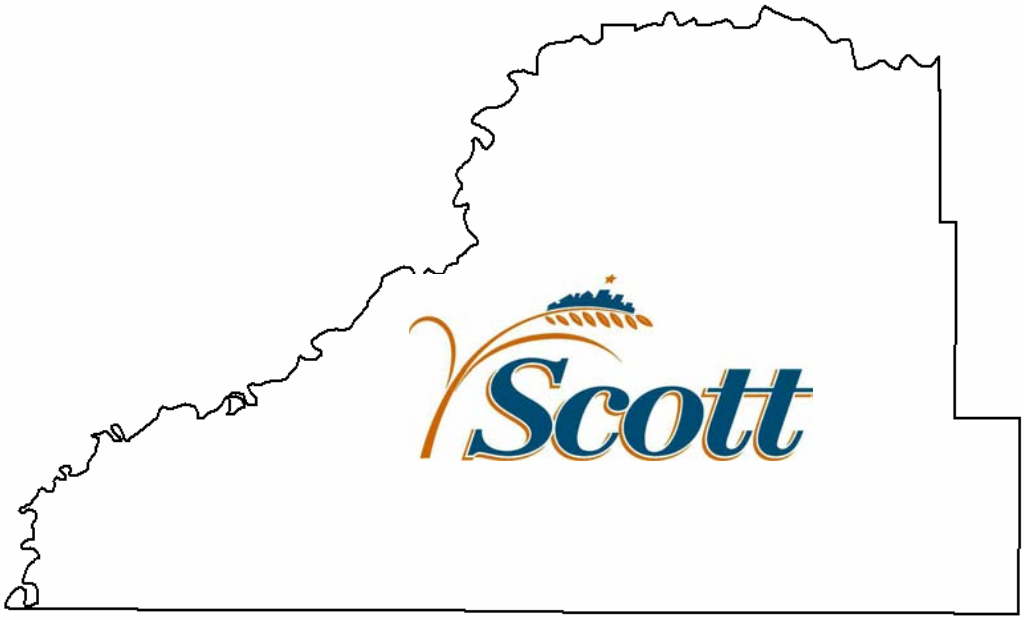
(I) Insurance: The applicant for a WECS must demonstrate to the village that he can obtain and maintain adequate liability insurance for the facility.

(J) Wind Access: The village makes no assurance of wind access other than the provisions of this chapter. The applicant may provide evidence of covenants, easements or similar documentation from abutting property owners providing access to wind for the operation of a WECS.

(Ord. 163, passed 12-5-1961; Am. Ord. 2054, passed 9-22-1981; Am. Ord. 95-62, passed 6-13-1995)

SCOTT COUNTY

ZONING ORDINANCE NO. 3



Adopted by Scott County Board May 22, 2001, Effective May 23, 2001
Amended by Scott County Board August 28, 2001, Effective August 28, 2001
Amended by Scott County Board January 22, 2002, Effective January 22, 2002
Amended by Scott County Board March 26, 2002, Effective March 26, 2002
Amended by Scott County Board June 24, 2003, Effective June 24, 2003
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Amended by Scott County Board September 23, 2003, Effective September 23, 2003
Amended by Scott County Board February 24, 2004, Effective February 24, 2004
Amended by Scott County Board March 23, 2004, Effective March 23, 2004
Amended by Scott County Board May 25, 2004, Effective May 25, 2004
Amended by Scott County Board June 28, 2005, Effective June 28, 2005
Amended by Scott County Board May 23, 2006, Effective May 23, 2006
Amended by Scott County Board July 11, 2006, Effective July 11, 2006
Amended by Scott County Board July 25, 2006, Effective July 25, 2006
Amended by Scott County Board September 5, 2006, Effective September 5, 2006

3. Under normal circumstances support a prevalence of such vegetation.

Wetland (DNR Protected) - All type 3, 4, and 5 wetlands as defined in United States Fish and Wildlife Service Circular No. 39 (1971 edition), not protected by Chapter 70 of this Ordinance, included within the definition of public waters, that are ten (10) or more acres in size in unincorporated areas of 2.5 or more acres in incorporated areas.

Wind Energy Conversion System - Any device such as a wind charger, windmill, or wind turbine, which converts wind energy to a form of useable energy.

Yard - An open space on a lot surrounding a structure, which is unoccupied and unobstructed from the ground to the sky, except by landscaping or an eave not exceeding two (2) feet in width.

1. Yard, Front - The yard extending the width of the lot from the front lot line to the building setback line.

2. Yard, Rear - The yard extending the width of the lot extending from the rear lot line to the rear yard setback line.

3. Yard, Side - The yard extending along the side lot line between the front and rear yards, extending perpendicularly from the side lot line to the side yard setback line.

Zoning Amendment - A change authorized by the County either in the allowed use within a district or in the boundaries of a district.

Zoning District - An area or areas within the County for which the regulations and requirements governing use are uniform as defined by this Ordinance.

CHAPTER 12: ENERGY SYSTEMS

12-1 WIND ENERGY CONVERSION SYSTEM (WECS)

One (1) WECS shall be considered as an administrative permit in all zoning districts. All appropriate regulations within each zoning district must be complied with in addition to regulations outlined below.

1. Applicants requesting an administrative permit for a WECS shall furnish such scale drawings and information as the County deems necessary. This information may include, but is not limited to the following: a plot plan of the premises involved showing lot lines, the accurate location of all buildings and structures on the premises and on each adjacent plot and the location of the proposed tower and all guy wires, poles or anchors, and a sketch elevation of the premises accurately depicting the proposed tower and its relationship to structures on adjacent lots.

2. No more than one (1) WECS per lot shall be permitted.

3. The permitted maximum height of a WECS shall be determined in one of two ways:

    a. A ratio of one to one between the distance from the closest property line to any part of the WECS to the height of the tower.

    b. A maximum of one hundred (100) feet in industrial districts and sixty (60) feet in Agricultural, Rural Residential, Residential Suburban, Urban Expansion, and General Commercial Districts.

    The shortest height of the two above mentioned methods shall be used in determining maximum height. Height shall be measured from the surrounding grade to the rotor hub or top of the tower, whichever is higher.

4. No part of a WECS shall be located within or above any required front, side or rear setback area.

5. All WECS shall be designed to meet the following minimum standards:

    a. An automatic braking system device capable of halting operation in high winds (40 m.p.h. or greater) shall be incorporated.

    b. The WECS shall be operated and maintained in a condition which will not cause unreasonable noise emissions levels.

c. The WECS shall be guarded against unauthorized climbing. The first twelve (12) feet of the tower shall be unclimbable by design or be enclosed by a six (6) foot high, unclimbable fence with a secured access.

d. The WECS shall be designed and installed to withstand natural lightning strikes.

e. The WECS electrical equipment and connections shall adhere to all state and local government, as well as power company rules, regulations and standards.

6. The owner of a WECS which is to be dismantled must accomplish such act within forty five (45) days or the County is empowered to dismantle such WECS and assess the costs against the property.

7. WECS that are by nature ornamental, rather than functional, shall be exempt from this Ordinance if total height is less than twenty five (25) feet.

8. In order to ensure adequate wind access, the County does encourage the use of private easements and restrictive covenants as a means to protect wind access.

12-2 ALTERNATIVE ENERGY SYSTEMS

All normal energy systems shall comply with State codes. To provide for new and innovative approaches to the generation of energy for use by residents, businesses and industries in the County, exceptions may be made to height regulations, setback distances, lot coverage, accessory uses, and all other applicable standards in all districts for proposed innovative energy systems, associated equipment and structures. All modifications will be made through a conditional use permit process.

12. No application for an interim use permit shall be resubmitted for a period of six (6) months from the date of an order of denial of the request, except the Planning Advisory Commission may permit a new application, if in the opinion of the Planning Advisory Commission, new evidence or a change of circumstances warrant it.

13. In the event that any of the conditions set forth in a permit are violated, the County Board shall have the authority to revoke the interim use permit.

14. A copy of any interim use permit shall be filed with the Office of the County Recorder or Registrar of Titles. The interim use permit shall include the legal description of the property involved. The Planning Department shall be responsible for the document recording requirements of this Section and shall maintain records of the interim use permit request.

15. The Planning Department will review the interim use permit periodically. At the time designated for the interim use permit to expire, the Planning Department will conduct an inspection of the site. If the Planning Department finds that the use is still compatible, and is not creating an adverse affect on the surrounding area, the applicant may apply for an extension of the interim use. A reapplication for an interim use permit shall be administered in the same manner as the original interim use permit.

2-8 ADMINISTRATIVE PERMITS/CERTIFICATE OF COMPLIANCE

2-8-1 Purpose

The purpose of this Section is to establish regulations and procedures for the processing and consideration of activities allowed by administrative permit, certificate of compliance, and of matters requiring the approval of the Planning Department with the goal of protecting the health, safety, and welfare of the citizens of the County.

2-8-2 Applications Qualifying for Administrative Review

The applications which may be approved by administrative permit include sign permits, building permits, accessory structures, temporary uses, zoning certificates of compliance, lot line adjustments, ~~administrative subdivisions,~~ ordinance compliance review resource management plans, grading permits, provided they comply with all sections of this Ordinance. *(Amended May 23, 2006 Resolution No. 2006-077)*

2-8-3 Criteria for Granting an Administrative Permit or Certificate of Compliance

Administrative permit or certificate of compliance may be granted upon the applicant demonstrating that all applicable standards and criteria stated in this Ordinance will be satisfied. Among other things, the Planning Department shall make the following findings where applicable:

1. The proposed use is not in conflict with the Comprehensive Plan of Scott County.

2. The proposed use is consistent with the purpose of this Ordinance and the purpose of the zoning district in which the applicant intends to locate the proposed use.

3. The proposed use satisfies the design standards and criteria of this Ordinance.

4. The proposed use has been described in sufficient detail to enable County review and has been given approval and is not subject to any additional reviews or permits by other jurisdictions or State Agencies and is not subject to a mandatory environmental review as defined in Minnesota Statutes Chapter 4410.

2-8-4 Procedure

1. Pre-Application Meeting. Prior to submission of an administrative permit application, the property owner may meet with the Planning Department to discuss the administrative permit application. Through the pre-application, the Planning Department will summarize the informational requirements and issues related to the specific administrative permit request.

2. The property owner applying for an administrative permit shall submit to the Planning Department a completed administrative use permit application and provide all other information required by the Planning Department. The application shall be completed when the applicant has complied with the following requirements:

    a. A written and/or graphic description of an administrative permit request including the applicable information outlined in Section 2-10-3 of this Ordinance.

b. Supporting information described by the Planning Department during the pre-application meeting and required in other sections of this Ordinance.

c. Applications must be accompanied by a fee established by the County Board.

3. The Planning Department, upon receipt of the application, shall notify the applicant in writing within ~~ten (10)~~ fifteen (15) County business days or as amended by Minnesota Statutes Chapter 15.99 if the application is found to be incomplete. *(Amended May 23, 2006 Resolution No. 2006-077)*

4. The Planning Department shall make a determination on approval or denial of the administrative permit, within the time permitted by Minnesota Statutes 15.99, as amended.

5. A written permit shall be issued to the applicant when a determination of compliance has been made. Specific conditions to assure compliance with applicable evaluation criteria, codes, ordinances, and the standards of this Ordinance shall be attached to the permit.

6. A written denial of the permit shall be issued to the applicant when a determination of non-compliance with applicable codes, ordinances, and the standards in this paragraph has been made.

7. Unresolved disputes as to administrative application of the requirements of this paragraph shall be subject to appeal to the Board of Adjustments as outlined in Section 2.3 of this Ordinance.

2-9 BUILDING PERMITS

For the purposes of enforcing this Ordinance and the Minnesota State Building Code, no building or structure regulated by this Ordinance or the Minnesota State Building Code shall be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished unless a separate permit for each building or structure has first been obtained from the Building Official.

1. Persons requesting a building permit shall submit all information required, and a completed application, and all applicable forms to the Building Inspection and Environmental Health Departments.

2. No site preparation work, including rough grading, driveway construction, footing construction, or other physical changes to the site shall occur prior

Watauga County Ordinance To Regulate Wind Energy Systems

Section 1 Authority and Purpose

Inasmuch as Watauga County has determined that single wind power turbines are exempt from the North Carolina Mountain Ridge Protection Act, and pursuant to the authority granted to counties by NC General Statute 153A-121 *et seq*. and other pertinent statutes and amendments thereto, it is the purpose of this ordinance to regulate the use of wind energy systems and to describe the conditions by which a permit for installing a system could be obtained.

Section 2 Findings

Wind power is a clean, inexhaustible, reliable, and economical source of energy that can help us reduce our dependence on fossil fuels, help to preserve and protect the environment, and help to create new jobs and sustainable forms of development. As a result of these benefits, wind power has become the fastest growing energy source in the world and is helping to satisfy the growing demand for electricity cleanly and affordably.

The State of North Carolina has enacted a number of laws and programs to encourage the use of small-scale renewable energy systems including a state tax credit, net metering law, property tax exemptions, and a state wide green power program.

Section 3 Definitions

Large Wind Energy System: A wind energy conversion system consisting of one or more wind turbine(s), a tower(s), and associated control or conversion electronics, which has a rated capacity of more than 20 kW.

Small Wind Energy System: A wind energy conversion system consisting of a single wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity of not more than 20 kW. Multiple systems located on agricultural farms as defined in the Watauga County High Impact Land Use Ordinance are also considered small wind energy systems even if the aggregate kW exceeds 20, provided the primary intent is to generate power to reduce on-site consumption.

Wind Turbine Height: The height above grade to the tip of the turbine blade when it reaches its highest elevation.

Section 4 Small Wind Energy Systems

Small wind energy systems shall be a permitted use by right subject to the requirements set forth in this section:

4.1. Wind Turbine Height: Height shall be limited to 135 feet.

4.2. Setback: The base of the wind turbine shall not be closer to surrounding property lines than the height of the wind turbine unless a NC Registered Professional Engineer certifies the fall zone of the wind turbine and appurtenances will be within the setback area proposed. In addition, no wind turbine shall be located closer to an inhabited structure on adjacent property than 1.5 times the height of the wind turbine. Relief from this section may be granted if the applicant can secure a permanent easement from the adjoining property owner(s) providing for a fall zone.

4.3. Building Permit Requirements: A building permit shall be required and building permit applications for small wind energy systems shall be accompanied by standard drawings of the wind turbine structure, including the tower, base, and footings. An engineering analysis of the tower certified by a licensed professional engineer which includes standards for ice/wind loading shall also be submitted. This analysis may be supplied by the manufacturer. Wet stamps shall not be required.

4.4. Compliance with FAA Regulations: Small wind energy systems must comply with applicable FAA regulations, including any necessary approvals for installations close to airports. Evidence of compliance or non-applicability shall be submitted with the application.

4.5. Utility Notification: No small wind energy system shall be installed until evidence has been given that the utility company has been informed of the customer's intent to install an interconnected customer-owned generator. Off-grid systems shall be exempt from this requirement.

4.6. Appearance: Small wind energy towers shall maintain a galvanized finish or be painted to conform the tower color to the surrounding environment to reduce visual obtrusiveness. No wind tower should have any signage, or writing or pictures that may be construed as advertising placed on it at any time. In addition no flags, streamers or decorative items may be attached to the wind energy system tower or turbine.

4.7. Removal of Defective or Abandoned Wind Energy Systems: Any wind energy system that is not functional shall be repaired by the owner or removed. In the event that the County becomes aware of any wind energy system that is not operated for a continuous period of 6 months, the County will notify the landowner by registered mail and provide 45 days for a written response. In such a response, the landowner shall set forth reasons for the operational difficulty and provide a reasonable timetable for corrective action. If the County deems the timetable for corrective action as unreasonable, the County shall notify the landowner and such landowner shall remove the turbine with 120 days of receipt of said notice.

Section 5 Large Wind Energy Systems

Large wind energy systems shall be a use permitted by review subject to the requirements of this Section 5 as well as Section 4, except that the height limits in 4.1 may be increased if approved as necessary by the Planning Board.

5.1. Permit Application: A person seeking a site permit for a wind turbine over 20 KW shall file an application with the County Planning Board for review as follows.

An applicant for a site permit must provide the following background information regarding the applicant:

(1) A letter of transmittal signed by an authorized representative or agent of the applicant.

(2) The complete name, address, telephone number, and e-mail address of the applicant and any authorized representative.

(3) The signature of the person who prepared the application, if prepared by an agent or consultant of the applicant.

(4) The role of the permit applicant in the construction and operation of the wind power project.

(5) The identity of any other wind power project located in the State in which the applicant, or a principal of the applicant, has an ownership or other financial interest; the operator of the wind power project if different from the applicant; and the name of the person or persons to be the permittee if a site permit is issued.

(a) The applicant shall state in the application whether a certificate of public convenience and necessity for the system is required from the North Carolina Utilities Commission and, if so, the anticipated schedule for obtaining the certificate. The County may ask the Utilities Commission to determine whether a certificate of public convenience and necessity is required for a particular wind power project for which the County has received a site permit application. The County shall not approve a project requiring a certificate unless and until such certificate is issued by the Utilities Commission. If a certificate is not required from the Utilities Commission, the permit applicant shall include with the application a discussion of what the applicant intends to do with the power that is generated.

(b) The applicant shall describe in the application how the proposed wind power project furthers State policy to site such projects in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources.

(c) The permit applicant shall include the following information about the site proposed for the wind power project and any associated facilities:

(1) The surveyed boundaries of the site proposed for the wind power project.

(2) The location of other wind turbines in the general area of the proposed wind power project.

(3) The applicant's land rights within the boundaries of the proposed site.

(d) The permit applicant shall provide the following information regarding the design of the proposed wind power project:

(1) A project layout, prepared by a design professional, including a map showing the proposed location of the turbine(s).

(2) A description of the turbine(s) and tower(s) and other equipment proposed to be used in the wind power project, including the name of the manufacturers of the equipment.

(3) A description of the project electrical system, including transformers at both low voltage and medium voltage.

(4) A description and location of associated facilities.

(e) An applicant for a site permit shall include with the application an analysis of the potential impacts of the wind power project, proposed mitigative measures, and any adverse environmental effects that cannot be avoided, in the following areas:

(1) Demographics, including people, homes, and businesses.

(2) Noise.

(3) Visual impacts.

(4) Public services and infrastructure

(5) Cultural and archaeological impacts.

(6) Recreational resources.

(7) Public health and safety, including air traffic, electromagnetic fields, and security and traffic.

(8) Hazardous materials.

(9) Land-based economics, including agriculture, forestry, and mining.

(10) Tourism and community benefits.

(11) Topography.

(12) Soils.

(13) Geologic and groundwater resources.

(14) Surface water and floodplain resources.

(15) Wetlands.

(16) Vegetation.

(17) Avian, impact assessment that includes an indication of the type and number of birds that are known or suspected to use a project site and the area surrounding that site.

(18) Wildlife.

(19) Rare and unique natural resources.

(f) The permit applicant shall describe all of the following:

(1) The manner in which the wind power project, including associated facilities, will be constructed.

(2) How the wind power project will be operated and maintained after construction, including a maintenance schedule.

(3) The anticipated schedule for completion of the wind power project, and shall identify the expected date of commercial operation.

(4) The energy expected to be generated by the wind power project.

(g) The permit applicant shall include the following information regarding decommissioning of the wind power project and restoring the site:

(1) The anticipated life of the wind power project.

(2) The estimated decommissioning costs in current dollars.

(3) The method and schedule for updating the costs of decommissioning and restoration.

(4) The method of ensuring that funds will be available for decommissioning and restoration.

(5) The anticipated manner in which the wind power project will be decommissioned and the site restored.

(h) The permit applicant shall include in the application a list of all known federal, state, and local agencies or authorities, and titles of the permits they issue that are required for the proposed wind power project.

(i) Blue Ridge Parkway: If a proposed wind energy site is within the Blue Ridge Parkway viewshed the applicant shall inform the National Park Service of the proposed wind turbine sitting. Park Service recommendations shall be given reasonable consideration and documentation of this consideration shall be provided to the County. The Park Service shall be afforded 30 days to respond to the applicant's written intention to erect a wind turbine. No answer to the notification within the 30 days shall be considered as an affirmation of the site as proposed. Viewshed shall be determined by the County using maps and documents prepared for that purpose by the Design Research Laboratory at NC State University and the Blue Ridge Parkway Division of Resource Planning and Professional Services.

5.2. Hearing Required: Prior to granting or denying a permit for a large wind energy system, the Planning Board shall conduct a public hearing. The purpose of the hearing shall be to receive comments and information pertinent to the issues listed in this section. Comments and information not pertinent shall not be considered.

Following the hearing, the Planning Board shall render a decision on the application based upon the following considerations:

1. Completeness of the application;

2. Compliance with applicable State and Federal regulations;

3. Compliance with all applicable development standards specified in this ordinance;

4. Compliance with other applicable County regulations;

5. The proposed large wind energy system is a desirable and/or necessary use, particularly considering the standards included in this ordinance;

6. The proposed large wind energy system is properly related to other uses and transportation and other public facilities in the vicinity;

7. The proposed large wind energy system would not adversely affect the health or safety of persons living or working in the vicinity, or be detrimental to the public welfare.

5.3 High Impact Land Use Ordinance: Stand-alone large wind power systems which generate electricity solely for consumption by consumers off-site shall also be subject to the Watauga County High Impact Land Use Ordinance.

Section 6 Appeals and Variances

6.1. Board of Commissioners: The Watauga County Board of Commissioners, as established by N.C.G.S. § 153A-25 *et seq.* shall hear all appeals, requests for variances, and all challenges to the decision or interpretation of the Ordinance Administrator.

6.2. Powers of Board of Commissioners: The Board shall have the following powers:

(a) To hear, decide and review appeals from any order, requirement, decision, or determination made by the Ordinance Administrator in the performance of its duties; and

(b) To hear and decide applications for variances from the requirements of this Ordinance in accordance with Section 6.5. Nothing in this Section shall be construed to broaden the power of the Board to permit a use by variance beyond that power given in Section 6.5 below.

6.3. Administration: The Board shall adopt rules of procedures and regulations for the conduct of its affairs.

All meetings of the Board shall be open to the public. The Board shall keep a record of its meetings, including of the vote of each member on every question, a fair and accurate summary of the evidence submitted to it, the documents (or accurate copies thereof) submitted to it and of all official actions. The Board shall give due notice of matters coming before it.

In presenting an appeal, the petitioner shall bear the burden of proof, which shall be by the greater weigh of the evidence.

All evidence presented to the Board of Commissioners shall be sworn.
The person acting as Chairman of the Board is authorized to administer oaths to any witnesses in any matter coming before the Board.

Application for variances, requests for interpretations and appeals for review of decisions of the Ordinance Administrator shall be filed with the Clerk for the Board, as agent for the Board, on forms provided by the Clerk.

It shall be the responsibility of the Ordinance Administrator to notify by certified mail the applicant or appellant of the disposition which the Board makes of any matter before it.
It shall be the responsibility of the Ordinance Administrator to issue a permit in accord with the Board's action on an appeal or application, if a permit is authorized by the Board action.

6.4. Quorum and Vote Required: A quorum of the Board, necessary to conduct any business of the Board, shall consist of four-fifths of the total membership of the Board.

The concurring vote of a simple majority of the total membership of the Board shall be necessary in order to:

(a) Reverse any order, requirement, decision or determination of the Ordinance Administrator;

(b) Decide in favor of the applicant any matter upon which it is required to pass by this Ordinance; or

(c) Approve an application for a variance

6.5. Application of the Variance Power: A variance shall only be allowed by the Board of Commissioners in cases involving practical difficulties or unnecessary hardships. Any authorizing of a variance shall not destroy the intent of the ordinance. Any authorized variance shall be recorded in the minutes of the Watauga County Board of Commissioners. A hardship, as used in the context of this section, shall be considered to be some unique or unusual character of the proposed site, including but not limited to unique size, shape, contour, or distance requirement. An economic hardship to the applicant is not to be considered for a variance.

The Board may grant a variance upon finding that the following conditions exist:

1) Extraordinary and exceptional conditions exist pertaining to the particular place or property in question because of its size, shape, or topography.

2) The variance will not confer upon the applicant any special privileges that are, or would be, denied to other similarly situated individuals.

3) This ordinance would deprive the applicant of rights commonly enjoyed by other similarly situated individuals.

4) The variance would not seriously deter from the purpose and intent of this ordinance and will not be injurious to the neighborhood or to the general welfare.

5) The special circumstances causing the need for variance(s) are not the fault of the applicant.

The Board may impose reasonable conditions upon the granting of any variance in order to protect the public interest or neighboring property owners. Violation of any such conditions shall be a violation of this ordinance and subject to the penalties set forth in Section 7 of this ordinance.

6.6. Application of Interpretation Power: An appeal from an order, requirement, or decision of the Ordinance Administrator shall be decided by the Board duly supported by competent evidence. In exercising this power, the Board shall act in a prudent manner so that the purposes and intent of the Ordinance shall be served. No decision shall have the effect of varying the terms of the Ordinance or permitting as a matter of right any use otherwise limited or prohibited hereunder.

6.7. Appeal Stays Further Proceedings: An appeal to the Board of Commissioners from a decision or determination of the Ordinance Administrator stays all proceedings in furtherance of the decision or determination appealed from, except as provided in Section 6.8, during the pendency of the appeal.

6.8. Exceptions to Stay of Action: An appeal to the Board of Commissioners of a decision or determination of the Ordinance Administrator shall not stay proceedings in furtherance of the decision or determination appealed from, if the Ordinance Administrator certifies either:

(a) That a stay would cause imminent peril to life or property; or

(b) That the situation subject to the appeal is transitory in nature and therefore, an appeal would seriously interfere with enforcement of this Ordinance.

In each instance, the Ordinance Administrator shall set forth in the certificate facts to support its conclusion.

6.9. Appeals of Board Actions: Every decision of the Board shall be subject to review at the instance of any aggrieved party in the Superior Court by proceedings in the nature of a petition for writ of certiorari. Such proceedings in the Superior Court shall be initiated within thirty (30) days of the filing of the decision in the office of the Ordinance Administrator or the delivery of the notice required in Section 6.3, whichever is later. Appeals not received within this thirty (30) day period are not timely. The Superior Court is authorized to stay enforcement of this ordinance during the pendency of an appeal from the decision of the Board of Commissioners upon a hearing and the posting of a bond sufficient to the Court which will adequately protect the interests of the County.

Section 7 Enforcement and Penalties

7.1. Administration and Enforcement: The Ordinance Administrator shall be responsible for the administration and enforcement of this ordinance.

If the Ordinance Administrator shall determine that any of the provisions of this ordinance are being violated, he shall notify in writing the person responsible for such violation, indicating the nature of the violation and ordering the action necessary to within ten (10) working days correct the violation. He may order the discontinuance of illegal use of land, buildings, or structures; the removal of illegal buildings or structures or of addition, alterations, or structural changes thereto; the discontinuance of any illegal work being done; and may take any other action authorized by this ordinance to insure compliance with, or to prevent violation of, its provisions.

7.2. Conflict with Other Laws: Wherever the provisions or application of this ordinance impose higher standards than are required in any other local ordinance or regulation, the provisions or application of this ordinance shall govern. Wherever the provisions of any other statute or local ordinance or regulation impose higher standards than are required by the provisions or application this ordinance, the provisions of such other statute or local ordinance or regulation shall govern.

7.3. Penalties: Any person, firm or corporation who violates any provision of any article of this ordinance; or who shall violate or fail to comply with any order made hereunder; or who shall continue to work upon any structure after having received written notice from the Ordinance Administrator to cease work, shall, upon conviction, be guilty of a Class 3 misdemeanor as provided by N.C.G.S. § 14-4 and shall be punishable by a fine not to exceed fifty ($50.00) dollars, or imprisonment not to exceed twenty days. Each day such violation shall be permitted to exist shall constitute a separate offense. Notice of violation shall be sufficient if directed to the owner, the agent of the owner, or the contractor and left at his known place of residence or place of business. In lieu of or in addition to the criminal penalties outlined above, each person violating this ordinance shall be subject to a civil penalty, under N.C.G.S. 153A-123(c), in the amount of $200.00 per day. No penalty shall be assessed prior to notice to the violator. For every day a violator is in violation of this ordinance, it shall be considered a separate offense. If the violator does not pay such penalty within 30 days of notification of its assessment by written citation it and any subsequently accruing penalty may be recovered by the County in a civil action in the nature of a debt. Any contest of said penalty shall be by appropriate action taken in the General Court of Justice for Watauga County.

7.4. Severability Clause: Should any section or provisions of this ordinance be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of this ordinance as a whole, or any part hereof other than the part so declared to be unconstitutional or invalid.

7.5. Ordinance Amendments: This Ordinance may be amended by the Board of Commissioners following a public hearing on the proposed changes. The Board shall cause notice of the hearing to be published once a week for two successive calendar weeks. The notice shall be published the first time not less than 10 days nor more than 25 days before the date fixed for the hearing. In computing such period, the day of publication is not to be included but the day of the hearing shall be included.

Adopted this the 7th day of August, 2006.

_____
James M. Deal, Jr., Chairman

ATTEST:

_____
Anita J. Fogle, Clerk to the Board

APPENDIX

To: Watauga County Planning Board Members
From: Andrea N. Capua, Esq., di Santi Watson Capua & Wilson
Re: Legal Memorandum
Date: May 15, 2006

Facts: Watauga County is known to be an area with an abundant wind resource. As a result, there has been recent efforts by its citizens to promote the use of wind turbines as a source of alternative energy. A legitimate question has been raised as to whether a landowner wishing to erect a single wind turbine on his or her property could do so legally, without the need to obtain a county building permit. In the wake of growing issues related to energy and the future of oil, local authorities are encouraged to take their own initiative to make way for renewable energy policies. The Watauga County Board of Commissioners has voted to support the use of single wind turbines. It is, therefore, considering enacting an ordinance as an attempt to address issues which may arise from their use.

Issue: Whether wind turbines ("windmills") are exempt from the North Carolina Mountain Ridge Protection Act (the "Ridge Law").

Conclusion: Windmills are exempt from the North Carolina Mountain Ridge Protection Act. This memo is limited to a brief legal analysis of single wind turbines. It does not address legal rights to the use of wind turbines which are part of a large wind farm.

I. General History of the Ridge Law

In July 1983 the North Carolina General Assembly enacted the Mountain Ridge Protection Act (the "Ridge Law"). The legislature stated both aesthetic and non-aesthetic purposes being primarily to protect structures from high winds and destruction by fire, to protect against the effects of water erosion, and to preserve the natural beauty of the mountains.

The Ridge Law provided three options for counties to regulate the construction of tall buildings or structures on protected mountain ridges: (1) accept statutory imposed construction height restrictions on mountain ridges (N.C. Gen. Stat. §113A-209); (2) adopt their own restrictions (N.C. Gen. Stat. §113A-208); or (3) opt out of having any restrictions (N.C. Gen. Stat. §113A-214). Watauga County chose to accept the statutory imposed restrictions as outlined in §113A-209 of the Ridge Law.

II. Relevant Definitions Within the Ridge Law

The Ridge Law specifically includes the following definitions:

"Protected mountain ridges" are defined as "all mountain ridges whose elevation is 3,000 feet and whose elevation is 500 or more feet above the elevation of an adjacent valley floor." (N.C. Gen. Stat. §113A-206 (6)).

"Tall buildings or structures" are defined to include "any building, structure or unit within a multiunit building with a vertical height of more than 40 feet measured from the top of the foundation of said building, structure or unit and the uppermost point of said building, structure or unit… and no such building structure or unit shall protrude at its uppermost point above the crest of the ridge by more than 35 feet," (N.C. Gen Stat. §113A-206 (3)).

The definition of tall buildings or structures specifically excludes "**structures of a relatively slender nature** and minor vertical projections of a parent building, including chimneys, flagpoles, flues, spires, steeples, belfries, cupolas, antennas, poles, wires, **or windmills**." (emphasis added). (N.C. Gen. Stat. §113A-206(3)(b)).

III. Interpretation of the Ridge Law

Interpretations of the exclusions contained within the definition of "tall buildings or structures" have varied and have been viewed three ways: (1) windmills are exempt only if they are relatively slender in nature and are minor vertical projections of a parent building; (2) windmills are exempt because they are naturally slender; and (3) windmills are exempt, period.

There exists no case law to date interpreting the Ridge Law. After a recent inquiry by Watauga County Planning and Inspections Director, Joe Furman, the North Carolina Attorney General has declined to take a position at this point. Therefore, it is left up to the individual county to interpret and apply the law and the following factors should be considered by Watauga County.

First, it is well known that from 1979 until 1983, a Mod-I wind turbine was located on Howard's Knob, a prominent 4000' peak rising just north of Boone. Because of the timing of the Ridge Law, there is support for the third interpretation, being that windmills were specifically excluded from the definition of tall buildings or structures to avoid de-legitimizing the Howard's Knob project. (Watauga County Planning Board member Tom Foxx, who was a planner at the Division of Community Assistance at that time, and who was also involved with the drafting of the statute, confirmed this.)

A second factor to consider is simply looking at the Webster's Dictionary definition of "slender," which is "small or slight in width in proportion to height or length." Whether a windmill is "relatively slender in nature" is subjective. However, objectively, it would be hard to argue otherwise.

IV. Conclusion

Taking into consideration the history of the Ridge Law, its stated purposes, and the simple language of the statute, it is my opinion that windmills were intended to be exempt. Therefore, it remains up to Watauga County whether to be silent as to their use, or whether to enact an ordinance promoting windmills and taking the opportunity to address anticipated issues which may arise as a result of their use.

Solar Access Ordinances

Ashland (Oregon), City of. *Municipal Code*. 2007.

18.70 Solar Access

18.70.010 Purpose and Intent

The purpose of the Solar Access Chapter is to provide protection of a reasonable amount of sunlight from shade from structures and vegetation whenever feasible to all parcels in the City to preserve the economic value of solar radiation falling on structures, investments in solar energy systems, and the options for future uses of solar energy.

18.70.020 Definitions

A. Exempt Vegetation. All vegetation over fifteen (15) feet in height at the time a solar access permit is applied for.

B. Highest Shade Producing Point. The point of a structure which casts the longest shadow beyond the northern property boundary at noon on December 21st.

C. Natural Grade. The elevation of the natural ground surface in its natural state, before man-made alterations. The natural ground surface is the ground surface in its original state, before any grading, excavation, or filling.

D. Northern Lot Line. Any lot line or lines less than forty-five (45) degrees southeast or southwest of a line drawn east-west and intersecting the northernmost point of the lot. If the northern lot line adjoins any unbuildable area (e.g., street, alley, public right-of-way, parking lot, or common area) other than a required yard area, the northern lot line shall be that portion of the northerly edge of the unbuildable area which is due north from the actual northern edge of the applicant's property.

E. North-South Lot Dimension. The average distance in feet between lines from the corners of the northern lot line south to a line drawn east-west and intersecting the southernmost point of the lot.

F. Solar Energy System. Any device or combination of devices or elements which rely upon direct sunlight as an energy source, including but not limited to any substance or device which collects sunlight for use in the heating or cooling of a structure or building, the heating or pumping of water, or the generation of electricity. A solar

energy system may be used for purposes in addition to the collection of solar energy. These uses include, but are not limited to, serving as a structural member of part of the roof of a building or structure and serving as a window or wall.

G. Solar Envelope. A three dimensional surface which covers a lot and shows, at any point, the maximum height of a permitted structure which protects the solar access of the parcel(s) to the north.

H. Solar Heating Hours. The hours and dates during which solar access is protected by a solar access permit, not to exceed those hours and dates when the sun is lower than twenty-four (24) degrees altitude and greater than seventy (70) degrees east and west of true south.

I. Solar Access Permit Height Limitations. The height limitations on affected properties required by the provisions of a Solar Access Permit displayed as a series of five (5) foot contour lines which begin at the bottom edge of the solar energy system protected by the permit, rise at an angle to the south not less than twenty-four (24) degrees from the horizon, and extend at an angle not greater than seventy (70) degrees to the east and west of true south and run parallel to the solar energy system.

J. Solar Setback. The minimum distance that a structure, or any part thereof, can be located from a property boundary.

K. Slope. A vertical change in elevation divided by the horizontal distance of the vertical change. Slope is measured along lines extending one hundred fifty (150) feet north from the end points of a line drawn parallel to the northern lot line through the midpoint of the north-south lot dimension. North facing slopes will have negative (-) values and south facing slopes will have positive (+) values.

L. Sunchart. Photographs or drawings, taken in accordance with the guidelines of the Staff Advisor, which plot the position of the sun during solar heating hours. The sunchart shall contain at a minimum the southern skyline as seen through a grid which plots solar altitude for a forty-two (42) degree northern latitude in ten (10) degree increments and solar azimuth measured from true south in fifteen (15) degree increments. If the solar energy system is less than twenty (20) feet wide, a minimum of one (1) sunchart shall be taken from the bottom edge of the center of the solar energy system. If the solar energy system is greater than twenty (20) feet wide, a minimum of

two (2) suncharts shall be taken, one (1) from the bottom edge of each end of the solar energy system.

18.70.030 Lot Classifications

Affected Properties. All lots shall meet the provisions of this Section and will be classified according to the following formulas and table:
FORMULA I:
Minimum N/S lot dimension for Formula I = 30' 0.445 + S Where: S is the decimal value of slope, as defined in this Chapter.

FORMULA II:
Minimum N/S lot dimension for Formula II = 10' 0.445 + S Lots whose north-south lot dimension exceeds that calculated by Formula I shall be required to meet the setback in Section (A), below.
Those lots whose north-south lot dimension is less than that calculated by Formula I, but greater than that calculated by Formula II, shall be required to meet the setback in Section (B), below.
Those lots whose north-south lot dimension is less than that calculated by Formula II shall be required to meet the setback in Section (C), below.

See the Lot Classification Standards image at the bottom of the page

18.70.040 Solar Setbacks

A. Setback Standard A. This setback is designed to insure that shadows are no greater than six (6) feet at the north property line. Buildings on lots which are classified as Standard A, and zoned for residential uses, shall be set back from the northern lot line according to the following formula:
SSB = H - 6'
0.445 + S
WHERE:
SSB = the minimum distance in feet that the tallest shadow producing point which creates the longest shadow onto the northerly property must be set back from the northern property line.
H = the height in feet of the highest shade producing point of the structure which casts the longest shadow beyond the northern property line.
S = the slope of the lot, as defined in this Chapter.

B. Setback Standard B. This setback is designed to insure that shadows are no greater than sixteen (16) feet at the north property line.
Buildings for lots which are classified as Standard B, or for any lot zoned C-1, E-1 or M-1, or for any lot not abutting a residential zone to the north, shall be set back from the northern lot line as set forth in the following formula:
SSB = H - 16'
0.445 + S

C. Setback Standard C. This setback is designed to insure that shadows are no greater than twenty-one (21) feet at the north property line.
Buildings for lots in any zone whose north/south lot dimension is less than Standard B shall meet the setback set forth in the following formula:
SSB = H - 21'
0.445 + S

D. Exempt Lots. Any lot with a slope of greater than thirty percent (30%) in a northerly direction, as defined by this Ordinance, shall be exempt from the effects of the Solar Setback Section.

E. Lots Affected By Solar Envelopes. All structures on a lot affected by a solar envelope shall comply with the height requirements of the solar envelope.

F. Exempt Structures.

1. Existing Shade Conditions. If an existing structure or topographical feature casts a shadow at the northern lot line at noon on December 21, that is greater than the shadow allowed by the requirements of this Section, a structure on that lot may cast a shadow at noon on December 21, that is not higher or wider at the northern lot line than the shadow cast by the existing structure or topographical feature. This Section does not apply to shade caused by vegetation.

2. Actual Shadow Height. If the applicant demonstrates that the actual shadow which would be cast by the proposed structure at noon on December 21, is no higher than that allowed for that lot by the provisions of this Section, the structure shall be approved. Refer to Table D for actual shadow lengths.

18.70.050 Solar Access Performance Standard

A. Assignment of Solar Factor. All land divisions which create new lots shall be designed to permit the location of a twenty-one (21) foot high structure with a setback which does not exceed fifty (50%) percent of the lot's north-south lot dimension. Lots having north facing (negative) slopes of less than fifteen percent (15%) (e.g., 10%), and which are zoned for residential uses, shall have a north-south lot dimension equal to or greater than that calculated by using Formula I. Lots having north facing (negative) slopes equal to or greater than fifteen percent (15%) (e.g., 20%), or are zoned for non-residential uses, shall have a north-south lot dimension equal to or greater than that calculated by using Formula II.

B. Solar Envelope. If the applicant chooses not to design a lot so that it meets the standards set forth in (A) above, a Solar Envelope shall be used to define the height requirements which will protect the applicable Solar Access Standard. The Solar Envelope, and written description of its effects, shall be filed with the land partition or subdivision plat for the lot(s).

18.70.060 Variances

A. Variances to this Chapter shall be processed as a Type I procedure, except that variances granted under subsection B of this Section may be processed as a Staff Permit. (Ord. 2484 S3, 1988)

B. A variance may be granted with the following findings being the sole facts considered by the Staff Advisor:

1. That the owner or owners of all property to be shaded, sign and record with the County Clerk on the affected properties' deed, a release form supplied by the City, which contains the following information:

a. The signatures of all owners or registered leaseholders who hold an interest in the property in question.

b. A statement that the waiver applies only to the specific building or buildings to which the waiver is granted.

c. A statement that the solar access guaranteed by this Section is waived for that particular structure and the City is held harmless for any damages resulting from the waiver.

d. A description and drawing of the shading which would occur, and

2. The Staff Advisor finds that:

a. The variance does not preclude the reasonable use of solar energy on the site by future buildings; and

b. The variance does not diminish any substantial solar access which benefits a habitable structure on an adjacent lot.

c. There are unique or unusual circumstances which apply to this site which do not typically apply elsewhere.

18.70.070 Solar Access Permit for Protection from Shading by Vegetation

A. A Solar Access Permit is applicable in the City of Ashland for protection of shading by vegetation only. Shading by buildings is protected by the setback provisions of this Ordinance.

B. Any property owner or lessee, or agent of either, may apply for a Solar Access Permit from the Staff Advisor. The application shall be in such form as the Staff Advisor may prescribe but shall, at a minimum, include the following:

1. A fee of Fifty ($50.00) Dollars plus Ten ($10.00) Dollars for each lot affected by the Solar Access Permit.

2. The applicant's name and address, the owner's name and address, and the tax lot number of the property where the proposed solar energy system is to be located.

3. A statement by the applicant that the solar energy system is already installed or that it will be installed on the property within one (1) year following the granting of the permit.

4. The proposed site and location of the solar energy system, its orientation with respect to true south, and its slope from the horizontal shown clearly in drawing form.

5. A sun chart.

6. The tax lot numbers of a maximum of ten (10) adjacent properties proposed to be subject to the Solar Access Permit. A parcel map of the owner's property showing such adjacent properties with the location of existing buildings and vegetation, with all exempt vegetation labeled exempt.

7. The Solar Access Permit height limitations as defined in Section 18.70.050 of this Ordinance, for each affected property which are necessary to protect the solar energy system from shade during solar heating hours. In no case shall the height limitations of the Solar Access Permit be more restrictive than the building setbacks.

C. If the application is complete and complies with this Ordinance, the Staff Advisor shall accept the solar access recordation application and notify the applicant. The applicant is responsible for the accuracy of all information provided in the application.

D. The Staff Advisor shall send notice by certified letter, return receipt requested, to each owner and registered lessee of property proposed to be subject to the Solar Access Permit. The letter shall contain, at a minimum, the following information:

1. The name and address of the applicant.
2. A statement that an application for a Solar Access Permit has been filed.
3. Copies of the collector location drawing, sunchart, and parcel map submitted by the applicant.
4. A statement that the Solar Access Permit, if granted, imposes on them duties to trim vegetation at their expense.
5. The advisability of obtaining photographic proof of the existence of trees and large shrubs.
6. The times and places where the application may be viewed.
7. Telephone number and address of the City departments that will provide further information.
8. That any adversely affected person may object to the issuance of the permit by a stated time and date, and how and where the objection must be made.

E. If no objections are filed within thirty (30) days following the date the final certified letter is mailed, the Staff Advisor shall issue the Solar Access Permit.

F. If any adversely affected person or governmental unit files a written objection with the Staff Advisor within the specified time, and if the objections still exist after informal discussions among the objector, appropriate City Staff, and the applicant, a hearing date shall be set and a hearing held in accordance with the provisions of Section 18.70.080.

18.70.080 Hearing Procedure

A. The Staff Advisor shall send notice of the hearing on the permit application to the applicant and to all persons originally notified of the Solar Access Permit application, and shall otherwise follow the procedures for a Type I hearing.

B. The Staff Advisor shall consider the matters required for applications set forth in Section 18.70.070(B) on which the applicant shall bear the burden of proof, and the following factor on which the objector shall bear the burden of proof: A showing by the objector that the proposed collector would unreasonably restrict the planting of vegetation on presently under-developed property.

1. If the objector is unable to prove these circumstances and the applicant makes the showings required by Section 18.70.060(B), the Staff Advisor shall approve the permit.

2. If the applicant has failed to show all structures or vegetation shading of the proposed collector location in his application, the Staff Advisor may approve the permit while adding the omitted shading structures or vegetation as exemptions from this Chapter.

3. If the objector shows that an unconditional approval of the application would unreasonably restrict development of the objector's presently under-developed property, the Staff Advisor may approve the permit, adding such exemptions as are necessary to allow for reasonable development of the objector's property.

4. If the Staff Advisor finds that the application contains inaccurate information which substantially affects the enforcement of the Solar Access Permit, the application shall be denied.

C. Any decision by the Staff Advisor is subject to review before the Planning Commission as a Type II planning action according to the usual procedures contained in this Title. (Ord. 2775, 1996)

18.70.090 Limits On Solar Access Permits

A. No Solar Access Permit may be filed which would restrict any lot which has an average slope of fifteen (15) percent in the northerly direction.

B. A Solar Access Permit becomes void if the use of the solar collector is discontinued for more than twelve (12) consecutive months or if the solar collector is not installed and operative within twelve (12) months of the filing date of the Solar Access Permit. The applicant may reapply for a Solar Access Permit in accordance with Chapter 18.70.070, however, the application fee shall be waived.

18.70.100 Entry of Solar Access Permit Into Register

A. When a Solar Access Permit is granted, the Staff Advisor shall:

1. File the Solar Access Permit with the County Clerk. This shall include the owner's name and address and tax lot of the property where the recorded collector is to be located, any special exceptions or exemptions from the usual affects of a Solar Access Permit, and the tax lots of the ten (10) or fewer adjacent properties subject to the Solar Access Permit.

2. File a notice on each affected tax lot that the Solar Access Permit exists and that it may affect the ability of the property owner to

grow vegetation, and that it imposes certain obligations on the property owner to trim vegetation.

3. Send a certified letter, return receipt requested, to the applicant and to each owner and registered lessee of property subject to the Solar Access Permit stating that such permit has been granted.

B. If a Solar Access Permit becomes void under Section 18.70.090(B), the Staff Advisor shall notify the County Clerk, the recorded owner, and the current owner and lessee of property formerly subject to the Solar Access Permit.

18.70.110 Effect and Enforcement

A. No City department shall issue any development permit purporting to allow the erection of any structure in violation of the setback provisions of this Chapter.

B. No one shall plant any vegetation that shades a recorded collector, or a recorded collector location if it is not yet installed, after receiving notice of a pending Solar Access Permit application or after issuance of a permit. After receiving notice of a Solar Access Permit or application, no one shall permit any vegetation on their property to grow in such a manner as to shade a recorded collector (or a recorded collector location if it is not yet installed) unless the vegetation is specifically exempted by the permit or by this Ordinance.

C. If vegetation is not trimmed as required or is permitted to grow contrary to Section 18.70.100(B), the recorded owner or the City, on complaint by the recorded owner, shall give notice of the shading by certified mail, return receipt requested, to the owner or registered lessee of the property where the shading vegetation is located. If the property owner or lessee fails to remove the shading vegetation within thirty (30) days after receiving this notice, an injunction may be issued, upon complaint of the recorded owner, recorded lessee, or the City, by any court of jurisdiction. The injunction may order the recorded owner or registered lessee to trim the vegetation, and the court shall order the violating recorded owner or registered lessee to pay any damages to the complainant, to pay court costs, and to pay the complainant reasonable attorney's fees incurred during trial and/or appeal.

D. If personal jurisdiction cannot be obtained over either the offending property owner or registered lessee, the City may have a notice listing the property by owner, address and legal description published once a

week for four (4) consecutive weeks in a newspaper of general circulation within the City, giving notice that vegetation located on the property is in violation of this Ordinance and is subject to mandatory trimming. The City shall then have the power, pursuant to court order, to enter the property, trim or cause to have trimmed the shading parts of the vegetation, and add the costs of the trimming, court costs and other related costs as a lien against that property.

E. In addition to the above remedies, the shading vegetation is declared to be a public nuisance and may be abated through Title 9 of the Ashland Municipal Code.

F. Where the property owner or registered lessee contends that particular vegetation is exempt from trimming requirements, the burden of proof shall be on the property owner or lessee to show that an exemption applies to the particular vegetation.

Ashland Setback Table
Setback Standard "A" Slope

-.30 -.25 -.20 -.15 -.10 -.05 -.00 .05 .10 .15
Height in feet
8 * 14 10 8 7 6 5 4 4 4 3
10 * 28 20 6 4 2 0 9 8 7 7
12 * 41 31 24 20 17 15 13 21 11 10
14 * 55 41 33 27 23 20 18 16 15 13
16 * 69 51 41 34 29 25 22 20 18 17
18 * 83 61 49 41 35 30 27 24 22 20
20 * 96 72 57 47 41 35 31 28 26 24
22 * 110 82 65 54 46 40 36 32 29 27
24 * 124 92 73 61 52 46 40 36 33 30
26 * 138 102 82 68 58 51 45 40 37 34
28 * 151 113 90 75 64 56 49 44 40 37
30 * 165 123 98 81 70 61 54 48 44 40
32 * 179 133 106 88 75 66 58 53 48 44
34 * 193 143 114 95 81 71 63 57 51 47
36 * 207 154 122 102 87 76 67 61 55 50
38 * 220 164 130 108 93 81 72 65 59 54
40 * 234 174 139 115 98 86 76 69 62 57

Ashland Setback Table
Setback Standard "B" Slope

.30 -.25- .20 -.15 -.10 -.05 .00 .05 .10 .15
Height in feet
8 *0 0 0 0 0 0 0 0 0 0
10 *0 0 0 0 0 0 0 0 0 0
12 *0 0 0 0 0 0 0 0 0 0
14 *0 0 0 0 0 0 0 0 0 0
16 *0 0 0 0 0 0 0 0 0 0
18 *14 10 8 7 8 5 4 4 4 3
20 *28 20 16 14 12 10 9 8 7 7
22 *41 31 24 20 17 15 13 12 11 10
24 *55 41 33 27 23 20 18 16 15 13
26 *69 51 54 34 29 25 22 20 18 17
28 *83 61 49 41 35 30 27 24 22 20
30 *96 72 57 47 41 35 31 28 26 24
32 *110 82 65 54 46 40 36 35 29 27
34 *124 92 73 61 52 46 40 36 33 30
36 *138 102 82 68 58 51 45 40 37 34
38 *151 113 90 75 64 56 49 44 40 37
40 *165 123 98 81 70 61 54 48 44 40

Ashland Setback Table
Setback Standard "C" Slope

-.30 -.25 -.20 -.15 -.10 -.05 .00 .05 .10 .15
Height in feet
8 *0 0 0 0 0 0 0 0 0 0
10 *0 0 0 0 0 0 0 0 0 0
12 *0 0 0 0 0 0 0 0 0 0
14 *0 0 0 0 0 0 0 0 0 0
16 *0 0 0 0 0 0 0 0 0 0
18 *0 0 0 0 0 0 0 0 0 0
20 *0 0 0 0 0 0 0 0 0 0
22 *7 5 4 3 3 3 2 2 2 2
24 *21 15 12 10 9 8 7 6 6 6
26 *34 26 20 17 14 13 11 10 9 8
28 *48 36 29 24 20 18 16 14 13 12
30 *62 46 37 30 26 23 20 18 17 15
32 *76 56 45 37 32 28 25 22 20 18
34 *90 67 53 44 38 33 29 26 24 22
36 *103 77 61 51 43 38 34 30 28 25
38 *117 87 69 58 49 43 38 34 31 29
40 *131 97 77 64 55 48 43 38 35 32

Ashland Setback Table "D"
Actual Shadow Length (at solar noon on December 21st) Slope

Height in feet	-.30	-.25	-.20	-.15	-.10	-.05	.00	.05	.10	.15
8	*55	41	33	27	23	20	18	16	15	13
10	*69	51	41	34	29	25	22	20	18	17
12	*83	61	49	41	35	30	27	24	22	20
14	*96	72	57	47	41	35	31	28	26	24
16	*110	82	65	54	46	40	36	32	29	27
18	*124	92	73	61	52	46	40	36	33	30
20	*138	102	82	68	58	51	45	40	37	34
22	*151	113	90	75	64	56	49	44	40	37
24	*165	123	98	81	70	61	54	48	44	40
26	*179	133	106	88	75	66	58	53	48	44
28	*193	143	114	95	81	71	63	57	51	47
30	*207	154	122	102	87	76	67	61	55	50
32	*220	164	130	108	93	81	72	65	59	54
34	*234	174	139	115	98	86	76	69	62	57
36	*248	184	147	122	104	91	81	73	66	60
38	*262	195	155	129	110	96	85	77	70	64
40	*275	205	163	135	116	101	90	81	73	67

Boulder (Colorado), City of. 2007. *Boulder Revised Code*.

Title 9: Land Use Regulation
Chapter 9-9: Development Standards

9-9-17 Solar Access.

(a) Purpose: Solar heating and cooling of buildings, solar heated hot water, and solar generated electricity can provide a significant contribution to the city's energy supply. It is the purpose of this section to regulate structures and vegetation on property, including city-owned and controlled property, to the extent necessary to ensure access to solar energy, by reasonably regulating the interests of neighboring property holders within the city.

(b) Applicability of Section:

(1) Private Property: All private property is subject to this section.

(2) Development Approval: No proposed development permit may be approved for any structure that would violate the basic solar access provided by this section unless the object or structure is exempt or an exception is granted by the city manager or the BOZA for such purpose.

(3) Government Property: Governmental organizations not under the jurisdiction of the city may elect to enjoy the benefits of solar access under this section if they also consent in a written agreement with the city to be bound by its restrictions.

(4) City Property: Property owned or possessed by the city is subject to, and enjoys the benefits of this section. The city may submit applications, make objections, and may take actions that are afforded to any other person subject to the provisions of this section.

(c) Solar Access Areas Established: Three solar access areas are hereby established: SA Area I, SA Area II, and SA Area III. The purpose of dividing the city into solar access areas is to provide maximum solar access protection for each area of the city consistent with planned densities, topography, and lot configurations and orientations.

(1) Solar Access Area I (RR-1, RR-2, RE, RL-1, and MH): SA Area I is designed to protect solar access principally for south yards, south walls, and rooftops in areas where, because of planned density, topography, or lot configurations or orientations, the preponderance of lots therein currently enjoy such access and where solar access of this nature would not unduly restrict permissible development. SA Area I includes all property in RR-1, RR-2, RE, RL-1, and MH zoning districts.

(2) Solar Access Area II (RL-2, RM, MU-1, MU-3, RMX, RH, and I): SA Area II is designed to protect solar access principally for rooftops in areas where, because of planned density, topography, or lot configuration or orientation, the preponderance of lots therein currently enjoy such access and where solar access of this nature would not unduly restrict permissible development. SA Area II includes all property in RL-2, RM, MU-1, MU-3, RMX, RH, and I zoning districts.

(3) Solar Access Area III - Permits - Other Zoning Districts: SA Area III includes areas where, because of planned densities, topography, or lot configurations or orientations, uniform solar access protection for south yards and walls or for rooftops may unduly restrict permissible development. Solar access protection in SA Area III is provided through permits. SA Area III initially includes property in all zoning districts other than those set forth in paragraph (c)(1) or (c)(2) of this section.

(d) Basic Solar Access Protection:

(1) Solar Fence: A solar fence is hereby hypothesized for each lot located in SA Area I and SA Area II. Each solar fence completely encloses the lot in question, and its foundation is contiguous with the lot lines. Such fence is vertical, opaque, and lacks any thickness.

(A) No person shall erect an object or structure on any other lot that would shade a protected lot's building envelope in SA Area I to a greater degree than the lot would be shaded by a solar fence twelve feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(B) No person shall erect an object or structure on any other lot that would shade a protected lot's building envelope in SA Area II to a greater degree than the lot would be shaded by a solar fence twenty-five feet in height, between two hours before and two hours after local solar noon on a clear winter solstice day.

(C) Solar fences are not hypothesized for lots located in SA Area III. Solar access protection in SA Area III is available under this section only through permits, as hereinafter provided.

(2) Height: Unless prohibited by another section of this title, nothing in this section prevents a structure in SA Area III from being erected up to a height of thirty-five feet if located within the allowed building envelope. However, unless an exception is granted pursuant to subsection (f) of this section, no such structure may exceed thirty-five feet in height if any such excess height would cause the structure to violate, or to increase the degree of violation of, the basic solar access protection provided for any lot in SA Area I or SA Area II.

(A) Nothing in this section shall be deemed to prevent the principal building on a lot in SA Area I or II from being erected within the building envelope up to the height of the solar fence in the area in which the structure is located.

(B) Each application for a development permit for a building of a height greater than allowed by this subsection shall:

(i) Include a graphic representation showing the shadows that would be cast by the proposed structure between two hours before and two hours after local solar noon on a clear winter solstice day;

(ii) The solar fences on all lots that the shadows would touch;

(iii) All possible obstructions of solar access protected by permit; and

(iv) Provide additional information as may be required by the city manager.

(3) Insubstantial Breaches and Existing Structures: Insubstantial breaches of the basic solar access protection or of the protection provided by a solar access permit are exempt from the application of this section. A structure in existence on the date of establishment of an applicable solar access area, or structures and vegetation in existence on the date of issuance of an applicable solar access permit, are exempt from the application of this section. For purposes of this section, structures are deemed to be in existence on the date of issuance of a development permit authorizing its construction.

(4) Temporary Solar Obstructions: Unavoidable temporary obstructions of protected solar access necessitated by construction activities or other necessary and lawful purposes are exempt to the

extent that they do not exceed ten days in any three month period and thirty days in any year.

(5) Solar Analysis: When a solar analysis is required for any review process, it shall be prepared in compliance with the methods described in materials provided by the city manager.

(e) Amendment of Solar Access Areas:

(1) Purpose: The planning board may amend solar access areas on its own motion or on petition of any person with a property interest in the subject area. A petitioner shall submit a list to the planning board of the names and addresses of all owners of property within and adjacent to the subject area and within one hundred feet to the north and sixty feet to the east and west of the subject area.

(2) Public Hearing and Notice Required: Before amending a solar access area, the planning board shall conduct a public hearing on the proposal. The board shall provide notice for the hearing pursuant to the requirements of section 9-4-3, "Public Notice Requirements," B.R.C. 1981.

(3) Review Criteria: A solar access area may be amended only after the planning board determines that one or more of the following conditions applies to the subject area:

(A) The subject area was established as a particular solar access area in error, and as currently established it is inconsistent with the purposes of the solar access areas;

(B) Permissible land uses and densities in the subject area are changing or should change to such a degree that it is in the public interest to amend the solar access area for the area; or

(C) Experience with application of this ordinance has demonstrated that:

(i) The level of solar access protection available in the subject area can be increased without significant interference with surrounding property; or

(ii) Application of the ordinance has unreasonable interference with use and enjoyment of real property in the subject area.

(4) Impact of Changes: When any area is amended from SA Area I to another solar access area or from SA Area II to SA Area III, any solar access beneficiary whose solar access is affected by such change may apply for a permit to provide solar access protection to

any solar energy system installed and in use on the date the change becomes effective.

(f) Exceptions:

(1) Purpose: Any person desiring to erect an object or structure or increase or add to any object or structure, in such a manner as to interfere with the basic solar access protection, may apply for an exception.

(2) Application Requirements: An applicant for an exception shall pay the application fee prescribed by subsection 4-20-33(b), B.R.C. 1981, and apply on a form furnished by the city manager that includes, without limitation:

(A) The applicant's name and address, the owner's name and address, and a legal description of the lot for which an exception is sought;

(B) Survey plats or other accurate drawings showing lot lines, structures, solar systems, dimensions and topography as necessary to establish the reduction of basic solar access protection expected on each lot that would be affected by the exception, together with a graphic representation of the shadows that would be cast by the proposed structure during the period from two hours before to two hours after local solar noon on a clear winter solstice day. The requirements of this subparagraph may be modified by the city manager, depending upon the nature of the exception sought;

(C) A list of all lots that may be affected by the exception, including the names and addresses of all owners of such lots;

(D) A statement and supporting information describing the reasons that less intrusive alternatives, if any, to the action that would be allowed by the exception cannot or should not be implemented; and

(E) A statement certifying that the proposed structure would not obstruct solar access protected by permit.

(3) Public Notice: The city manager shall provide public notice pursuant to section 9-4-3, "Public Notice Requirements," B.R.C. 1981.

(4) City Manager Action: The city manager may grant an exception of this section following the public notification period if:

(A) The applicant presents the manager with an affidavit of each owner of each affected lot declaring that such owner is familiar with the application and the effect the exception would

have on the owner's lot, and that the owner has no objection to the granting of the exception, and

(B) The manager determines that the application complies with the requirements in paragraph (f)(2) of this section, and

(C) The manager finds that each of the requirements of paragraph (f)(6) of this section has been met.

(5) Appeal of City Manager's Decision: The city manager's decision may be appealed to the BOZA pursuant to the procedures of section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. Public notification of the hearing shall be provided pursuant to section 9-4-3, "Public Notice Requirements," B.R.C. 1981. The sign posted shall remain posted until the conclusion of the hearing.

(6) Review Criteria: In order to grant an exception, the approving authority must find that each of the following requirements has been met:

(A) Because of basic solar access protection requirements and the land use regulations:

(i) Reasonable use cannot otherwise be made of the lot for which the exception is requested;

(ii) The part of the adjoining lot or lots that the proposed structure would shade is inherently unsuitable as a site for a solar energy system; or

(iii) Any shading would not significantly reduce the solar potential of the protected lot; and

(iv) Such situations have not been created by the applicant;

(B) Except for actions under subparagraphs (f)(6)(D), (f)(6)(E), and (f)(6)(F) of this section, the exception would be the minimal action that would afford relief in an economically feasible manner;

(C) The exception would cause the least interference possible with basic solar access protection for other lots;

(D) If the proposed structure is located in a historic district designated by the city council according to section 9-11-2, "City Council May Designate or Amend Landmarks and Historic Districts," B.R.C. 1981, and if it conformed with the requirements of this section, its roof design would be incompatible with the character of the development in the historic district;

(E) If part of a proposed roof which is to be reconstructed or added to would be incompatible with the design of the remaining parts of the existing roof so as to detract materially

from the character of the structure, provided that the roof otherwise conformed with the requirements of this section;

(F) If the proposed interference with basic solar access protection would be due to a solar energy system to be installed, such system could not be feasibly located elsewhere on the applicant's lot;

(G) If an existing solar system would be shaded as a result of the exception, the beneficiary of that system would nevertheless still be able to make reasonable use of it for its intended purpose;

(H) The exception would not cause more than an insubstantial breach of solar access protected by permit as defined in paragraph (d)(3) of this section; and

(I) All other requirements for the issuance of an exception have been met. The applicant bears the burden of proof with respect to all issues of fact.

(7) Conditions of Approval: The approving authority may grant exceptions subject to such terms and conditions as the authority finds just and equitable to assist persons whose protected solar access is diminished by the exception. Such terms and conditions may include a requirement that the applicant for an exception take actions to remove obstructions or otherwise increase solar access for any person whose protected solar access is adversely affected by granting the exception.

(8) Planning Board: Notwithstanding any other provisions of this subsection, if the applicant has a development application submitted for review that is to be heard by the planning board and that would require an exception, the planning board shall act in place of the BOZA, with authority to grant exceptions concurrent with other actions on the application, pursuant to the procedures and criteria of this section.

(g) Solar Siting:

(1) Siting Requirements: For purposes of insuring the potential for utilization of solar energy in the city, all planned unit developments and subdivisions shall be designed and constructed in compliance with the following solar siting requirements:

(A) All residential units in Solar Access Areas I, II, and III have a roof surface that meets all of the following criteria:

(i) Is oriented within thirty degrees of a true east-west direction;

(ii) Is flat or not sloped towards true north;

(iii) Is physically and structurally capable of supporting at least seventy-five square feet of un-shaded solar collectors for each individual dwelling unit in the building; and

(iv) Has unimpeded solar access under either the provisions of this section or through easements, covenants, or other private agreements among affected landowners that the city manager finds are adequate to protect continued solar access for such roof surface;

(B) Each residential unit in Solar Access Area I has an exterior wall surface that meets all of the following criteria:

(i) Is oriented within thirty degrees of a true east-west direction;

(ii) Is located on the southernmost side of the unit; and

(iii) Is immediately adjacent to a heated space;

(C) Each nonresidential building with an anticipated hot water demand of one thousand or more gallons a day has a roof surface that meets all of the following criteria:

(i) Is flat or oriented within thirty degrees of a true east-west direction;

(ii) Is physically and structurally capable of supporting a solar collector or collectors capable of providing at least one-half of the anticipated hot water needs of the building; and

(iii) Has unimpeded solar access under either the provisions of this section or through easements, covenants, or other private agreements among affected landowners that the city manager finds are adequate to protect continued solar access for such roof surface;

(2) Waivers: Upon request of any applicant for a building permit or a subdivision or planned unit development approval, the approving authority may waive such of the requirements of this paragraph as it deems appropriate if it finds that any of the following criteria are met:

(A) Any structure or structures subject to the requirements of this paragraph are designed and intended to be unheated;

(B) Topographic features, land slope, shading by objects, structures, or vegetation outside the control of the applicant, or the nature of surrounding development or circulation patterns when combined with the requirements of this paragraph:

(i) Makes use of solar energy not feasible in some or all of the structures to be erected;

(ii) Will result in a substantial decrease in the density of land use in the subdivision or planned unit development;

(iii) Will result in an increase in transportation or other energy use that substantially outweighs the potential for increased solar energy use created by adherence to these requirements; or

(iv) Will be inconsistent with the floodplain management requirements of section 9-3-2, "Floodplains," B.R.C. 1981;

(C) Substantial planning, design, or other preliminary expenditures have been incurred by the applicant prior to July 1, 1982, and adherence to the standards of this paragraph would work an undue hardship on the applicant; or

(D) The applicant's proposal incorporates the following additional energy resource and conservation option points in excess of the requirements of subsection 10-5.5-2(y), "Resource Conservation – Green Points," B.R.C. 1981:

(i) 2 points - to qualify for a waiver of the requirement of subparagraph (g)(1)(A) of this section;

(ii) 3 points - to qualify for a waiver of the requirement of subparagraph (g)(1)(B) of this section; and

(iii) The city manager finds that adequate protection for any solar energy systems to be installed is provided either under the provisions of this section, or through covenants, easements, or other agreements among affected landowners.

(h) Solar Access Permits:

(1) Purpose of Solar Access Permit: In order to promote opportunities for the use of solar energy and where basic solar access protection established by this section is inadequate to protect potential solar energy users, or to insure maximum utilization of solar energy resources consistent with reasonable use of surrounding property, persons may obtain permits under this section. Beneficial use is the limit and measure of any right conferred by permit and no permit shall restrict use of other property beyond the extent reasonable to insure efficient and economical beneficial use of solar energy by the permittee. Further, no permit shall restrict the reasonable use and enjoyment of adjacent properties.

(2) Eligibility Standards: Any owner or possessor of property who has installed a solar energy system or who intends to install such

a system within a year from the date of application may apply for a permit if:

(A) The lot for which a permit is requested is included in SA Area III;

(B) The system that has been or will be installed is capable of applying to beneficial use substantial amounts of solar energy outside the hours of the day during which basic protection is provided for under this section;

(C) A solar energy system is in existence on the lot or is planned to be built within a year and the lot is changed from SA Area I to another solar access area or is changed from SA Area II to SA AREA III, resulting in a diminution or elimination of protection previously afforded the user or potential user of the solar energy system;

(D) A new structure is built on a lot in SA Area I or SA Area II after the effective date of this section whose locations renders the basic solar access protection inadequate, and the structure could not reasonably have been constructed at a location where it would have substantially benefited from the basic solar access protection provided by this section; or

(E) The applicant demonstrates that there are substantial technical, legal, or economic factors that render it infeasible to collect a reasonable amount of solar energy by utilizing the basic solar access protection available under this section without a permit. Such factors include, without limitation, structural characteristics of the applicant's building that limit possibilities for economical retrofit of a solar energy system or shading by objects, structures, or vegetation that are beyond the applicant's control and are exempt from the requirements of this section.

(3) Application Requirements: An applicant for a permit shall pay the fee prescribed by subsection 4-20-33(a), B.R.C. 1981, and complete an application in writing on a form furnished by the city manager that includes, without limitation:

(A) The applicant's name and address, the owner's name and address, and a legal description of the lot where the solar energy system is located or will be located;

(B) A statement by the applicant that the solar energy system is already installed or that the applicant intends to install such a system on the lot within one year of the issuance of the permit;

(C) A description of the existing or proposed size and location of the system, its orientation with respect to south, and its elevation and orientation from the horizontal;

(D) A statement describing the beneficial use to which solar energy is or will be applied and certifying the energy capacity of the system in BTUs or BTU equivalents and its reasonable life expectancy;

(E) A statement and accurate drawings describing the access protection desired beyond the basic solar access protection provided by this section, specifying the hours of the day, seasons of the year, and locations on the applicant's lot for which protection is desired;

(F) A description of all existing vegetation, objects, and structures wherever located that will or may in the future shade the solar energy system, together with a map or drawing showing their location to the extent possible;

(G) Information showing that the applicant has done everything reasonable in designing and locating the system so as to minimize the impact it will have on use and development on nearby land;

(H) Survey plats or other accurate drawings showing lot lines, dimensions, and topography of the lot on which the solar energy system is or will be located and all surrounding properties that are intended to be subject to the permit; and

(I) A list of all lots that may be affected by the permit, including the names and addresses of all owners of such lots.

(4) Public Notice: The city manager shall provide public notification pursuant to the requirements of section 9-4-3, "Public Notice Requirements," B.R.C. 1981.

(5) Permit Issuance: The city manager shall issue a solar access permit and may impose additional conditions or restrictions as the manager deems appropriate if the application complies with the requirements of paragraph (h)(7) of this section.

(6) Appeal of City Manager's Decision: The city manager's decision may be appealed to the BOZA pursuant to the procedures of section 9-4-4, "Appeals, Call-Ups and Public Hearings," B.R.C. 1981. Public notification of the hearing shall be provided pursuant to section 9-4-3, "Public Notice Requirements," B.R.C. 1981.

(7) Permit Requirements: In order to issue a permit, the approving authority must find that each of the following requirements has been met:

(A) The applicant meets at least one of the eligibility standards of paragraph (h)(2) of this section;

(B) The applicant has done everything reasonable in designing and locating the proposed solar energy system to minimize the impact it will have on use and development of nearby land. However, the fact that an alternate design or site may be more expensive does not necessarily establish that the applicant's failure to select that alternate design or site is reasonable. In making this finding, the board or the city manager may consider whether the additional cost of alternative, less intrusive sites or solar energy systems, if any, would exceed the difference between the adverse effects, if any, imposed on other lots by the proposed site and solar energy system and the adverse effects, if any, that would be imposed on other lots by alternative sites or solar energy systems;

(C) Issuance of the permit is consistent with reasonable use and enjoyment of nearby land, excluding landscaping considerations. Issuance of the permit will be presumed not to be consistent with reasonable use and enjoyment of nearby land if issuance would prevent any affected property owner from erecting, consistent with legal requirements, a structure of a size, character, and usefulness reasonably typical of those in existence on similar lots subject to the same zoning requirements located within one-fifth mile of the lot in question. However, nothing in this subsection prohibits issuance of a permit only because it would impose requirements on a neighboring lot owner that are more restrictive than the height or setback requirements that would otherwise apply, if reasonable use and enjoyment of such lot is preserved; and

(D) Issuance of the permit is consistent with reasonable landscaping of nearby land. In determining consistency, the board shall consider the need for any additional landscaping in the future, including any energy conservation value that such landscaping may have.

(8) Conditions of Approval: The board may grant permits subject to such terms and conditions as it finds just and equitable.

(9) Records: The city manager shall maintain complete records of all permits that have been issued and shall make them readily available for public inspection.

(10) Expiration of Permit: A solar access permit expires if:

(A) A functioning system is not installed within a year after the issuance of the permit;

(B) The solar energy system protected by the permit has not functioned to fulfill its intended purpose for a continuous period of two or more years; or

(C) The term established under paragraph (h)(11) of this section expires.

(11) Term of Solar Energy System: The city manager or the BOZA shall specify the term of each solar access permit, which shall be for the reasonable life expectancy of the particular solar energy system, as determined by the manager or the board. At the expiration of a permit, it may be renewed in the same manner as new permits are issued.

(12) Renewal of Permit: If no functioning solar energy system is installed within a year of the issuance of the permit, the city manager may grant a renewal of up to one additional year to the holder of the expired permit if the permittee demonstrates that the permittee has exercised due diligence in attempting to install the system.

(13) Enforcement: A solar access permit is enforceable by the beneficiary, if and only if the beneficiary has properly recorded the permit in the real property records of the Boulder County Clerk and Recorder with respect to each affected lot in such a manner that it could be detected through customary title search.

(A) On sale, lease, or transfer of the lot on which the protected solar system is located, the right to enforce its terms passes to the beneficial user of the system.

(B) No property owner shall be requested to remedy vegetative shading unless a protected solar system is installed and functioning.

(14) Impacts of Vegetation on an Issued Permit: Upon application of a beneficiary to the BOZA, vegetative shading may be remedied to the extent necessary to comply with the terms specified in a solar access permit. However, no vegetation in the ground and growing at the time the permit application is filed may be ordered removed or trimmed. After notice to at least the beneficiary and the vegetation owner, the board shall hold a hearing and, based on evidence submitted by any interested party, may issue any necessary order and specify the time in which actions thereunder must be performed. Absent unusual circumstances, the cost of remedying shading from vegetation not in the ground and growing at the time the permit application is filed shall be borne by the vegetation owner. If an owner or possessor of real property who receives an order to remedy

vegetative shading fails to comply within the specified time, the city manager may order the condition remedied and charge the actual cost thereof to the person to whom the order is directed, who shall pay the bill. If any person fails or refuses to pay when due any charge imposed under this subsection, the manager may, in addition to taking other collection remedies, certify due and unpaid charges to the Boulder County Treasurer for collection as provided in section 2-2-12, "City Manager May Certify Taxes, Charges, and Assessments to County Treasurer for Collection," B.R.C. 1981.

(i) Authority to Issue Regulations: The city manager and the BOZA are each authorized to adopt rules and regulations necessary in order to interpret or implement the provisions of this section that each administers.
Ordinance Nos. 7484 (2006); 7522 (2007); 7535 (2007)

Solar Access

In response to the diminishing supply and increasing cost of conventional energy resources, the City of Boulder enacted an ordinance to protect the use of solar energy. The ordinance guarantees access to sunlight for homeowners and renters in the city. This is done by setting limits on the amount of permitted shading by new construction and requiring that new buildings be sited to provide good solar access.

The degree of solar access protection is defined by either a 12 foot or 25 foot hypothetical "solar fence" on the property lines of the protected buildings. The ordinance is designed to protect access for a four hour period on December 21st. Under most circumstances, new structures will not be allowed to shade adjacent lots to a greater extent than the applicable solar fence.

There are three Solar Access Areas in the City of Boulder. Following is a list of zoning districts and which solar access area they fall into:

Solar Access Area I

Lots are protected by a 12 foot “solar fence” as mentioned above. These lots are in RR-1, RR-2, RE, RL-1 and MH zoning districts.

Solar Access Area II

Lots are protected by a 25 foot “solar fence”. These lots are in RL-2, RM, MU-1, MU-3, RMX, RH, and I zoning districts.

Solar Access Area III

All other zoning districts are in Solar AccessAreaIII and are protected through the solar permit process

A solar access permit is available to those who have installed or who plan to install a solar energy system and need more protection than is provided automatically in Solar Access Areas I and II. The permit application must include detailed information describing the solar energy system, existing structures and vegetation on adjacent properties and the location and dimensions of the solar easement requested. Solar access permits do not affect vegetation which exists at the time of permit application submittal. Solar access permit application forms are available from the City Department of Planning and Community Development. The Board of Zoning Adjustment will review applications and award permits.

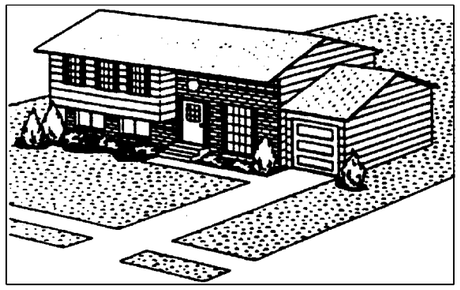
Members of the City of Boulder planning staff are available to answer questions regarding solar access and will be responsible for assuring that all plans are in compliance with the ordinance.

Compliance

When applying for a building permit, an adjusted shadow analysis must be submitted to Inspection Services. Identifying the height and orientation of the proposed building and the slope of the land, the shadow that it will cast on the 21st of December between 10 a.m. and 2 p.m. can be approximated. Complete the following steps and submit the results with the building permit application:

1. *Draw the proposed site plan.* The solar access site plan should be drawn to a scale of measurement (preferably 1:10) and show existing improvements, and the proposed building or addition, property lines, and a north arrow.

2. *Determine the height of the shadow casting portion of the roof.* Label the height of corners and peaks of the proposed roof structure on the site plan.



House to be analyzed below

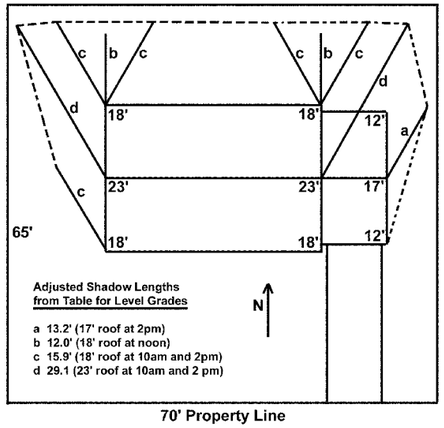


Figure 1. Simplified Shadow Analysis for House in Solar Access Area 1 (Illustration only—not to scale)

Table 1. Adjusted Solar Shadow Lengths for Level Grades

Solar Access Area I				*Solar Access Area II*			
Bldg Ht	Length of Shadow 10am	Noon	2pm	Bldg Ht	Length of Shadow 10am	Noon	2pm
13'	2.6'	2.0'	2.6'	26'	2.6'	2.0'	2.6'
14'	5.3'	4.0'	5.3'	27'	5.3'	4.0'	5.3'
15'	7.9'	6.0'	7.9'	28'	7.9'	6.0'	7.9'
16'	10.6'	8.0'	10.6'	29'	10.6'	8.0'	10.6'
17'	13.2'	10.0'	13.2'	30'	13.2'	10.0'	13.2'
18'	15.9'	12.0'	15.9'	31'	15.9'	12.0'	15.9'
19'	18.5'	14.0'	18.5'	32'	18.5'	14.0'	18.5'
20'	21.2'	16.0'	21.2'	33'	21.2'	16.0'	21.2'
21'	23.8'	18.0'	23.8'	34'	23.8'	18.0'	23.8'
22'	26.5'	20.0'	26.5'	35'	26.5'	20.0'	26.5'
23'	29.1'	22.0'	29.1'	36'	29.1'	22.0'	29.1'
24'	31.8'	24.0'	31.8'	37'	31.8'	24.0'	31.8'
25'	34.4'	26.0'	34.4'	38'	34.4'	26.0'	34.4'
26'	37.0'	28.0'	37.0'	39'	37.0'	28.0'	37.0'
27'	39.7'	30.0'	39.7'	40'	39.7'	30.0'	39.7'
28'	42.3'	32.0'	42.3'	41'	42.3'	32.0'	42.3'
29'	45.0'	33.9'	45.0'	42'	45.0'	33.9'	45.0'
30'	47.6'	35.9'	47.6'	43'	47.6'	35.9'	47.6'
31'	50.3'	37.9'	50.3'	44'	50.3'	37.9'	50.3'
32'	52.9'	39.9'	52.9'	45'	52.9'	39.9'	52.9'
33'	55.6'	41.9'	55.6'	46'	55.6'	41.9'	55.6'
34'	58.2'	43.9'	58.2'	47'	58.2'	43.9'	58.2'
35'	60.9'	45.9'	60.9'	48'	60.9'	45.9'	60.9'
				49'	63.5'	47.9'	63.5'
				50'	66.2'	49.9'	66.2'
				51'	68.8'	51.9'	68.8'
				52'	71.5'	53.9'	71.5'
				53'	74.1'	55.9'	74.1'
				54'	76.7'	57.9'	76.7'
				55'	79.4'	59.9'	79.4'

3. *Draw the approximate shadow cast by the proposed structure.* If your building is on a level lot and if the adjacent property to the north, east and west is part of the same solar access area, use Table 1 to check that your building's shadow is in compliance with the ordinance. Use the shadow pattern illustrated in Figure 1 as an example. Noon shadow lengths are projected directly north. Draw the 10:00 a.m. and 2:00 p.m. shadows at 30 degrees west of north and 30 degrees east of north. After the shadow lines have been drawn, connect the outer band of points to determine the four hour shadow pattern.

Note: If your proposed structure is not located on a level lot, please contact the Planning Department for information on adjusting actual shadow lengths for changes in grade.

4. *If the shadow cast is entirely within your property lines, the proposed building or addition is in compliance.*

5. *If the adjusted shadows cast by the proposed structure do not fall within your property lines, redesign your project or prepare a shadow analysis based on the actual shadows cast by the proposed structure.* An actual shadow analysis illustrates the true impact of all proposed shading on adjacent properties, and is required to demonstrate that the portion of the shadow which exceeds the solar fence falls within an exempt area. An actual analysis is also required as part of an application for an administrative or a board level solar exception. Apply shadow lengths listed in Table 2 to prepare an actual solar analysis.

Table 2. Actual Shadow Lengths On December 21 Solar Shadow Analysis Table for Level Grades

Bldg. Ht.	Length of Shadow 10 am	Noon	2 pm
10'	26.5'	20.0'	26.5'
11'	29.1'	22.0'	29.1'
12'	31.8'	24.0'	31.8'
13'	34.4'	26.0'	34.4'
14'	37.0'	28.0'	37.0'
15'	39.7'	30.0'	39.7'
16'	42.3'	32.0'	42.3'
17'	45.0'	34.0'	45.0'
18'	47.6'	36.0'	47.6'
19'	50.3'	38.0'	50.3'
20'	52.9'	40.0'	52.9'
21'	55.6'	42.0'	55.6'
22'	58.2'	44.0'	58.2'
23'	60.9'	46.0'	60.9'
24'	63.5'	48.0'	63.5'
25'	66.2'	50.0'	66.2'
26'	68.8'	52.0'	68.8'
27'	71.5'	54.0'	71.5'
28'	74.1'	56.0'	74.1'
29'	76.7'	58.0'	76.7'
30'	79.4'	60.0'	79.4'
31'	82.0'	62.0'	82.0'
32'	84.7'	64.0'	84.7'
33'	87.3'	66.0'	87.3'
34'	89.9'	68.0'	89.9'
35'	92.6'	71.0'	92.6'
36'	95.3'	72.0'	95.3'
37'	97.9'	74.0'	97.9'
38'	100.6'	76.0'	100.6'
39'	103.2'	78.0'	103.2'
40'	105.9'	80.0'	105.9'
41'	108.5'	82.0'	108.5'
42'	111.1'	84.0'	111.1'
43'	113.8'	86.0'	113.8'
44'	116.4'	88.0'	116.4'
45'	119.1'	90.0'	119.1'
46'	121.7'	92.0'	121.7'
47'	124.4'	94.0'	124.4'
48'	127.0'	96.0'	127.0'
49'	129.7'	98.0'	129.7'
50'	132.3'	100.0'	132.3'
51'	135.0'	102.0'	135.0'
52'	137.6'	104.0'	137.6'
53'	140.3'	106.0'	140.3'
54'	142.9'	108.0'	142.9'
55'	145.6'	110.0'	145.6'

Solar Exemptions

In certain circumstances, if the proposed structure shades an adjacent lot more than shades cast by the solar fence, the structure may still be in compliance. Compliance may be demonstrated through completion of an actual shadow analysis.

1. If an adjacent property is already shaded by existing buildings, mountains or other permanent objects (not including vegetation such as trees), you can build anything which does not add to those existing shadows.
2. If the proposed building or addition would shade part of an adjacent property which is outside the building envelope, the building or addition is exempt from the provisions of the solar ordinance.
3. A minimal amount of shading, as outlined in the solar ordinance, may qualify for an exemption and is not prohibited.

Solar Exception

If your plans actual shadows shade the building envelope of an adjacent property greater than the shadow cast by the solar fence, your options are to redesign your project or apply for a solar exception. Administrative exceptions can be considered if the owners of impacted lots have no objection, and the application complies with the criteria for exception found in section 9-9-17(f) Boulder Revised Code 1981.

A public hearing before the Board of Zoning Adjustment will be required when either the affected property owner objects to the increased shading or staff finds the proposal does not meet the criteria for a solar exception. Applications for an administrative exception or an exception from the Board of Zoning Adjustment are available from the Planning Department.

Solar Siting in New Construction

The ordinance sets standards for the siting of new development. It requires that all units in new developments which will not incorporate solar features include to the maximum extent possible:

1. long axis within 30 degrees of east-west;
2. roofs which are physically and structurally capable of supporting at least 75 square feet of solar collectors per dwelling unit; and
3. unimpeded solar access through the provisions of this ordinance or through private covenants.

Non-residential buildings have similar requirements for siting. Figure 2 is an example of a small project where 100% of the units are sited in accordance with the provisions of this ordinance.

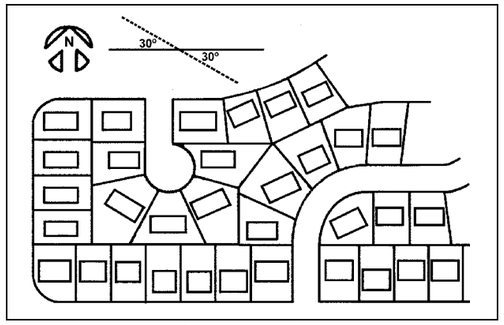
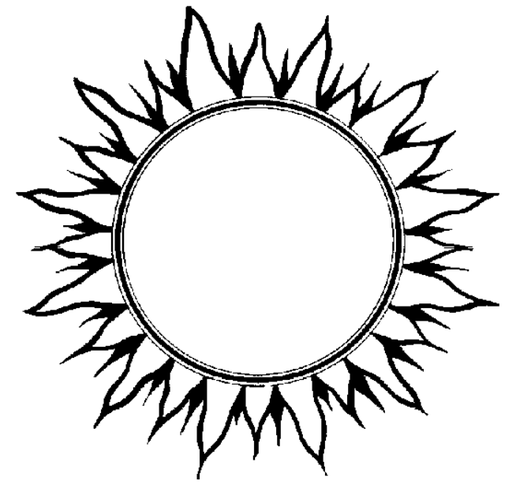


Figure 2. Typical Subdivision Site Plan

The planning staff or the Planning Board may waive the solar siting requirement for reasons of topography or lot configuration; substantial planning and design expenditures incurred before ordinance passage; or reduction in other aspects of energy efficient site planning. The incorporation of solar energy systems or other renewable energy sources may also be viable alternatives to the solar siting requirements.

If you have any questions or would like more information about the requirements of the solar access ordinance, please contact the City of Boulder Planning and Development Services Department at 303-441-1880. Also, the complete ordinance is available on the City website at: www.boulderplandevelop.net

Solar Access Guide



or Solar Shadow Analysis

City of Boulder
Building Services Center
P.O. Box 791, 1739 Broadway, Third Floor
Boulder, CO 80306
Phone 303-441-1880 • Fax 303-441-3241
Website www.boulderplandevelop.net
Revised Aug. 2006, 815.pdf

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1017 SOLAR ACCESS ORDINANCE FOR NEW DEVELOPMENT (3/24/05)

1017.01 PURPOSE

The purposes of the solar access ordinance for new development are to ensure that land is divided so that structures can be oriented to maximize solar access and to minimize shade on adjoining properties from structures and trees.

1017.02 APPLICATION OF SECTION (3/24/05)

The solar design standard in Subsection 1017.04 shall apply to applications for a development to create lots in VR-4/5, VR-5/7, R-5, R-7, R-8.5, R-10, R-15, R-20, and R-30 zones and for dwellings in any zone, except to the extent the Planning Director finds the applicant has shown that one or more of the conditions listed in Subsections 1017.05 and 1017.06 exist, and exemptions or adjustments provided for therein are warranted. (3/24/05)

1017.03 DEFINITIONS

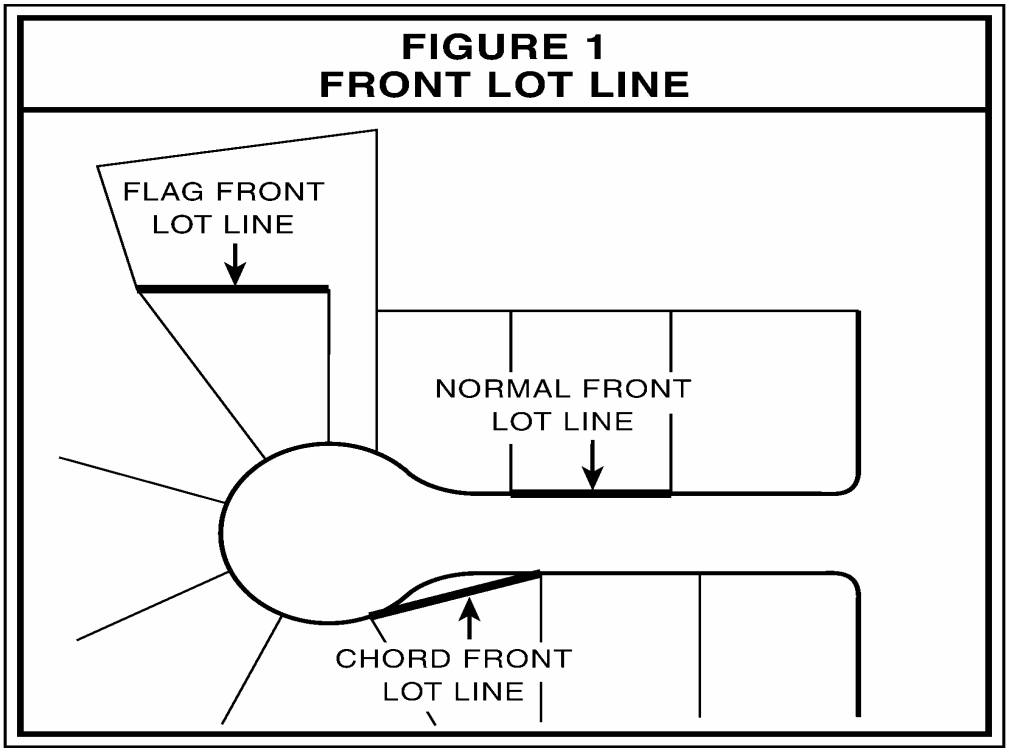
Words and terms used in Sections 1017, 1018, and 1019 are defined as follows:

A. CROWN COVER: The area within the drip line or perimeter of the foliage of a tree.

B. DEVELOPMENT: Any short plat, partition, subdivision, or planned unit development created under the County's land division or zoning regulations.

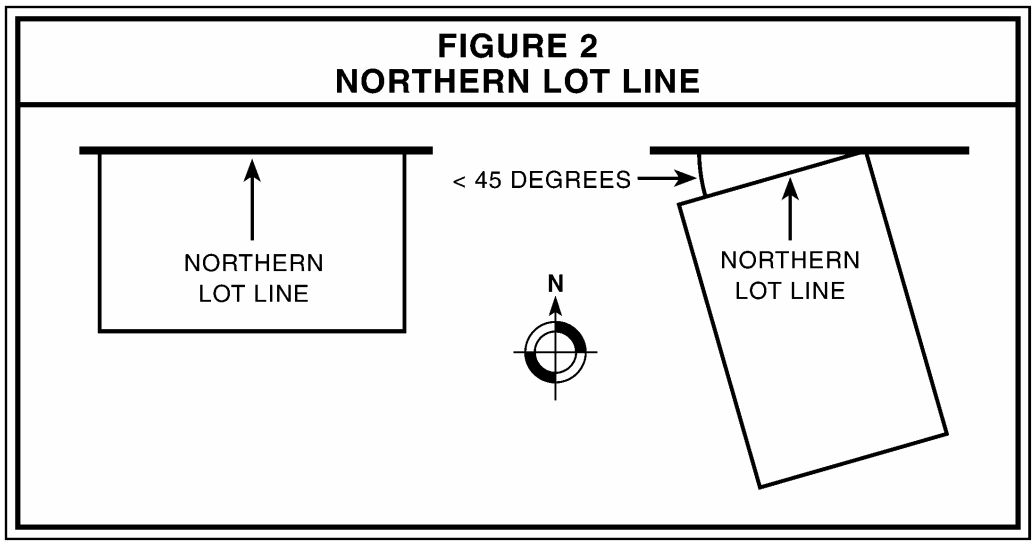
C. EXEMPT TREE OR VEGETATION: The full height and breadth of vegetation that the Planning Director has identified as "solar friendly"; and any vegetation listed as exempt on a plat map, a document recorded with the plat, or a solar access permit.

D. FRONT LOT LINE: For the purposes of the solar access regulations, a lot line abutting a street. For corner lots, the front lot line is that with the narrowest frontage. When the lot line abutting a street is curved, the front lot line is the chord or straight line connecting the ends of the curve. For a flag lot, the front lot line is the lot line that is most parallel to and closest to the street, excluding the pole portion of the flag lot (see Figure 1).



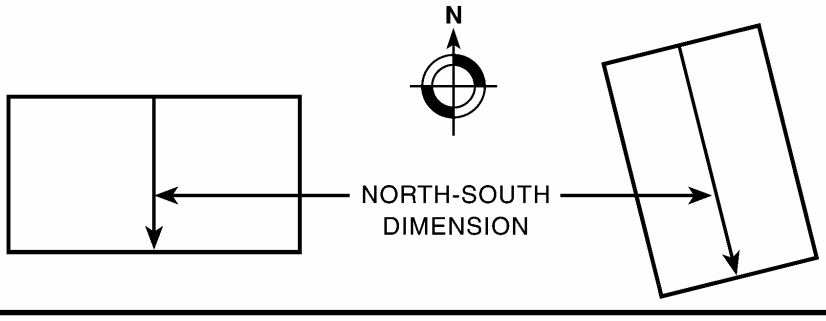
E. NONEXEMPT TREE OR VEGETATION: Vegetation that is not exempt.

F. NORTHERN LOT LINE: The lot line that is the smallest angle from a line drawn east-west and intersecting the northernmost point of the lot, excluding the pole portion of a flag lot. If the north line adjoins an undevelopable area other than a required yard area, the northern lot line shall be at the north edge of such undevelopable area. If two lot lines have an identical angle relative to a line drawn east-west, the northern lot line shall be a line 10 feet in length within the lot parallel with and at a maximum distance from the front lot line.



G. NORTH-SOUTH DIMENSION: The length of a line beginning at the midpoint of the northern lot line and extending in a southerly direction perpendicular to the northern lot line until it reaches a property boundary (see Figure 3).

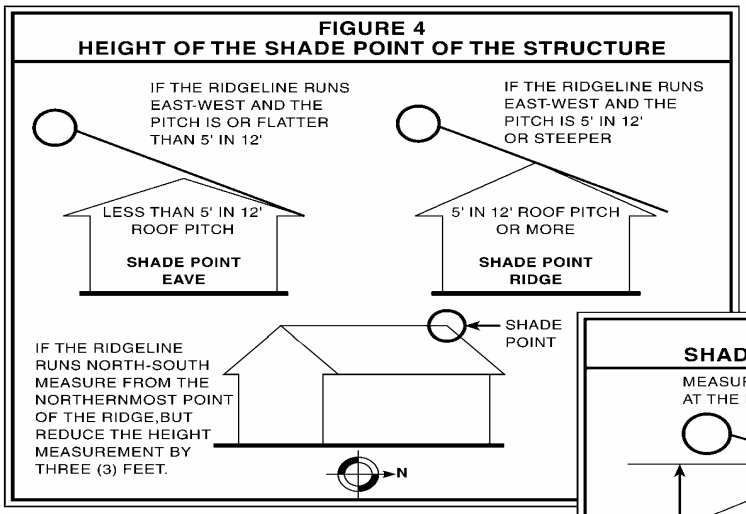
FIGURE 3
NORTH-SOUTH DIMENSION OF THE LOT

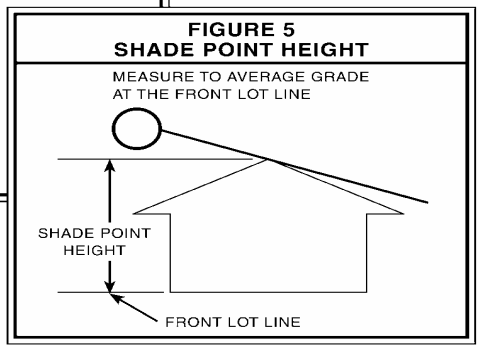


H. PROTECTED SOLAR BUILDING LINE: A line on a plat or map recorded with the plat that identifies the location on a lot where a point two feet above may not be shaded by structures or nonexempt trees (see Figure 10).

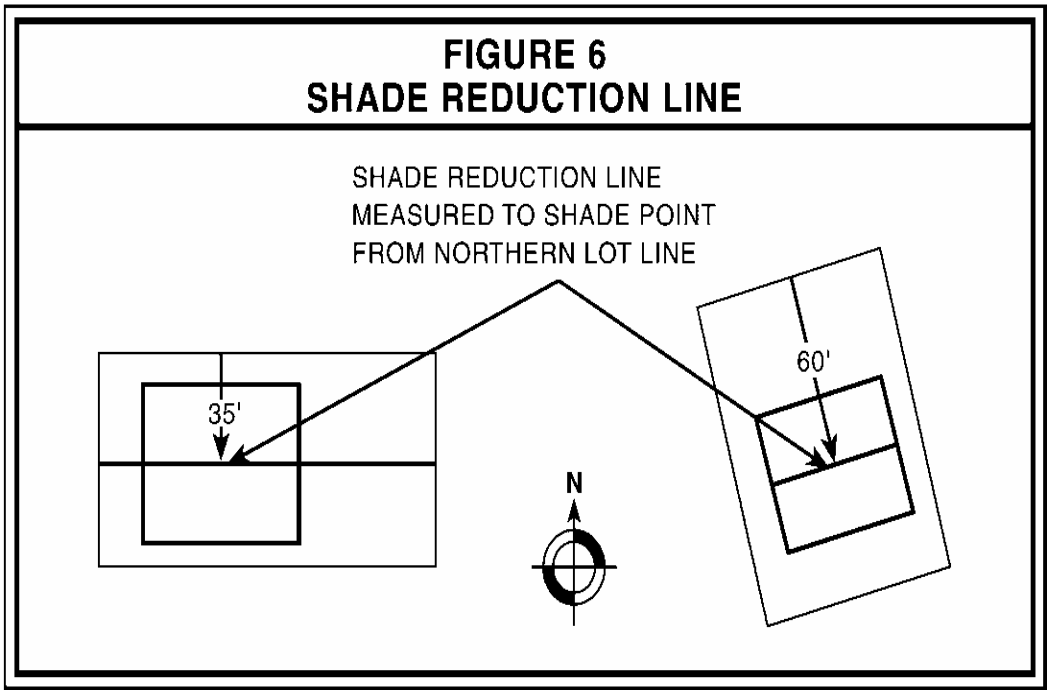
I. SHADE: A shadow cast by the shade point of a structure or vegetation when the sun is at an altitude of 21.3 degrees and an azimuth ranging from 22.7 degrees east and west of true south.

J. SHADE POINT: The part of a structure or nonexempt tree that casts the longest shadow onto the adjacent northern lot(s) when the sun is at an altitude of 21.3 degrees and an azimuth ranging from 22.7 degrees east and west of true south, except a shadow cause by a narrow object such as a mast or whip antenna, a dish antenna with a diameter of 3 feet or less, a chimney, utility pole, or wire. The height of the shade point shall be measured from the shade point to either the average elevation at the front lot line or the elevation at the midpoint of the front lot line. If the shade point is located at the north end of a ridgeline of a structure oriented within 45 degrees of a true north-south line, the shade point height computed according to the preceding sentence may be reduced by 3 feet. If a structure has a roof oriented within 45 degrees of a true east-west line with a pitch that is flatter than 5 feet (vertical) in 12 feet (horizontal), the shade point will be the eaves of the roof. If such a roof has a pitch that is 5 feet in 12 feet or steeper, the shade point will be the peak of the roof (see Figures 4 and 5).





K. SHADE REDUCTION LINE: A line drawn parallel to the northern lot line that intersects the shade point (see Figure 6).



L. SHADOW PATTERN: A graphic representation of an area that would be shaded by the shade point of a structure or vegetation when the sun is at an altitude of 21.3 degrees and an azimuth ranging between 22.7 degrees east and west of true south (see Figure 12).

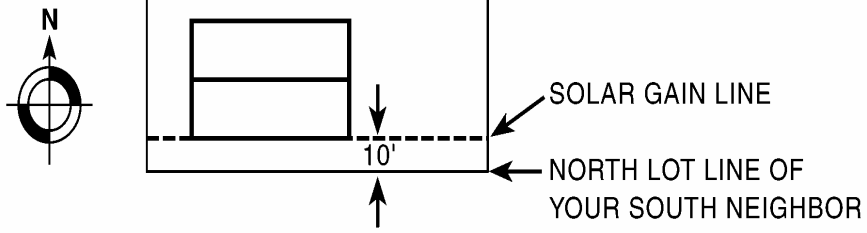
M. SOLAR ACCESS HEIGHT LIMIT: A series of contour lines establishing the maximum permitted height for nonexempt vegetation on lots affected by a Solar Access Permit (see Figure 11).

N. SOLAR ACCESS PERMIT: A document issued by the County that describes the maximum height that nonexempt vegetation is allowed to grow on lots to which a solar access permit applies.

O. SOLAR FEATURE: A device or combination of devices or elements that use or will use direct sunlight as a source of energy for such purposes as heating or cooling a structure, heating or pumping water, or generating electricity. Examples of a solar feature include a solar greenhouse, a solar hot water heater, or a window that contains at least 20 square feet of glazing oriented within 45 degrees east and west of true south. A solar feature may be used for purposes in addition to collecting solar energy, including but not limited to serving as a structural member or part of a roof, wall, or window. A south-facing wall without windows and without other features that use solar energy is not a solar feature for purposes of this ordinance.

P. SOLAR GAIN LINE: A line parallel to the northern property line(s) of the lot(s) south of and adjoining a given lot, including lots separated only by a street, that intersects the solar feature on that lot.

FIGURE 7
SOLAR GAIN LINE



Q. SOUTH OR SOUTH-FACING: True south, or 20 degrees east of magnetic south.

R. SUNCHART: One or more photographs that plot the position of the sun between 10:30 a.m. and 1:30 p.m. on January 21, prepared pursuant to guidelines issued by the Planning Director (?). The sunchart shall show the southern skyline through a transparent grid on which is imposed solar altitude for a 45-degree and 30-minute northern latitude in 10-degree increments and solar azimuth from true south in 15-degree increments.

S. UNDEVELOPABLE AREA: An area that cannot be used practicably for a habitable structure because of natural conditions, such as slopes exceeding 20 percent in a direction greater than 45 degrees east or west of true south, severe topographic relief, water bodies, or conditions that isolate one portion of a property from another portion so that access is not practicable to the unbuildable portion; or man-made conditions, such as existing development which isolates a portion of the site and prevents its further development; setbacks or development restrictions that prohibit development of a given area of a lot by law or private agreement; or existence or absence of easements or access rights that prevent development of a given area.

1017.04 DESIGN STANDARD

At least 80 percent of the lots in a development subject to this ordinance shall comply with one or more of the options in this subsection.

A. Basic Requirement: (See Figure 9). A lot complies with Subsection 1017.04 if it

1. Has a north-south dimension of 90 feet or more; and

FIGURE 9
SOLAR LOT OPTION 1: BASIC REQUIREMENTS

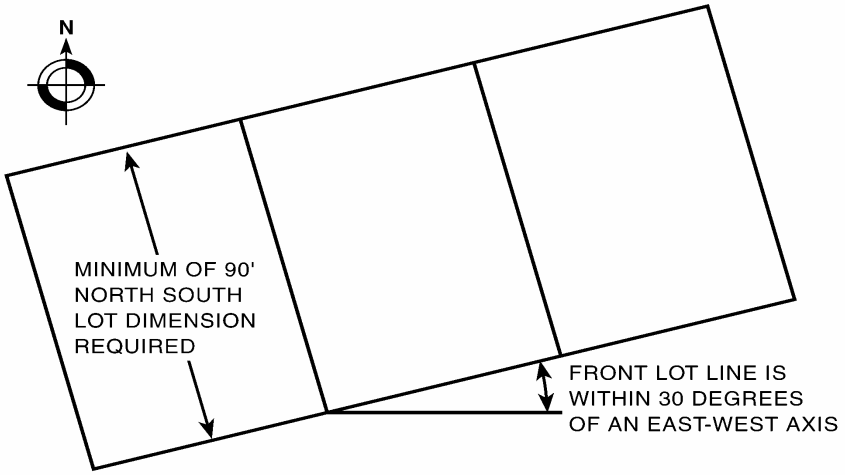
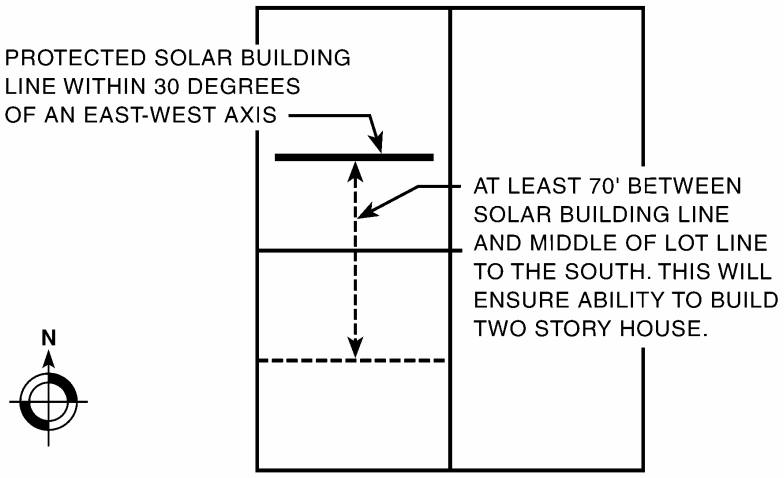


FIGURE 10
SOLAR LOT OPTION 2: PROTECTED SOLAR BUILDING LINE



2. Has a front lot line that is oriented within 30 degrees of a true east-west axis.

B. Protected Solar Building Line Option: (See Figure 10). In the alternative, a lot complies with Subsection 1017.04 if a solar building line is used to protect solar access as follows:

1. A protected solar building line for the lot to the north is designated on the plat or documents recorded with the plat; and

2. The protected solar building line for the lot to the north is oriented within 30 degrees of a true east-west axis; and

3. There is at least 70 feet between the protected solar building line on the lot to the north and the middle of the north-south dimension of the lot to the south, measured along a line perpendicular to the protected solar building line; and

4. There is at least 45 feet between the protected solar building line and the northern edge of the buildable area of the lot, or habitable structures are situated so that at least 80 percent of their south-facing wall will not be shaded by structures or nonexempt vegetation.

C. Performance Option: In the alternative, a lot complies with Subsection 1017.04 if:

1. Habitable structures built on that lot will have their long axis oriented within 30 degrees of a true east-west axis and at least 80 percent of their ground floor south wall protected from the shade of structures and nonexempt trees; or

2. Habitable structures built on that lot will have at least 32 percent of their glazing and 500 square feet of their roof area facing within 30 degrees of south and protected from the shade of structures and nonexempt trees.

1017.05 EXEMPTIONS FROM DESIGN STANDARD

A development is exempt from Subsection 1017.04 if the Planning Director finds the applicant has shown that one or more of the following conditions apply to the site. A development is partially exempt from Subsection 1017.04 to the extent the Planning Director finds the applicant has shown that one or more of the following conditions apply to a corresponding portion of the site.

If a partial exemption is granted for a given development, the remainder of the development shall comply with Subsection 1017.04.

A. Slopes: The site, or a portion of the site for which the exemption is sought, is sloped 20 percent or more in a direction greater than 45 degrees east or west of true south, based on a topographic survey by a licensed professional land surveyor.

B. Off-site Shade: The site, or a portion of the site for which the exemption is sought, is within the shadow of off-site features such as, but not limited to, structures, topography, or nonexempt vegetation, which will remain after development occurs on the site from which the shade is originating.

   1. Shade from an existing or approved off-site dwelling in a single family residential zone and from topographic features is assumed to remain after development of the site.

   2. Shade from an off-site structure in a zone other than a single family residential zone is assumed to be the shadow pattern of the existing or approved development thereon or the shadow pattern that would result from the largest structure allowed at the closest setback on adjoining land, whether or not that structure now exists.

   3. Shade from off-site vegetation is assumed to remain after development of the site if: the trees that cause it are situated in a required setback; or they are part of a developed area, public park, or legally reserved open space; or they are in or separated from the developable remainder of a parcel by an undevelopable area or feature; or they are part of landscaping required pursuant to local law.

   4. Shade from other off-site sources is assumed to be shade that exists or that will be cast by development for which applicable local permits have been approved on the date a complete application for the development is filed.

C. On-site Shade: The site, or a portion of the site for which the exemption is requested:

1. Is within the shadow pattern of on-site features such as, but not limited to, structures and topography which will remain after the development occurs; or

2. Contains nonexempt trees at least 30 feet tall and, when measured 4 feet above the ground, more than 6 inches in diameter, which have a crown cover over at least 80 percent of the site or relevant portion. The applicant can show such crown cover exists using a scaled survey or an aerial photograph. If granted, the exemption shall be approved subject to the condition that the applicant preserve at least 50 percent of the trees that cause the shade that warrants the exemption. The applicant shall file a note on the plat or other documents in the office of the County Recorder binding the applicant to comply with this requirement. The County shall be made a party of any covenant or restriction created to enforce any provision of this ordinance. The covenant or restriction shall not be amended without written County approval.

3. Compliance with Subsection 1017.04 would prevent the development from meeting the minimum density provisions in Section 1012. (11/5/98)

1017.06 ADJUSTMENT TO DESIGN STANDARD

The Planning Director shall reduce the percentage of lots that must comply with Subsection 1017.04 to the minimum extent necessary if he/she finds the applicant has shown that one or more of the following site characteristics apply:

A. Density and Cost: If the design standard in Subsection 1017.04 is applied, either the resulting density is less than that proposed, the minimum density is less than that required in Section 1012, or on-site site development costs (e.g., grading, water, storm drainage and sanitary systems, and roads) and solar related off-site site development costs are at least 5 percent more per lot than if the standard is not applied. The following conditions, among others, could constrain the design of a development in such a way that compliance with Subsection 1017.04 would reduce density or increase per-lot costs in this manner. The applicant shall show which, if any, of these or other similar site characteristics apply in an application for a development. (11/5/98)

1. The portion of the site for which the adjustment is sought has a natural grade that is sloped 10 percent or more and is oriented greater than 45 degrees east or west of true south, based on a topographic survey of the site by a professional land surveyor.

2. There is a significant natural feature on the site, identified as such in the Comprehensive Plan or development ordinance, that prevents given streets or lots from being oriented for solar access, and it will exist after the site is developed.

3. Existing road patterns must be continued through the site or must terminate on-site to comply with applicable road standards or public road plans in a way that prevents given streets or lots in the development from being oriented for solar access.

4. An existing public easement or right-of-way prevents given streets or lots in the development from being oriented for solar access.

B. Development Amenities: If the design standard in Subsection 1017.04 is applied to a given lot or lots, significant development amenities that would otherwise benefit the lot(s) will be lost or impaired. Evidence that a significant diminution in the market value of the lot(s) would result from having the lot(s) comply with Subsection 1017.04 is relevant to whether a significant development amenity is lost or impaired.

C. Existing Shade: Nonexempt trees at least 30 feet tall and, when measured 4 feet above the ground, more than 6 inches in diameter, have a crown cover over at least 80 percent of the lot and at least 50 percent of the crown cover will remain after development of the lot. The applicant can show such crown cover exists using a scaled survey of nonexempt trees on the site or using an aerial photograph.

1. Shade from nonexempt trees is assumed to remain if: the trees are situated in a required setback; or they are part of an existing or proposed park, open space, or recreational amenity; or they are separated from the developable remainder of their parcel by an undevelopable area or feature; or they are part of landscaping required pursuant to local law; and the trees do not need to be removed for a driveway or other development.

2. Also, to the extent the shade is caused by on-site trees or off-site trees on land owned by the applicant, the shade is assumed to remain if the applicant files in the office of the County Recorder a covenant binding the applicant to retain the trees causing the shade on the affected lots.

1017.07 PROTECTION FROM FUTURE SHADE

Structures and nonexempt vegetation must comply with the Solar Balance Point Ordinance for existing lots (Section 1018) if located on a lot that is subject to the solar design standard in Subsection 1017.04 or if located on a lot south of and adjoining a lot that complies with Subsection 1017.04.

The applicant shall file a note on the plat or other documents in the office of the County Recorder binding the applicant and subsequent purchasers to comply with the future shade protection standards in Subsection 1017.07. The County shall be made a party of any covenant or restriction created to enforce any provision of this ordinance. The covenant or restriction shall not be amended without written County approval.

1017.08 APPLICATION

An application for approval of a development subject to this ordinance shall include:

A. Maps and text sufficient to show the development complies with the solar design standard of Subsection 1017.04, except for lots for which an exemption or adjustment from Subsection 1017.04 is requested, including at least:

   1. The north-south lot dimension and front lot line orientation of each proposed lot.

   2. Protected solar building lines and relevant building site restrictions, if applicable.

   3. For the purpose of identifying trees exempt from Subsection 1017.07, a map showing existing trees at least 30 feet tall and over 6 inches diameter at a point 4 feet above grade, indicating their height, diameter, and species, and stating that they are to be retained and are exempt.

   4. Copies of all private restrictions relating to solar access.

B. If an exemption or adjustment to Subsection 1017.04 is requested, maps and text sufficient to show that given lots or areas in the development comply with the standards for such an exemption or adjustment in Subsection 1017.05 and 1017.06, respectively.

1017.09 REVIEW PROCESS

Review of new developments for compliance with these standards shall be a part of the review process stipulated in Section 1105 and Section 1106. (6/6/02)

FIGURE 11
SOLAR ACCESS HEIGHT LIMIT

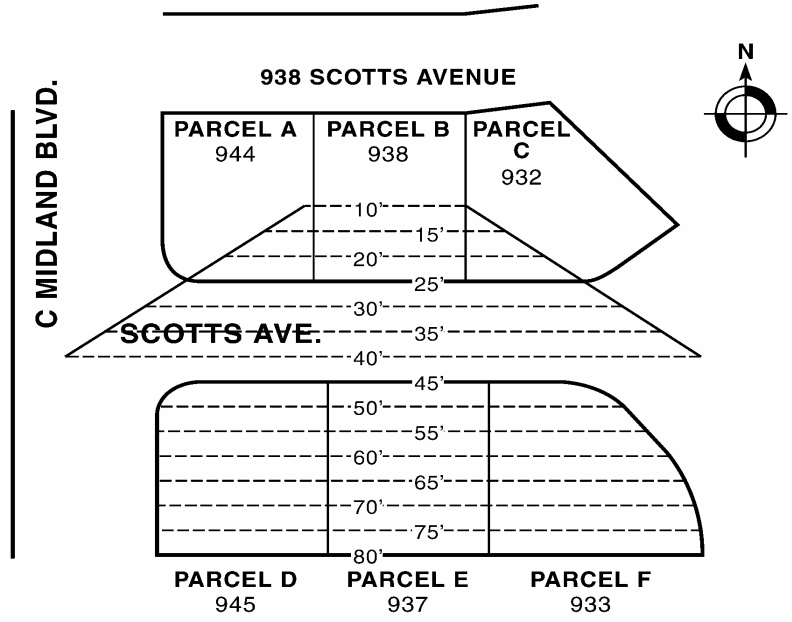
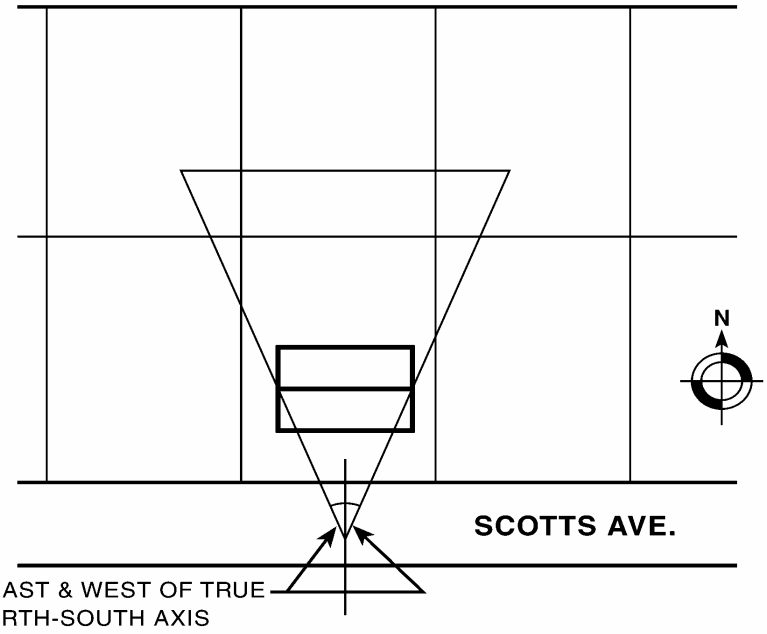


FIGURE 12
SHADOW PATTERN



1018 SOLAR BALANCE POINT/INFILL ORDINANCE (3/24/05)

1018.01 PURPOSE

The purposes of this ordinance are to promote the use of solar energy, to minimize the shading of structures by structures and accessory structures, and, where applicable, to minimize the shading of structures by trees. Decisions related to this ordinance are intended to be ministerial.

1018.02 APPLICATION OF SECTION (3/24/05)

This section shall apply to an application for a building permit for all structures in VR-4/5, VR-5/7, R-7, R-8.5, R-10, R-15, R-20, and R-30 zones and all detached single-family dwellings in any zone, except to the extent the Planning Director finds the applicant has shown that one or more of the conditions listed in Subsections 1018.06 and 1018.07 exists, and exemptions or adjustments provided for therein are warranted. In addition, nonexempt vegetation planted on lots subject to Subsection 1017.07 shall comply with the shade point height standards as provided in Subsections 1018.05 and 1018.06. (3/24/05)

1018.03 DEFINITIONS

Words and terms used in this section shall be as defined under Subsection 1017.03.

1018.04 SOLAR SITE PLAN REQUIRED

An applicant for a building permit for a structure subject to this ordinance shall submit a site plan that shows the maximum shade point height allowed under Subsection 1018.05 and the allowed shade on the proposed structure's solar features as provided in Subsection 1018.08. If applicable, the site plan also shall show the solar balance point for the structure as provided in Subsection 1018.09.

1018.05 MAXIMUM SHADE POINT HEIGHT STANDARD

The height of the shade point shall comply with either A or B below.

A. Basic Requirement: The height of the shade point shall be less than or equal to the height specified in Table A or computed using the following formula. If necessary, interpolate between the 5-foot dimensions listed in Table A.

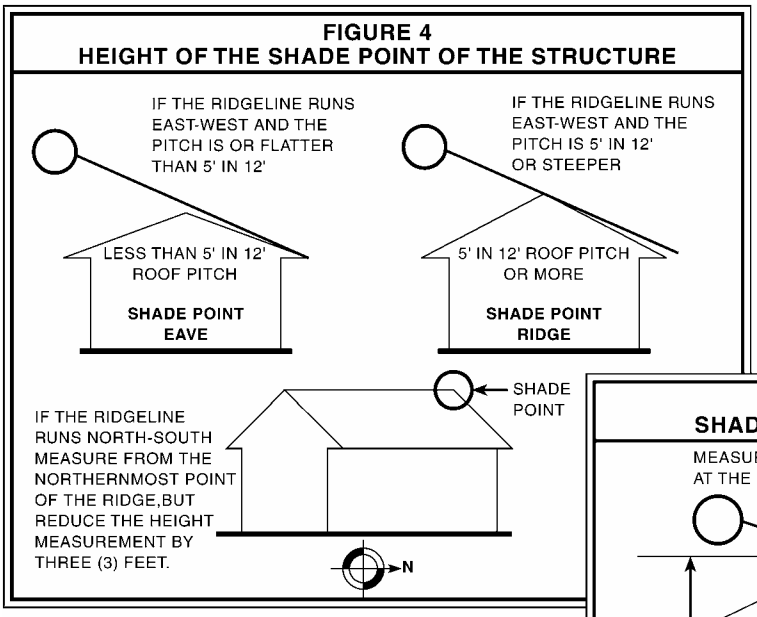
$$H = \frac{(2 \times SRL) - N + 150}{5}$$

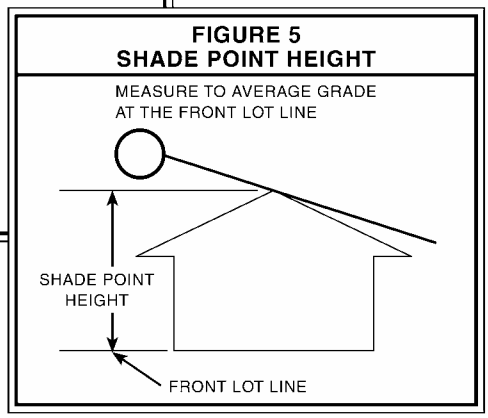
Where: H = the maximum allowed height of the shade point (see Figures 4 and 5);

SRL = shade reduction line (the distance between the shade point and the northern lot line, see Figure 6); and

N = the north-south lot dimension, provided that a north-south lot dimension of more than 90 feet shall use a value of 90 feet for this section.

Adjustment to shade point height on sloped lots: The maximum allowed height of the shade point may be increased one foot above the amount calculated using the formula or Table A for each foot that the average grade at the north property line exceeds the average grade at the south property line.





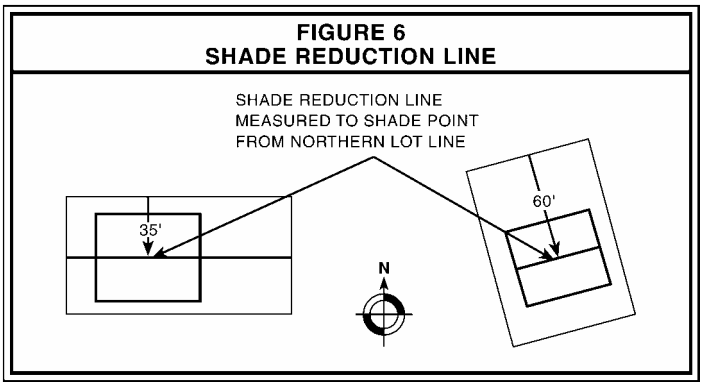


TABLE A
MAXIMUM PERMITTED SHADE POINT HEIGHT (In Feet)

LENGTH OF SHADE REDUCTION LINE	North-South Lot Dimension (in Feet)										
	90+	85	80	75	70	65	60	55	50	45	40
70	40	41	42	43	44						
65	38	39	40	41	42	43					
60	36	37	38	39	40	41	42				
55	34	35	36	37	38	39	40	41			
50	32	33	34	35	36	37	38	39	40		
45	30	31	32	33	34	35	36	37	38	39	
40	28	29	30	31	32	33	34	35	36	37	38
35	26	27	28	29	30	31	32	33	34	35	36
30	24	25	26	27	28	29	30	31	32	33	34
25	22	23	24	25	26	27	28	29	30	31	32
20	20	21	22	23	24	25	26	27	28	29	30
15	18	19	20	21	22	23	24	25	26	27	28
10	16	17	18	19	20	21	22	23	24	25	26
5	14	15	16	17	18	19	20	21	22	23	24

B. Performance Option: The proposed structure or applicable nonexempt vegetation will shade not more than 20 percent of the south-facing glazing of an existing habitable structure(s), or, where applicable, the proposed structure or nonexempt vegetation will comply with Subsections 1017.04B or 1017.04C of the Solar Access Ordinance for New Development. If Subsection 1017.04B, Protected Solar Building Line, is used, nonexempt trees and the shade point of structures shall be set back from the protected solar building line 2.5 feet for every 1 foot of height of the structure or of the mature height of nonexempt vegetation over 2 feet.

1018.06 EXEMPTIONS FROM THE MAXIMUM SHADE POINT HEIGHT STANDARD

The Planning Director shall exempt a proposed structure or nonexempt vegetation from Subsections 1018.04 and 1018.05 of this ordinance if the applicant shows that one or more of the conditions in this section exist, based on plot plans or plats, corner elevations or other topographical data, shadow patterns, suncharts or photographs, or other substantial evidence submitted by the applicant.

A. Exempt Lot: When created, the lot was subject to the Solar Access Ordinance for New Development and was not subject to the provisions of Subsection 1017.07 of that ordinance.

B. Preexisting Shade: The structure or affected nonexempt vegetation will shade an area that is shaded by one or more of the following:

1. An existing or approved building or structure;

2. A topographic feature;

3. A nonexempt tree that will remain after development of the site. It is assumed a tree will remain after development if it: is situated in a building setback required by local law; is part of a developed area or landscaping required by local law, a public park or landscape strip, or legally reserved open space; is in or separated from the developable remainder of a parcel by an undevelopable area or feature; or is on the applicant's property and not affected by the development. A duly executed covenant also can be used to preserve trees causing such shade.

C. Slope: The site has an average slope that exceeds 20 percent in a direction greater than 45 degrees east or west of true south, based on a topographic survey by a licensed professional land surveyor.

D. Insignificant Benefit: The proposed structure or nonexempt vegetation shades one or more of the following:

1. An undevelopable area; or
2. The wall of an unheated space, such as a typical garage; or
3. Less than 20 square feet of south-facing glazing.

E. Public Improvement: The proposed structure is a publicly owned improvement.

1018.07 ADJUSTMENTS TO THE MAXIMUM SHADE POINT HEIGHT STANDARD

The Planning Director shall increase the maximum permitted height of the shade point determined using Subsection 1018.05 to the extent he/she finds the applicant has shown one or more of the following conditions exists, based on plot plans or plats, corner elevations or other topographical data, shadow patterns, suncharts or photographs, or other substantial evidence submitted by the applicant.

A. Physical Conditions: Physical conditions preclude development of the site in a manner that complies with Subsection 1018.05, due to such things as a lot size less than 3000 square feet, unstable or wet soils, a drainageway, public or private easement, or a right-of-way.

B. Conflict Between Maximum Shade Point Height and Allowed Shade on Solar Feature Standards: A proposed structure may be sited to meet the solar balance point standard described in Subsection 1018.09 or be sited as near to the solar balance point as allowed by Subsection 1018.09 if:

1. When the proposed structure is sited to meet the maximum shade point height standard determined using Subsection 1018.05, its solar feature will potentially be shaded as determined using Subsection 1018.08; and

2. The application includes a form provided by the County that:

   a) Releases the applicant from complying with Subsection 1018.05 and agrees that the proposed structure may shade an area otherwise protected by Subsection 1018.05;

   b) Releases the County from liability for damages resulting from the adjustment; and

   c) Is signed by the owner(s) of the property(ies) that would be shaded by the proposed structure more than allowed by the provisions of Subsection 1018.05.

   Before the County issues a permit for a proposed structure for which an adjustment has been granted pursuant to Subsection 1018.07B, the applicant shall file the form provided for in Subsection 1018.07B2, above, in the office of the County Recorder with the deeds to the affected properties.

1018.08 ANALYSIS OF ALLOWED SHADE ON SOLAR FEATURE

A. The applicant is exempt from Subsection 1018.08 if the lot(s) south of and adjoining the applicant's property is exempt from Subsection 1018.05 of this ordinance.

B. Applicants shall be encouraged to design and site a proposed habitable structure so that the lowest height of the solar feature(s) will not be shaded by buildings or nonexempt trees on the lot(s) to the south. The applicant shall complete the following calculation procedure to determine if the solar feature(s) of the proposed structure will be shaded. To start, the applicant shall choose which of the following sources of shade originating from the adjacent lot(s) to the south to use in calculating the maximum shade height at the north property line:

   1. Existing structure(s) or nonexempt trees; or

   2. The maximum shade that can be cast from future buildings or nonexempt trees, based on Table C. If the lot(s) to the south can be further divided, the north-south dimension shall be assumed to be the minimum lot width required for a new lot in that zone.

C. The height of the lowest point of any solar feature of the proposed structure shall be calculated with respect to either the average elevation or the elevation at the midpoint of the front lot line of the lot to the south.

D. The applicant shall determine the height of the shadow that may be cast upon the applicant's solar feature by the source of shade selected in Subsection 1018.08B by using the following formula or Table B.

SFSH = SH(SGL/2.5)

Where: SFSH = The allowed shadow height on the solar feature (see Figure 8)

SH = The height of the shade at the northern lot line of the lot(s) to the south as determined in Subsection 1018.08B

SGL = The solar gain line (the distance from the solar feature to the northern lot line of the adjacent lot(s) to the south)

TABLE B
MAXIMUM PERMITTED HEIGHT OF SHADOW AT SOLAR FEATURE (In Feet)

Distance from Solar Gain Line to Lot Line (in Feet)	Allowed Shade Height at Northern Lot Line of Adjacent Lot(s) to the South (In Feet)												
	22	21	20	19	18	17	16	15	14	13	12		
50			2	1									
45			4	3	2	1							
40			6	5	4	3	2	1					
35			8	7	6	5	4	3	2	1			
30			10	9	8	7	6	5	4	3	2	1	
25			12	11	10	9	8	7	6	5	4	3	2
20			14	13	12	11	10	9	8	7	6	5	4
15			16	15	14	13	12	11	10	9	8	7	6
10			18	17	16	15	14	13	12	11	10	9	8
5			20	19	18	17	16	15	14	13	12	11	10

Table C may be used to determine (SH) in the above formula.

TABLE C

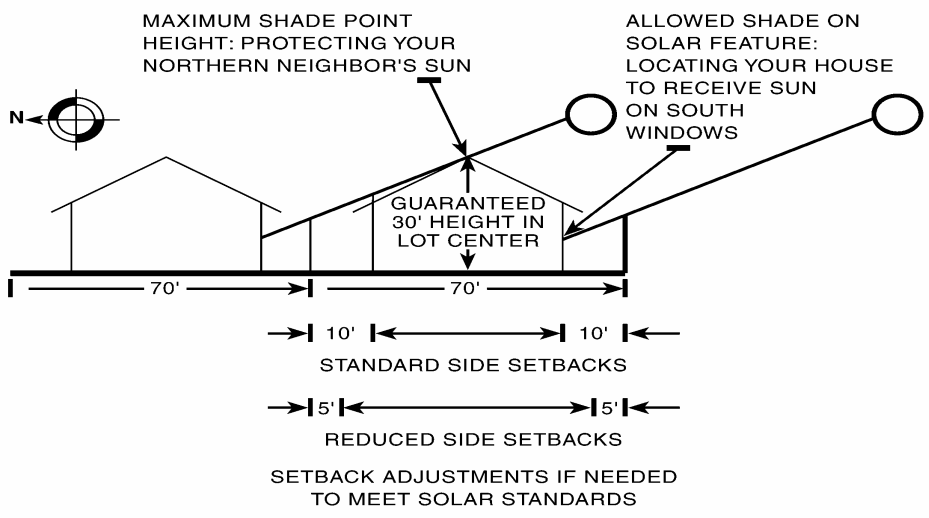
North-South Lot Dimension of Adjacent Lot(s) to the South	100	95	90	85	80	75	70	65	60	55	50	45	40
Allowed Shade Height at the North Property Line of Adjacent Lot(s) to the South	12	12	12	13	14	15	16	17	18	19	20	21	22

E. If the allowed shade height on the solar feature calculated in Subsection 1018.08D is higher than the lowest height of the solar feature calculated in Subsection 1018.08C, the applicant shall be encouraged to consider any changes to the structure design or location which would make it practical to locate the solar feature so that it will not be shaded in the future.

1018.09 SOLAR BALANCE POINT

If a structure does not comply with the maximum shade point height standard in Subsection 1018.05 and the allowed shade on a solar feature standard in Subsection 1018.08, the solar balance point of the lot shall be calculated (see Figure 8). The solar balance point is the point on the lot where the location of a structure would be the same for complying with both of these standards.

FIGURE 8
SOLAR BALANCE POINT STANDARD



1018.10 YARD SETBACK ADJUSTMENT

The County shall grant an adjustment to the side, front and/or rear yard setback requirement(s) by up to 50 percent if necessary to build a proposed structure so it complies with either the shade point height standard in Subsection 1018.05, the allowed shade on a solar feature standard in Subsection 1018.08, or the solar balance point standard in Subsection 1018.09 as provided herein (see Figure 8). This adjustment is not intended to encourage reductions in available solar access or unnecessary modification of setback requirements, and shall apply only if necessary for a structure to comply with the applicable provisions of this ordinance. The following are permitted yard setback adjustments:

A. In R-7 and R-8.5 zones:

1. A front yard setback may be reduced to not less than 10 feet.
2. A rear yard setback may be reduced to not less than 10 feet.
3. A side yard setback may be reduced to not less than 3 feet.

B. In R-10, R-15, and R-20 zones:

1. A front yard setback may be reduced to not less than 15 feet.
2. A rear yard setback may be reduced to not less than 15 feet.
3. A side yard setback may be reduced to not less than 5 feet.

1018.11 REVIEW PROCESS

The provisions of this Section shall be administered by the Planning staff at the time of building permit application. Appeals of staff actions under this section shall be to the Hearings Officer as stated in Section 1305.01K.

1019 SOLAR ACCESS PERMIT ORDINANCE (3/24/05)

1019.01 PURPOSE

This ordinance authorizes the owners of certain properties to apply for a County permit that prohibits shade caused by certain vegetation on neighboring properties from being cast on a solar feature(s) on the property of a permittee.

1019.02 APPLICATION OF SECTION (3/24/05)

An owner of property, including a government, agency, or firm, may apply for and/or be subject to a solar access permit for a solar feature(s) if that property is in a VR-4/5, VR-5/7, R-5, R-7, R-8.5, R-10, R-15, R-20, or R-30 zone, or will be developed with a dwelling. The County's decision whether or not to grant a solar access permit is intended to be ministerial. (3/24/05)

1019.03 DEFINITIONS

Words and terms used in this section shall be defined as provided under Subsection 1017.03.

1019.04 APPROVAL STANDARDS FOR A SOLAR ACCESS PERMIT

The Planning Director shall approve an application for a solar access permit if:

A. The application is complete;

B. The information in the application is accurate; and

C. The applicant shows that nonexempt vegetation on his/her property does not shade the solar feature(s).

1019.05 DUTIES CREATED BY SOLAR ACCESS PERMIT

A. A party to whom the County grants a solar access permit shall:

1. File the permit in the office of the County Recorder with the deeds to the properties affected by it and pay the fees for such filing;

2. Install the solar feature in a timely manner as provided in Subsection 1019.09; and

3. Maintain nonexempt vegetation on the site so it does not shade the solar feature.

B. An owner of property burdened by a solar access permit shall be responsible and pay all costs for keeping nonexempt vegetation from exceeding the solar access height limit.

1019.06 APPLICATION CONTENTS

An application for a solar access permit shall contain the following:

A. Legal Description: A legal description of the applicant's lot and a legal description, owners' names, and owners' addresses for lots all or a portion of which are within 150 feet of the applicant's lot and 54 degrees east and west of true south measured from the east and west corners of the applicant's south lot line. The records of the County shall be used to determine who owns property for purposes of an application. Persons whose names and addresses are not on record at the time an application is filed need not be listed. The failure of a property owner to receive notice shall not invalidate the action if a good faith attempt was made to notify all persons who may have been affected.

B. Site Plan: A scaled plan of the applicant's property showing:

1. Vegetation in the ground as of the date of the application if, when mature, that vegetation could shade the solar feature(s).

2. The approximate height above grade of the solar feature(s), its location, and its orientation relative to true south.

C. Other: A scaled plan of the properties listed in Subsection 1019.06A, above, showing:

1. Their approximate dimensions; and

2. The approximate location of all existing vegetation on each property that could shade the solar feature(s) on the applicant's property.

D. Solar Access Height Limit: For each affected lot, the requested solar access height limit. The solar access height limit is a series of contour lines establishing the maximum permitted height for nonexempt vegetation on lots affected by a Solar Access Permit (see Figure 11). The contour lines begin at the bottom edge of a solar feature for which a permit is requested and rise in five-foot increments at an angle to the south not less than 21.3 degrees from the horizon and extend not more than 54 degrees east and west of true south.

Notwithstanding the preceding, the solar access height limit at the northern lot line of any lot burdened by a solar access permit shall allow nonexempt vegetation on that lot whose height causes no more shade on the benefited property than could be caused by a structure that complies with the Solar Balance Point Ordinance (Section 1018) for existing lots.

FIGURE 11
SOLAR ACCESS HEIGHT LIMIT

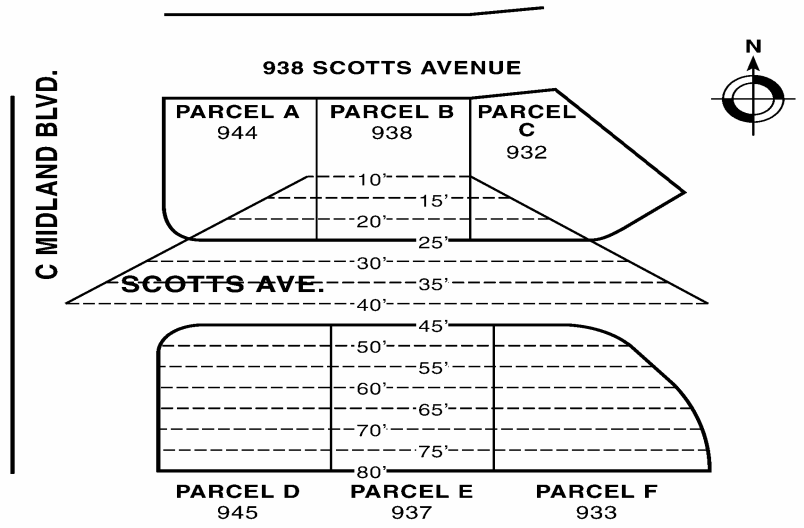
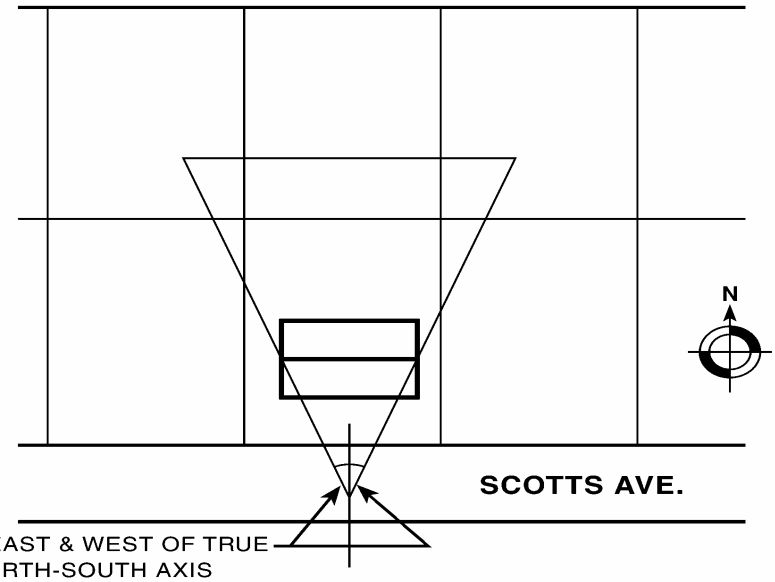


FIGURE 12
SHADOW PATTERN



E. Fee: A fee as required by the Planning Division.

F. Verification Form: If available, a statement signed by the owner(s) of some or all of the property(ies) to which the permit will apply if granted, verifying that the vegetation shown on the plan submitted pursuant to Subsection 1019.05C, above, accurately represents vegetation in the ground on the date of the application. The County shall provide a form for that purpose. The signed statements provided for therein are permitted but not required for a complete application.

1019.07 APPLICATION REVIEW PROCESS

A. Preapplication Conference: Unless waived by the Planning Director, prior to filing an application for a solar access permit, an applicant or applicant's representative shall meet with the Planning Director or designate to discuss the proposal and the requirements for an application. If a meeting is held, the Planning Director or designate shall convey a written summary of the meeting to the applicant by mail within 5 calendar days of the meeting. The applicant may file an application containing the information required in Subsection 1019.06, above, after the preapplication meeting is held or waived.

B. Preliminary Review: Within 7 calendar days after an application is filed, the Planning Director or designate shall determine whether the application is complete and, if it is not complete, notify the applicant in writing, specifying what is required to make it complete.

C. Tentative Decision: Within 14 calendar days after the Planning Director decides an application for a solar access permit is complete, the Planning Director or his/her designate shall issue a written decision tentatively approving or denying the request, together with reasons therefor, based on the standards in Subsection 1019.04.

1. If the tentative decision is to deny the permit, the Planning Director shall mail a copy of the decision to the applicant.

2. If the tentative decision is to approve the permit and the owners of all affected properties did verify the accuracy of the plot plan as permitted under Subsection 1019.06F, the Planning Director shall mail a copy of the decision to the applicant and affected parties.

3. If the tentative decision is to approve the permit and the owners of all affected properties did not verify the accuracy of the plot plan as permitted under Subsection 1019.06F, the Planning Division shall mail a copy of the tentative decision to the applicant and to the owners of affected properties who did not sign the verification statement pursuant to Subsection 1019.06F. The notice shall include the plot plans required in Subsections 1019.06B and C, above, the proposed solar access height limits, and the duties created by the permit. The notice shall request recipients to verify that the plot plan shows all nonexempt vegetation on the recipient's property and to send the Planning Division comments in writing within 14 calendar days after the tentative decision is mailed if the recipient believes the applicant's plot plan is inaccurate.

D. Final Decision: Within 28 days after notice of a tentative decision is mailed to affected parties, the Planning Division shall consider responses received from affected parties and/or conduct an inspection of the site, modify the plot plan and the permit to be consistent with the accurate information, and issue a final decision. The Planning Division shall send a copy of the permit and solar access height limits to the owners of each property affected by the permit.

E. Recording of Solar Access Height Limits: If the application is approved, the applicant shall file the permit and associated solar access height limits in the office of the County Recorder with the deeds to the properties affected by it before the permit is effective.

1019.08 PERMIT ENFORCEMENT PROCESS

A. Enforcement Request: A solar access permittee may request the County to enforce the solar access permit by providing the following information to the Planning Division:

1. A copy of the solar access permit and the plot plans submitted with the permit; and

2. The legal description of the lot(s) on which alleged nonexempt vegetation is situated, the address of the owner(s) of that property, and a scaled site plan of the lot(s) showing the nonexempt vegetation; and

3. Evidence the vegetation violates the solar access permit, such as a sunchart photograph, shadow pattern, and/or photographs.

B. Enforcement Process: If the Planning Director determines the request for enforcement is complete, he or she shall initiate an enforcement action.

1019.09 EXPIRATION AND EXTENSION OF A SOLAR ACCESS PERMIT

A. Expiration: Every permit issued by the Planning Division under the provisions of this ordinance shall expire if the construction of the solar feature(s) protected by such a permit is not commenced within 180 days from the date of such permit, or if the construction of the solar feature(s) protected by such a permit is suspended or abandoned at any time after the work is commenced for period of 180 days. The Planning Director shall terminate the permit by filing the notice of expiration in the office of the County Recorder with the deeds to the affected properties.

B Extension: Any permittee holding an unexpired permit may apply for an extension of the time within which he or she may commence work under that permit when he or she is unable to commence work within the time required by this subsection for good and satisfactory reasons. The Planning Division may extend the time for action by the permittee for a period not exceeding 180 days upon written request by the permittee showing that circumstances beyond the control of the permittee have prevented action from being taken. No permit shall be extended more than once.

Solar Standards

9.2780 **Purpose of Solar Standards.** Solar standards are utilized to create lot divisions, layouts and building configurations to help preserve the availability of solar energy to one and two family dwellings.

(Section 9.2780, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02.)

9.2790 **Solar Lot Standards.**

(1) **Applicability.** Solar lot standards apply to the creation of lots within subdivisions in R-1 and R-2 zones.

(2) **Solar Lot Requirements.** In R-1 and R-2, at least 70% percent of the lots in a subdivision shall be designed as "solar lots" and shall have a minimum north-south dimension of 75 feet and a front lot line orientation that is within 30 degrees of the true east-west axis. For purposes of this subsection, a lot proposed for more than one dwelling unit shall count as more than one lot , according to the number of units proposed (e.g. a lot proposed for a fourplex shall be considered 4 lots). **(See Figure 9.2790(2) Solar Lot Requirements.)**

(3) **Exceptions to the Solar Lot Requirements.** A proposed subdivision shall be exempt from EC 9.2790(2) if either of the following exists:

(a) Density. The proposed subdivision provides at least 70% of the maximum allowed density according to the zoning of the property.

(b) Site Constraints. One of the following circumstances is present:

1. Compliance with applicable street standards or public street plans requires a street configuration that prevents the lots from being oriented for solar access.
2. An existing public easement or right-of-way prevents the lot from being oriented for solar access.
3. There is a significant natural feature on the site, identified as such in the Metro Plan, adopted refinement plan, or in any city-adopted natural resource inventory that will continue to exist after the site is developed, and that prevents the lot from being oriented for solar access.

(4) **Exemptions to the Solar Lot Requirements.** A proposed lot shall not be identified as a "solar lot" but shall be counted as a lot that satisfies EC 9.2790(2) Solar Lot Requirements when the lot satisfies (a)(b)(c) or (d) of this subsection.

(a) Slopes. The lot is sloped 20 percent or more in a direction greater than 45 degrees east or west of true south.

(b) Existing Off-Site Shade. The lot is within the shadow pattern of off-site features, such as but not limited to buildings, topography, or coniferous trees or broadleaf evergreens, which will remain after development occurs on the site from which the shade is originating.

1. Shade from existing or approved off-site buildings or structures and from topographic features is assumed to remain after development of the site.
2. Shade from vacant developable areas off-site is assumed to be the shadow pattern that would result from the largest building allowed at the closest setback allowed on adjoining land, whether or not that building now exists.

3. Shade from coniferous trees or broadleaf evergreens is assumed to remain after development of the site if that vegetation is situated in a required setback; or part of a developed area, public park, or legally reserved open space; or part of landscaping or other features required pursuant to this land use code.

(c) Existing On-Site Shade. The site, or portion of the site for which the exception is sought complies with at least one of the following:

1. The site is within the shadow pattern of on-site features such as, but not limited to, buildings and topography which will remain after the development occurs.
2. The site contains coniferous trees or broadleaf evergreens at least 30 feet tall and more than 8 inches in diameter measured four feet above the ground which have a crown cover over at least 80 percent of the site or relevant portion. The applicant can show such crown cover exists using a scaled survey or an aerial photograph. If granted, the exemption shall be approved subject to the condition that the applicant preserve at least 50 percent of the non-solar friendly vegetation that cause the shade that warrants the exemption. The applicant shall file a note on the plat or documents in the office of the county recorder binding the applicant to comply with this requirement.

(d) Housing Mix. The lot is designated for a housing type other than one-family detached dwellings in a proposed subdivision that identifies at least 10% of the lots for a housing type other than one-family detached dwellings.

(Section 9.2790, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02.)

9.2795 Solar Setback Standards.

(1) Applicability. These standards apply to all structures on R-1 and R-2 zoned lots, 4000 square feet or greater, with a minimum north-south dimension of 75 feet.

(2) Solar Setback Requirements. Buildings shall be setback from the northern property line according to the standards in this section. An applicant for a development permit for a building subject to this section shall submit verification on a form approved by the city manager that shows either the solar setback or how the structure qualifies for an exemption. If buildings on separate lots are attached or connected at a common lot line, the solar setback standards apply as if the buildings are a single building on a single lot composed of both lots. **(See Figure 9.2795 Solar Setback Standards, Figure 9.2795(2) Shade Point Height (SPH) Measurement, Figure 9.2795(2)(a) R-1 Solar Setback Calculation, and Figure 9.2795(2)(b) R-2 Solar Setback Calculation.)**

(a) Solar Setback for R-1 Zone. The solar setback of the shade point shall be greater than or equal to the following formula:

SSB = (2.5 X SPH) + (N divided by 2) - 82.5

Where:

SSB = Solar setback (the shortest horizontal distance between the shade point and the plane of the northern lot line).

SPH = Shade point height (Reduce this dimension by 3 feet if the shade point is a ridgeline between 45 degrees east or west of true north.)

N = North-south lot dimension. Maximum allowable "N" for purposes of calculating the solar setback shall be 90 feet.

The following table, which accurately applies the formula, can be used to determine compliance with the solar setback standard.

Table 9.2795(2)(a) Solar Setback From Northern Lot Line for R-1 [SSB] (All figures are in feet.)*

Shade Point Height [SPH]	North-South Lot Dimension			
	90 feet [N]	85 feet [N]	80 feet [N]	75 feet [N]
18 feet	7.5	5	2.5	0
20 feet	12.5	10	7.5	5
22 feet	17.5	15	12.5	10
24 feet	22.5	20	17.5	15
26 feet	27.5	25	22.5	20
28 feet	32.5	30	27.5	25
30 feet	37.5	35	32.5	30
32 feet	42.5	40	37.5	35
34 feet	47.5	45	42.5	40
36 feet	52.5	50	47.5	45
38 feet	57.5	55	52.5	50
40 feet	62.5	60	57.5	55

*Solar setback is usually measured from an eave or from a ridge line of a roof. See Shade Point definition in EC 9.0500 and Figure 9.2795.

(b) Solar Setback for R-2 Zone. The solar setback of the shade point shall be greater than or equal to the following formula:

SSB = (2.5 X SPH) + (N divided by 2) - 95

Where:

SSB = Solar setback (the shortest horizontal distance between the shade point and the plane of the northern lot line).

SPH = Shade point height (Reduce this dimension by 3 feet if the shade point is a ridgeline between 45 degrees east or west of true north.)

N = North-south lot dimension. Maximum allowable "N" for purposes of calculating the solar setback shall be 90 feet.

The following table, which accurately applies the formula, can be used to determine compliance with the solar setback standard.

Table 9.2795(2)(b) Solar Setback From Northern Lot Line for R-2 [SSB] (All figures are in feet.)*				
Shade Point Height [SPH]	North-South Lot Dimension			
	90 feet [N]	85 feet [N]	80 feet [N]	75 feet [N]
22 feet	5	2.5	0	0
24 feet	10	7.5	5	2.5
26 feet	15	12.5	10	7.5
28 feet	20	17.5	15	12.5
30 feet	25	22.5	20	17.5
32 feet	30	27.5	25	22.5
34 feet	35	32.5	30	27.5
36 feet	40	37.5	35	32.5
38 feet	45	42.5	40	37.5
40 feet	50	47.5	45	42.5
42 feet	55	52.5	50	47.5
44 feet	60	57.5	55	52.5
46 feet	65	62.5	60	57.5

*Solar setback is usually measured from an eave or from a ridge line of a roof. See Shade Point definition in EC 9.0500 and Figure 9.2795.

(3) Exemptions to Solar Setback Requirements. A building is exempt from the solar setback standards when any of the following conditions exist:

(a) Slopes. The lot on which the building is located has an average slope of 20 percent or more in a direction greater than 45 degrees east or west of true north.

(b) Existing Shade. The building will shade an area that is already shaded by one or more of the following:

1. An existing or approved building or structure.
2. A topographic feature.
3. Coniferous trees or broadleaf evergreens that will remain after development of the site.

(c) Insignificant Benefit. The building will shade one or more of the following:

1. A non-developable area, such as designated open space, a public utility easement, street or alley.
2. The wall of an unheated space, such as a garage, excluding solar greenhouses and other similar solar structures.
3. The wall of a non-residential structure.
4. No more than 20% of a south wall of an existing habitable dwelling. See Figures 9.2795(2), 9.2795(2)(a) and 9.2795(2)(b).

(d) Neighbor Approval. The owner of the abutting property to the north, for which a certificate of occupancy has been issued by the city, grants an exemption to the solar setback requirement on a form supplied by the city and subject to a fee set by the city manager.

(e) PUD Exemption. The lot is identified as being exempt from solar setback provisions through an approved PUD application where one or more of the following exists:

1. The lot has been identified as being exempt from solar setback standards.
2. The proposed building locations and heights were approved.

(Section 9.2795, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02; and amended by Ordinance No. 20353, enacted November 28, 2005, effective January 1, 2006.)

Special Area Zones

General

9.3000 **Purpose for Creating Special Area Zones.** The S Special Area zone provides procedures and criteria for recognition of areas of the city that possess distinctive buildings or natural features that have significance for the community and require special consideration or implementation of conservation and development measures that can not be achieved through application of the standard base zones. In some cases, an S Special Area Zone is applied to implement a plan for an area identified for nodal development. Application of S Special zone to a lot containing a specific building, structure, object, site or archeological resource that qualifies as an historic landmark will ensure that permitted uses encourage preservation of historic qualities.

(Section 9.3000, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02; and amended by Ordinance No. 20266, enacted November 12, 2002, effective December 12, 2002)

9.3010 **Applicability of General Regulations and Standards.** When an area is zoned S Special Area, as indicated on the Eugene Zoning Map, the general development standards set forth in this land use code shall govern, except when they conflict with the special standards applicable specifically in the special area zone. In cases of conflict, the standards specifically applicable in the special area zone shall control.

(Section 9.3010, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02.)

9.3015 **Process for Establishment or Change of an S Special Area Zone.** Establishment of an S Special Area zone shall be processed as a Type V application as provided for in EC 9.7500 through EC 9.7560 Type V Application Procedures, based on the criteria in EC 9.3020 and the required provisions of EC 9.3030. Application of the S special area zone to specific areas shall be processed concurrently with establishment of the special area zone. Future application of the zone to specific properties shall be processed as a zone change.

(Section 9.3015, see chart at front of Chapter 9 for legislative history from 2/26/01 through 6/1/02.)

9.3020 **Criteria for Establishment of an S Special Area Zone.** Before adopting an ordinance establishing a S Special Area Zone, the city council shall find that the proposal is in compliance with following criteria:

(1) The area to which the S Special Area Zone is being applied meets at least one of the following criteria:

(a) Is identified in the Metro Plan or a refinement plan as appropriate for

CHAPTER 8

Solar Access

§ 10-8-1 Statement of Finding and Purpose
§ 10-8-2 Definitions
§ 10-8-3 Permit Application and Notice
§ 10-8-4 Hearing
§ 10-8-5 Grant of Permit
§ 10-8-6 Appeals
§ 10-8-7 Record of Permit
§ 10-8-8 Rights of Permit Holder
§ 10-8-9 Waiver of Rights
§ 10-8-10 Termination of Permits
§ 10-8-11 Preservation of Rights

SEC. 10-8-1 STATEMENT OF FINDINGS AND PURPOSE.

(a) The Village Board finds that:
  (1) Diminishing supplies of nonrenewable energy resources threaten the physical and economic well being of the residents of this community who presently rely on such resources to maintain their homes, industries, businesses and institutions;
  (2) Solar energy systems hold great promise for the future energy needs of this community because they use a renewable energy resource; because they require less capital, land, water and other resources needed for central-station generation of electricity; and because they do not pollute the community's water and air; and
  (3) The successful use of solar energy systems for such purposes as supplying space heating, water heating or the production of electricity is dependent upon sufficient access to direct sunlight.

(b) This chapter is adopted under authority contained in sec. 66.032, Wis. Stats., for the purpose of protecting the health, safety, and general welfare of the community by:
  (1) Promoting the use of solar energy systems;
  (2) Protecting access to sunlight for solar energy systems; and
  (3) Assuring that potentially conflicting interests of individual property owners are accommodated to the greatest extent possible compatible with the overall goal of this ordinance.

SEC. 10-8-2 DEFINITIONS.

(a) In this Chapter "AGENCY" means the Village of Prairie du Sac Zoning Inspector.
(b) "APPLICANT" means an owner applying for a permit under this chapter.
(c) "APPLICATION" means an application for a permit under this chapter.

(d) "COLLECTOR SURFACE" means any part of a solar collector that absorbs solar energy for use in the collector's energy transformation process. "Collector surface" does not include frames, support and mounting hardware.

(e) "COLLECTOR USE PERIOD" means 9:00 a.m. to 3:00 p.m. standard time daily.

(f) “IMPERMISSIBLE INTERFERENCE" means a blockage of solar energy from a collector surface or a proposed collector surface for which a permit has been granted under this chapter [section] during a collector use period, if such blockage is by any structure or vegetation on property an owner of which was notified under Section 10-8-3(f). 'impermissible interference" does not include:

(1) Blockage by a narrow protrusion, vegetation, or other object which never obstructs more than 5% of the solar energy which would strike a solar collector during the collector use period on any given day;

(2) Blockage by any structure constructed, under construction or for which a building permit has been applied for before the date the last notice is mailed or delivered under Section 10-8-3(f).

(3) Blockage by any vegetation planted before the date the last notice is mailed or delivered under Section 10-8-3 (f).

(4) Blockage by any structure or vegetation which obstructs less solar energy from a solar collector during the collector use period than would be obstructed by a 6 foot high wall located along the northern boundaries of the property to the south of the solar collector.

(g) "OWNER" means at least one owner, as defined under Sec. 66.021(1)(a), Wis. Stats., of a property or the personal representative of at least one owner.

(h) "PERMIT" means a solar access permit issued under this Chapter.

(i) "SOLAR COLLECTOR" means a device, structure or part of a device or structure a substantial purpose of which is to transform solar energy into thermal, mechanical, chemical or electrical energy.

(j) "SOLAR ENERGY" means direct radiant energy received from the sun.

SEC. 10-8-3 PERMIT APPLICATION AND NOTICE.

(a) PERMIT JURISDICTION. Any owner who has installed or intends to install a solar collector may apply to the Village Board for a permit. A permit may affect any land located within the territorial limits of the Village or which is subject to an extraterritorial zoning ordinance unless the extraterritorial land is subject to a zoning ordinance adopted by a county or town.

(b) APPLICATION. An application for a permit under this Chapter may be obtained from the Village Administrator and shall be completed by the applicant.

(c) INFORMAL PRE-APPLICATION MEETING. Prior to the filing of an application, the applicant shall meet with the Plan Commission to discuss the application and the permit process.

(d) APPLICATION FEE. The completed permit application shall be submitted to the Village Administrator with an application fee as stated in the Schedule of Fees.

(e) REVIEW OF APPLICATION. The Plan Commission shall review the application to determine if it is satisfactorily completed. The Plan Commission shall notify the applicant of this

determination within thirty (30) days after the application has been filed and the application fee received. If the Plan Commission determines that the application is satisfactorily completed, the Village shall provide notice forms and receipt forms to the applicant for service and signing under Subsection (f).

(f) SERVICE OF NOTICE. If an applicant is notified that an application has been satisfactorily completed, the applicant shall deliver by certified mail or by hand the notice, supplied by the Village, to the owner of any property which the applicant proposes to be restricted by the permit. The applicant shall submit to the Village Administrator a copy of a signed receipt for every notice- delivered under this subsection.

(g) CONTENT OF NOTICE. The information on the notice form shall include:

(1) The name and address of the applicant, and the address of the land upon which the solar collector is or will be located.

(2) That an application has been filed by the applicant.

(3) That the permit, if granted, may affect the rights of the notified owner to develop his or her property and to plant vegetation.

(4) That any person who received a notice may request a hearing under Section 10-8-4 within thirty (30) days after receipt of the notice.

(5) he procedure for filing a hearing request and telephone number, address and office hours of the agency.

SEC. 10-8-4 HEARING.

Within thirty (30) days after receipt of the notice under Section 10-8-3(f), any person who has received a notice, or anyone acting on that person's behalf, may file a request for a hearing on the granting of a permit or the Village Board may determine that a hearing is necessary even if no such request is filed. If a request is filed or if the Village Board determines that a hearing is necessary, the Village Board shall conduct a hearing on the application within 90 days after the last notice is delivered. At least thirty (30) days prior to the hearing date, the Village Board shall notify the applicant, any person who has requested a hearing under this section, all owners notified under Section 10-8-3(f), and any other person filing a request of the time and place of the hearing. Prior to the hearing, the Plan Commission shall submit an advisory recommendation to the Village Board.

SEC. 10-8-5 GRANT OF PERMIT.

(a) DETERMINATION. The Village Board shall grant a permit if the Board determines that:

(1) The granting of a permit will not unreasonably interfere with the orderly land use and development plans of the Village;

(2) No person has demonstrated that she or he has present plans to build a structure that would create an impermissible interference by showing that she or he has applied for a building permit prior to receipt of a notice under Sec. 10-8-3(f), has expended at least Five Hundred ($500.00) Dollars on planning or designing such a structure, or by submitting any other credible evidence that she or he has made substantial progress toward planning or constructing a structure that would create an impermissible interference; and

(3) The benefits to the applicant and the public will exceed any burdens.

(4) No person has demonstrated that the granting of a permit would cause an undue hardship in using his or her property in a manner consistent with existing zoning regulations and neighboring property uses.

(b) CONDITIONS.

(1) The Village Board may grant a permit subject to any condition or exemption the Village Board deems necessary to minimize the possibility that the future development of nearby property will create an impermissible interference or to minimize any other burden on any person affected by granting the permit. Such conditions or exemptions may include but are not limited to restrictions on the location of the collector and requirements for the compensation of persons affected by the granting of the permit.

(2) As a condition of receiving a permit, the permit holder shall be responsible for the cost of trimming [pre-existing] vegetation on property affected by the permit to prevent an impermissible interference. The permit holder shall give consideration to the desires of the property owner in trimming such vegetation and shall not unnecessarily remove vegetation which does not or will not in a reasonable period of time create an impermissible interference.

SEC. 10-8-6 APPEALS.

Any person aggrieved by a decision under this chapter may appeal the decision by making a written request to the Village Board within ten (10) days of the decision. The decision shall be reviewed by the Zoning Board of Appeals.

SEC. 10-8-7 RECORD OF PERMIT.

If the Village Board grants a permit:

(a) The Village Board shall specify the property restricted by the permit and shall prepare notice of the granting of the permit. The notice shall include the legal description pursuant to sec. 706.05(2)(c), Wis. Stats., for the property upon which the solar collector is or will be located and for any property restricted by the permit, and shall indicate that the property may not be developed and vegetation may not be planted on the property so as to create an impermissible interference with the solar collector which is the subject of the permit unless the permit affecting the property is terminated or unless a waiver agreement affecting the property is recorded under Section 10-8-9.

(b) The applicant shall record with the register of deeds of the county in which the property is located the notice under Subsection (a) for each property specified under Subsection (a) and for the property upon which the solar collector is or will be located.

(c) The Village Board shall note the location of any solar collector which is the subject of a permit on a map showing the location of all solar collectors for which permits have been granted and shall identify on the map all properties which are subject to restrictions resulting from the granting of a permit.

SEC. 10-8-8 RIGHTS OF PERMIT HOLDER.

The holder of a permit granted under this Chapter is entitled to access to sunlight for the solar collector subject to any conditions or exemptions in the permit and may seek damages for any loss caused by an impermissible interference or an injunction to prevent an impermissible interference as provided under sec. 66.032(7), Wis. Stats.

SEC. 10-8-9 WAIVER OF RIGHTS.

A permit holder by written agreement may waive all or part of any right protected by a permit. The permit holder shall record a copy of the agreement with the register of deeds. A copy of the agreement shall also be filed with the Village Board.

SEC. 10-8-10 TERMINATION OF PERMITS.

(a) Any rights protected by a permit under this Chapter shall terminate if the Village Board determines that the solar collector which is the subject of the permit is:
  (1) Permanently removed or is not used for two (2) consecutive years, excluding time spent on repairs or improvements, or
  (2) Not installed and functioning within two (2) years after the date of issuance of the permit.

(b) The Village Board shall give the permit holder written notice and an opportunity for a hearing on a proposed termination under Subsection (a).

(c) If the Village Board terminates a permit, the Village Board shall record a notice of termination with the register of deeds. The Village Board may charge the permit holder for the cost of recording.

(d) The Village Board shall modify the map of solar collectors prepared under Section 10-8-7(c) to reflect the termination of a permit.

SEC. 10-8-11 PRESERVATION OF RIGHTS.

The transfer of title to any property shall not change the rights and duties provided by a permit granted under this Chapter.

San Luis Obispo (California), City of. 2007. *Municipal Code*.
Current through Ordinance 1509, passed September 18, 2007

Title 16. SUBDIVISIONS
Chapter 16.18. GENERAL SUBDIVISION DESIGN STANDARDS

16.18.160 Energy conservation.

All subdivisions shall provide opportunities for passive or natural heating and cooling opportunities to each of the proposed lots, where determined by the reviewing body to be feasible, except for condominium conversion of existing structures where no new structures are added. Such opportunities may include, but are not limited to:

A. Siting of structures or building envelopes to take optimum advantage of passive cooling and heating opportunities.

B. Adjusting building setback lines to promote the optimum spacing of structures to create adequate solar access.

C. Orienting the longest dimension of each lot within thirty degrees of south, unless the subdivider demonstrates that for certain lots:

1. The lots are large enough to allow proper building orientation and maximum feasible control of solar exposure by the lot owner, regardless of lot orientation. Properly oriented building envelopes shall be established for lots smaller than one acre;

2. Buildings will be constructed as part of the subdivision project (as in condominium or planned development) and the buildings themselves will be properly oriented with adequate solar exposure;

3. Topography makes variations from the prescribed orientation desirable to reduce grading or tree removal or to take advantage of a setting which favors early morning or late afternoon exposure, or where topographical conditions make solar energy infeasible;

4. The size of the subdivision in relation to surrounding streets and lots precludes desirable lot orientation. (Ord. 1490 § 3 (part), 2006)

16.18.170 Easements for solar access.

A. In order to provide for the maximum feasible use of solar energy within subdivisions, the city may require establishment of easements for some or all of the lots to protect access to sunlight. Such easements shall be established on each parcel for the benefit of neighboring parcels within the subdivision. Such easements will not be required when:

1. A plan for building construction and landscaping is approved in conjunction with the subdivision approval, and the plan will provide an acceptable level of solar exposure, as provided in the energy element of the general plan; or

2. The size and shape of the parcels together with the yard and height restrictions of the zoning regulations will allow subsequent development of each parcel in a way which will not eliminate acceptable solar exposure for neighboring parcels within the subdivision; or

3. The subdivision is a condominium conversion.

B. Where required, solar access easements shall protect solar exposure during the period from ten a.m. to two p.m. Pacific Standard Time on the winter solstice, unless topographical conditions or other overriding design considerations make protection of some other, equivalent time interval more desirable. They shall be recorded concurrent with recordation of the subdivision map.

1. The burdens and benefits of the solar easement shall be transferable and run with the land to subsequent grantees of the original grantor(s) and grantee(s).

2. The description of the easement shall include:

a. A plan and orthographic view of the easement area in relation to lot lines, together with notations on the maximum height of structures or vegetation which may occupy the easement area;

b. A written description specifying the easement as a plane limiting the height of structures or vegetation, such plane beginning at a line clearly defined in relation to ground elevation and lot line location, and extending upward at a specific angle (altitude) in a specific direction (azimuth);

c. The restrictions placed on vegetation, structures or other objects which would impair or obstruct passage of sunlight through the easement; and

d. Any terms or conditions under which the easement may be revised or terminated.

3. The establishment of solar easements is not intended to result in reducing allowable densities or the percentage of a lot which may be occupied by structures under zoning in force at the time the easement is established. (Ord. 1490 § 3 (part), 2006)

City of Santa Barbara

SOLAR ACCESS PACKET

- ☐ Solar Access Height Limitations
- ☐ S.B. Municipal Code Sections Created or Amended by the Solar Access Ordinance: Ordinance #4426, Adopted 10/7/86
- ☐ Rules and Regulations Pertaining to the Protection and Enhancement of Solar Access in the City of Santa Barbara
- ☐ Solar Access Shadow Plan Preparation Instructions

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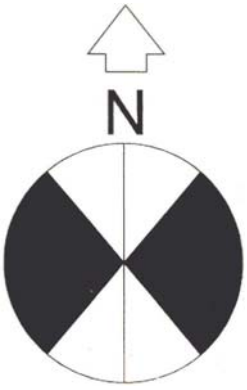
City of Santa Barbara

SOLAR ACCESS HEIGHT LIMITATIONS



TEMPLATE

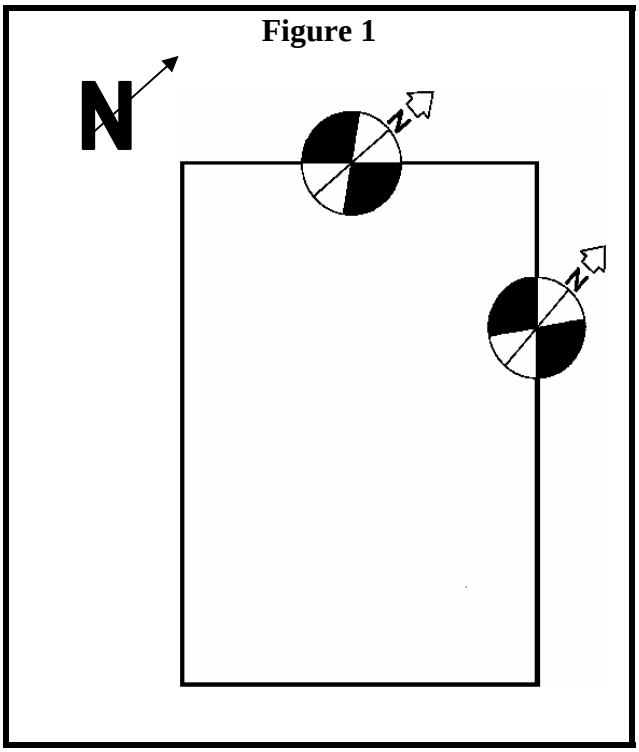
Use the following steps to determine whether your structure complies with the Solar Access Ordinance (SBMC Chapter 28.11). **This ordinance only applies in residential zones.** The purpose of the Solar Access Ordinance is to ensure that your building does not cast a significant shadow on your neighbor's building. This is determined by projecting a shadow that your building would cast on December 21, the day when the sun is lowest in the sky, and your building casts its longest shadow.

The sun shines from the south; therefore your building casts a shadow to the north. If your property is oriented towards one of the cardinal directions (North, South, East, or West), such as in the Outer State Street area, you will usually have one northern neighbor. If your property is located in the downtown area, it is oriented approximately 45 degrees away from the cardinal directions (Northeast, Northwest, Southeast or Southwest), and you may have more than one northerly neighbor. The first step in applying the Solar Access Ordinance to your property is to find all of your northerly property lines.

1. The City defines the northerly lot lines as, "The property line which forms a generally north facing boundary of the lot, and which has a bearing greater than or equal to 40º from either true north or true south." This definition doesn't mean much to most people, so here is an easy way to find your northerly lot lines. First find True North. Then eliminate all lot lines which are obviously not on the northern edges of the property.

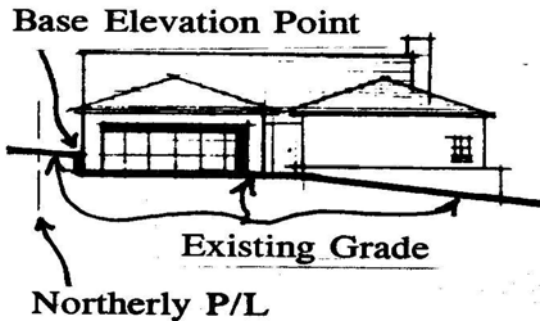
   To determine exactly which of the remaining lot lines are northerly lot lines, use the template which is located on the upper right corner of this page. Place the center of the circle on one of the remaining lot lines. Point the north arrow towards True North. If the lot line in question runs through the black area, it is a northerly property line. In Figure 1, there are two northerly property lines.

Figure 1



2. Establish the "base elevation point" on the east or west elevation plans by finding the highest point of contact between the building and the ground (See Figure 2). On a flat lot, the base elevation point will be the ground. On a sloped lot, the base elevation point will be on the uphill side of the house. The east elevation shows the building as if you were viewing it with your back facing east. The west elevation shows as if your if you were viewing it with your back facing west.

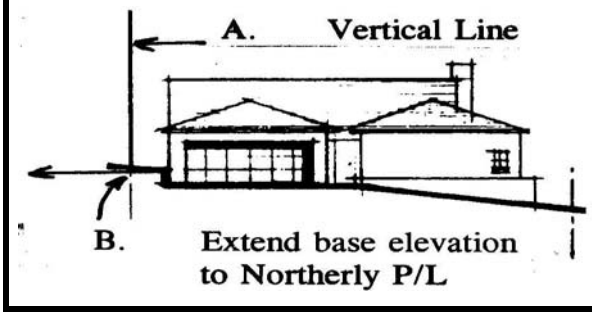
Figure 2



3. Draw the vertical extension of the northerly property line by drawing a vertical line at the northerly property line. See Figure 3, part A.

4. Draw a horizontal line from the base elevation point to the vertical extension of the northerly property line that you drew in Step 3. See Figure 3, part B.

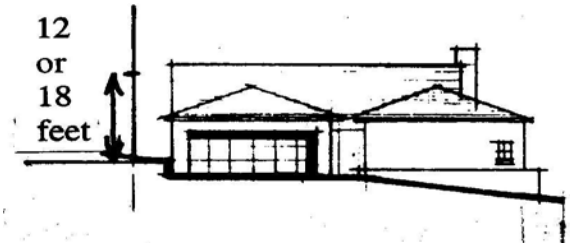
Figure 3



5. On the vertical extension of the northerly property line, mark off a height of either 12 or 18 feet above the base elevation, depending on the zone in which the building is proposed. See the following chart and Figure 4.

Zone	**Length of vertical line**
A, E, R-1, R-2	12 feet
R-3, R-4	18 feet

Figure 4

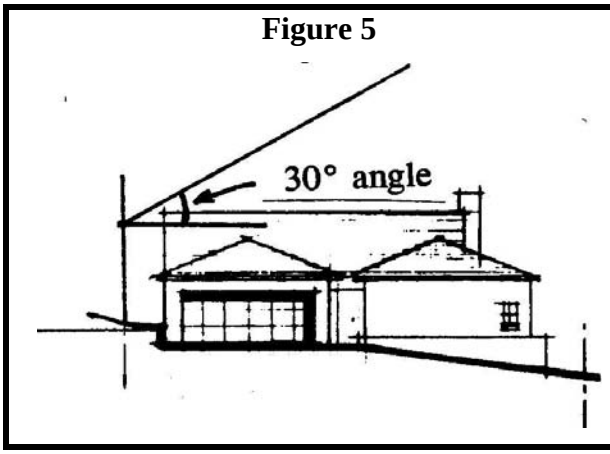


6. From the mark drawn on the vertical extension of the northerly property line in a pervious step, draw a diagonal line towards the proposed building or structure. The diagonal line should be drawn at a 30° angle above horizontal. See Figure 5.

   ☺ If the building is **below** the 30° line, it is **in compliance** with the solar height ordinance.

   ☹ If the building is **above** the 30° line, it is **not in compliance** with the solar height ordinance.

Figure 5



NOTE: *There are exemptions to these requirements for certain architectural features and for certain circumstances. See SBMC Chapter 28.11 for more information.*

City of Santa Barbara

SANTA BARBARA MUNICIPAL CODE SECTIONS CREATED OR AMENDED BY THE SOLAR ACCESS ORDINANCE: ORDINANCE #4426, ADOPTED 10/7/86

Chapter 28.11 PROTECTION AND ENHANCEMENT OF SOLAR ACCESS

28.11.010 Definitions.

For the purposes of this Chapter, the following words and phrases shall have the meaning indicated, unless the context or usage clearly requires a different meaning:

A. BASE ELEVATION. The elevation of the highest point of contact of a structure with the adjacent ground. For the purposes of this determination, all fences, covered and uncovered walkways, driveways, patio covers and other similar elements shall be considered separate structures.

B. NORTHERLY LOT LINE. Any lot line, of which there may be more than one per lot, that forms a generally north facing boundary of a lot and has a bearing greater than or equal to forty degrees from either true north or true south. For curved lot lines, the bearing of the lot line at any point shall be the bearing of the tangent to the curve at that point.

C. PLAN VIEW. A plot plan of the parcel which shows the horizontal dimensions of a parcel and each structure on the parcel.

D. RESIDENTIAL ZONE. An A-1, A-2, E-1, E-2, E-3, R-1, R-2, R-3 or R-4 zone as defined in Title 28 of the Santa Barbara Municipal Code.

E. SHADOW PLAN. A plot plan which shows the extent of shading caused by a proposed structure and is in compliance with the Rules and Regulations approved pursuant to Section 28.11.040 of this Chapter.

F. SOLAR ACCESS. The ability of a location to receive direct sunlight as provided by the height limitations of Section 28.11.020 of this Chapter. (Ord. 4426, 1986.)

28.11.020 Height Limitation.

The maximum elevation of each point on a structure in a residential zone as measured from the base elevation shall not exceed the sum of (i) eighteen (18) feet in an R-3 or R-4 zone or twelve (12) feet in all other residential zones and (ii) fifty-eight percent (58%) of the shortest distance from that point to the nearest northerly lot line as measured horizontally on the plan view of the structure. Any height limitation imposed by this Section shall be in addition to any other height limitation imposed in the Charter or this Code, such that the more restrictive height limitation shall apply. (Ord. 4426, 1986.)

28.11.030 Exemptions.

The following shall be exempt from the height limitations of Section 28.11.020:

A. Any portion of a structure in existence, or for which a valid building permit was issued, prior to the effective date of the ordinance first enacting this Chapter.

B. Any portion of a structure which received Preliminary Approval by the Architectural Board of Review prior to the effective date of the ordinance first enacting this Chapter.

C. Any flagpole, antenna, ornamental spire, chimney, or other building element less than four (4) feet along each horizontal dimension.

D. A utility pole and line.

E. Any portion of a structure for which a shadow plan is prepared and submitted by the applicant demonstrating that shadows cast by that portion of the structure at 9:00 a.m., noon, and 3:00 p.m., Pacific Standard Time on December 21 will:

1. Not exceed the boundaries of a simultaneous shadow cast by a legally existing structure, or by a hill or other topographical feature other than trees or other vegetation; or

2. Not shade that portion of any adjacent residentially zoned lot which is occupied by a dwelling or which could legally and without modification of required yards be occupied in the future by a dwelling; or

3. Fall entirely within the boundaries of an existing covered or uncovered paved off street parking area, or paved driveway leading thereto. (Ord. 4426, 1986.)

28.11.040 Rules and Regulations.

The Community Development Director may promulgate and administer rules and regulations necessary for the administration and interpretation of this Chapter, subject to approval by the City Council. (Ord. 4426, 1986.)

Chapter 28.15 A-1, A-2, E-1, E-2, E-3 and R-1 One-Family Residence Zones

28.15.050 Building Height.

No building in these zones shall exceed a height of thirty feet (30') nor exceed the height limitations imposed for the protection and enhancement of solar access by Chapter 28.11 of this Code. (Ord. 4426, 1986; Ord. 3710, 1974; Ord. 3540, 1972.)

Chapter 28.18 R-2 TWO-FAMILY RESIDENCE ZONE

28.18.050 Building Height.

No building in the R-2 Zone shall exceed a height of thirty feet (30') nor exceed the height limitations imposed for the protection and enhancement of solar access by Chapter 28.11 of this Code. (Ord. 4426, 1986; Ord. 3710, 1974; Ord. 3587, 1973.)

Chapter 28.21 R-3 LIMITED MULTIPLE-FAMILY RESIDENCE ZONE AND R-4 HOTEL-MOTEL-MULTIPLE RESIDENCE ZONE

28.21.050 Building Height.

Three (3) stories, which three (3) stories combined shall not exceed (i) forty-five feet (45') nor (ii) exceed the height limitations imposed for the protection and enhancement of solar access by Chapter 28.11 of this Code. (Ord. 4426, 1986; Ord. 3710, 1974; Ord. 2585, 1957.)

Chapter 28.92 VARIANCES, MODIFICATIONS AND ZONE CHANGES

28.92.026 Modifications.

Modifications may be granted by the Planning Commission or by the Community Development Director as follows:

A. BY THE PLANNING COMMISSION. The Planning Commission, subject to appeal to the City Council, may permit the following:

1. A modification or waiver of the parking or loading requirements where, in the particular instance, the modification will not be inconsistent with the purposes and intent of this Title and will not cause an increase in the demand for parking space or loading space in the immediate area.

2. A modification of yard, lot and floor area regulations where the modification is consistent with the purposes and intent of this Title, and is necessary to (i) secure an appropriate improvement on a lot, (ii) prevent unreasonable hardship, (iii) promote uniformity of improvement, or (iv) the modification is necessary to construct a housing development which is affordable to very low-, low-, moderate- or middle-income households.

3. A modification of fence, screen, wall and hedge regulations where the modification is necessary to secure an appropriate improvement on a lot and is consistent with the purposes and intent of this Title.

4. A modification of height limitations imposed by Section 28.11.020 to protect and enhance solar access where the modification is necessary to prevent an unreasonable restriction. The Rules and Regulations approved pursuant to Section 28.11.040 shall contain criteria for use in making a finding of unreasonable restriction.

5. A modification of building height limitations for existing buildings or structures that exceed the current building height limit, to allow the exterior of the portion of the building or structure that exceeds the building height limit to be improved or upgraded, provided that the improvements increase neither the height nor the floor area of any portion of the building or structure that exceeds the building height limit, except as otherwise allowed in the Code.

B. BY THE COMMUNITY DEVELOPMENT DIRECTOR. Following a public hearing for which notice is given in the manner required by Section 28.92.023 of the Code, the Community Development Director may permit minor modifications in accordance with subsections 1., 2., 3., 4., and 5. above, if said Director finds that:

1. The requested modification is not part of the approval of a tentative subdivision map, conditional use permit, development plan, site plan, plot plan, or any other matter which requires approval of the Planning Commission; and

2. If granted, the modification would not significantly affect persons or property owners other than those entitled to notice.

C. REFERRAL BY COMMUNITY DEVELOPMENT DIRECTOR TO PLANNING COMMISSION. The Community Development Director may, at any time after receipt of an application, determine that the application should be heard by the Commission and shall refer said matter to the Commission for decision. In the event that the Community Development Director determines to refer the application to the Commission and announces the time and place of the Commission meeting at the time set for the public hearing or during the public hearing scheduled before the Community Development Director, a new notice of hearing need not be sent prior to the Commission meeting.

D. APPEAL AND/OR REVIEW OF MODIFICATION DECISION RENDERED BY THE COMMUNITY DEVELOPMENT DIRECTOR.

1. After the Planning Commission is given written notice of the decision by the Community Development Director, or his or her designated appointee (hereinafter "hearing officer"), the Chairperson, Vice Chairperson or other designated member of the Planning Commission, may take action to suspend said decision and schedule a public hearing by the Planning Commission to review said decision and direct the Community Development Director to give notice of said hearing.

2. An appeal by any party shall be filed with the Community Development Director within ten calendar days after the decision by the hearing officer which shall be reported in writing to the Planning Commission within seven days after the decision.

3. In the absence of a timely appeal of the decision made by the hearing officer or a timely action by the Chairperson, Vice Chairperson or other designated member of the Planning Commission to suspend the decision, the decision shall be final.

4. An appeal or review of the decision of the hearing officer shall be conducted by the Planning Commission which shall decide, subject to appeal to the City Council, whether the modification shall be approved, denied or approved with conditions.

5. Any review by the Planning Commission of the decision by the hearing officer shall be consolidated with and considered at the same time as any timely appeal of said decision. (Ord. 5072, 1998; Ord. 4912, 1995; Ord. 4789, 1992; Ord. 4426, 1986; Ord. 4203, 1983; Ord. 4141, 1982; Ord. 4063, 1980; Ord. 3894, 1977; Ord. 3710, 1974.)

City of Santa Barbara

RULES AND REGULATIONS PERTAINING TO THE PROTECTION AND ENHANCEMENT OF SOLAR ACCESS IN THE CITY OF SANTA BARBARA

ADOPTED OCTOBER 7, 1986
AMENDED MARCH 31, 1998

(Attachment to Resolution 98-027)

1. **Authority**

These rules and regulations are promulgated and approved pursuant to Santa Barbara Municipal Code Section 28.11.040.

2. **Policy for Protection and Enhancement of Solar Access**

a. GOALS. It is the goal of the City to promote the use of renewable energy resources, including solar energy. Since the present and future applications of solar energy are well suited to the needs of the residential sector, the City Council adopted Ordinance No. 4426 on October 7, 1986. The intent of the ordinance is to:

i. Establish height limitations for structures constructed hereafter in a residential zone so as to provide a balance between solar rights and development rights. The Municipal Code contains a formula that allows the maximum building height to increase in relation to the distance from a northerly lot line (SBMC §28.11.020).

ii. Allow the Community Development Department to establish rules and regulations regarding administration and interpretation of the Municipal Code Sections related to solar access, subject to City Council approval.

It is not the intent of the ordinance to reduce the allowable number of units on any lot, nor to discourage the development of affordable housing. It is not the intent of the ordinance to establish height limitations on vegetation, because existing state law on this subject is considered adequate for the time being. Neither is it the intent of the ordinance to consider shadows cast by vegetation as a permanent shading source. Therefore, a structure shall not be granted relief from the height limitations on the grounds that its shadow fall within those cast by existing vegetation.

b. POLICY. The Community Development Director shall pursue a policy of:

i. Enforcing the height limitation contained in SBMC §28.11.20; and

ii. Facilitating the granting of appropriate modifications.

3. **Compliance with Height Limitations**

a. HEIGHT LIMITATIONS. The allowable height of any point on a structure in a residential zone is set forth in §28.11.020 of the Santa Barbara Municipal Code. The Community Development Director may, at any time prior to or during construction, require calculations demonstrating compliance with such limitations. The height limitations is related to the distance from a northerly lot line, which is defined so as to include any lot line facing within 40 degrees of north. The intention of this definition is to include both the northwest and northeast lot line on a lot that is oriented 45 degrees away from the cardinal points of

the compass. This is considered necessary so as to provide protection to southeast and southwest facing walls and roof areas.

b. NATURAL GRADE. In determining the base elevation for use in calculating allowable building height, the natural grade shall be used to determine the "highest point of contact of the structure with the adjacent ground."

c. SHADOW DIAGRAMS.

i. In order to obtain an exemption based on SBMC §28.11.030.D, the applicant must submit an acceptable shadow diagram including the following information:

(1) A true north arrow;

(2) Topographical features of the proposed site and any adjacent northerly lots, and existing improvements thereon;

(3) Plan view and exterior elevation view of the proposed structure showing the location of all northerly property lines on both;

(4) Diagrams of the shadows cast at 9:00 a.m., Noon, and 3:00 p.m. Pacific Standard Time on December 21 by the portion of the structure being considered for an exemption.

(5) Any other information deemed necessary by the Community Development Director.

ii. The shadow diagram may be included on the site plan or may be a separate diagram.

iii. The Community Development Director shall provide a sample shadow diagram as a part of the informational materials prepared to implement SBMC Chapter 28.11.

4. **Modification of Solar Access Height Limitations**

a. MUNICIPAL CODE REFERENCE. Santa Barbara Municipal Code §28.92.026.A.4 allows modification of the solar access height limitations to be granted where the modification is necessary to prevent an unreasonable restriction.

b. CRITERIA FOR DETERMINATION OF UNREASONABLE RESTRICTION.

i. MAINTAINING ALLOWABLE NUMBER OF DWELLING UNITS. In the event that the solar access height limitations result in a reduction in the otherwise allowable number of dwelling units in a residential structure or development, including density bonus, such situation may be considered an unreasonable restriction if all of the following criteria apply:

(1) Every feasible effort has been made for the proposed development or structure to comply with the solar access height limitations established by SBMC §28.11.020, and the development or structure is determined to be unable to achieve the otherwise allowable number of dwelling units without violating such height limitations; and

(2) The proposed infringement on solar access is the minimum necessary to permit the allowable number of units on the property.

Applicants desiring a modification on the basis of such criteria shall provide documentation demonstrating that the above criteria are met and demonstrating the

reason that the non-complying portion of the structure or development cannot be relocated or redesigned so as to be in compliance.

ii. AFFORDABLE HOUSING. A development which includes 25% or more dwelling units meeting the affordability criteria of the Community Development Department and which is subject to City monitoring of rent or resale price levels for a minimum of ten years shall receive special consideration in the granting of modifications of the solar access height limitations. If compliance with such limitations will result in significant additional costs for the construction phase of development, this additional cost may be considered an unreasonable restriction.

An applicant desiring modification based on this criterium shall provide adequate documentation showing the extent of the extra costs associated with compliance and demonstrating that the proposed infringement on solar access is the minimum necessary to prevent significant extra construction costs.

iii. CONSIDERATION OF SECOND STORY ADDITIONS. In cases of second story additions to dwellings in residential zones other than R-3, a modification of the solar access height limitations may be granted on the basis of an unreasonable restriction such that the height limitation would be the same as that specified for R-3 and R-4 zones by SBMC Section 28.11.020 providing that all of the following criteria apply:

(1) All portions of the proposed addition which will violate the solar access height limitations for zones other than R-3 and R-4, except for roof overhangs of up to two (2) feet, are entirely within the perimeter of a structure which was constructed or was issued a building permit prior to the effective date of the ordinance first enacting SBMC Chapter 28.11.

(2) The horizontal dimensions of the proposed addition, excluding roof overhangs, as measured parallel to all northerly lot lines of the lot upon which it is proposed, do not exceed twenty five (25) feet, except that portions of the addition that comply with the solar access height limitations for zones other than R-3 and R-4 shall be exempt from the provisions of this sentence.

(3) All portions of the addition which violate the solar access height limitations for zones other than R-3 and R-4 have been designed so as to cast no shadow at 9:00 a.m., Noon, and 3:00 p.m. PST on December 21 on any solar collector in existence, or for which a building permit has been issued. For the purposes of this subsection, a solar collector shall be any device which is designed primarily to collect solar energy and which contains an area of twenty four (24) square feet or more.

(4) The amount of direct sunlight on all south facing windows on any adjacent lot at 9:00 a.m., Noon, and at 3:00 p.m. PST on December 21 following construction of the proposed addition will be greater than or equal to the amount of such sunlight in the event that the maximum addition in compliance with the solar access height limitations were to be constructed. The effect of shade caused by vegetation shall not be a consideration in this determination. For the purposes of this subsection, south facing windows

shall include any window in a dwelling which faces 45 degrees or less from true south and which separates heated from non-heated space.

Applicants desiring a modification of the solar access height limitations based on these criteria shall provide adequate documentation, including but not limited to shadow diagrams as described in Section 3, Paragraph C above, demonstrating that these criteria are met.

iv. TWO AND THREE STORY STRUCTURES IN THE CENTRAL BUSINESS DISTRICT. A modification may be granted to applicants proposing to construct a two (2) or three (3) story structure on property zoned R-3 or R-4 and located in the Central Business District pursuant to SBMC §28.92.26(A.)(4.) provided the following:

(1) The property has less than the required 60 feet of frontage on a public street;

(2) All portions of the structure which exceed the requirements of the solar access height limitations for zones R-3 and R-4 have been designed so as to cast no shadow at 9:00 a.m., Noon, and 3:00 p.m. PST on December 21 on any solar collector in existence, or for which a building permit has been issued. For the purposes of this subsection, a solar collector shall be any device which is designed primarily to collect solar energy and which contains an area of twenty four (24) square feet or more.

(3) The amount of direct sunlight reaching all south facing windows of any structure on an adjacent lot at 9:00 a.m., Noon, and at 3:00 p.m. PST on December 21 following construction of the proposed third story will be greater than or equal to the amount of such sunlight in the event that the maximum development in compliance with the solar access height limitations were to be constructed. The effect of shade caused by vegetation shall not be a consideration in this determination. For the purposes of this subsection, south facing windows shall include any window in a dwelling which faces 45 degrees or less from true south and which separates heated from non-heated space.

Applicants desiring a modification of the solar access height limitations based on these criteria shall provide adequate documentation acceptable to the Community Development director, including but not limited to shadow diagrams as described in Section 3, Paragraph C above, demonstrating that these criteria are met.

For the purposes of this Resolution, the Central Business District (CBD) shall be defined as the area bounded by Garden Street on the northeast, De La Vina Street on the southwest, Arrellaga Street to the northwest and U.S. Highway 101 to the southeast.

5. **Modification of Required Yards to Promote the Use of Solar Energy**

a. MUNICIPAL CODE REFERENCE. Santa Barbara Municipal Code Section 28.92.026.A.2 allows a modification of required yard size where the modification is consistent with the purposes and intent of the Zoning Ordinance (SBMC Title 28) and is necessary to:

i. Secure an appropriate improvement on a lot,

ii. Prevent unreasonable hardship, or

iii. Promote uniformity of improvement.

b. CRITERIA FOR MODIFICATIONS OF REQUIRED YARDS TO PROMOTE THE USE OF SOLAR ENERGY. The construction of a dwelling or a solar energy collection and/or storage device within a required yard may be considered an appropriate improvement on a lot and the basis for a modification of required yards as follows:

i. A modification may be granted for up to a 50% reduction in a required yard dimension for the purpose of locating a dwelling to achieve better solar access, provided that all of the following criteria are met:

(1) The portion of the required yard that is reduced as a result of the modification will be added to the required yard space elsewhere on the lot; and

(2) The proposed structure is designed so as to utilize the solar energy provided by the improved solar access.

Applicants for such modifications shall provide adequate documentation demonstrating that the above criteria are met.

ii. A modification for up to 50% reduction of a required yard dimension may be granted for the purpose of installing a solar energy collection and/or storage device, provided that all of the following criteria are met:

(1) The device is primarily for use in collecting and/or storing solar energy; and

(2) The device or structure will not provide additional habitable floor space.

Applicants for such modifications shall provide adequate documentation demonstrating that the above criteria are met.

iii. In cases where construction is proposed on two adjacent lots at the same time, a zero lot line modification may be granted for the purposes of improving solar access. In such cases, a required interior may be eliminated so as to allow the joining of structures along a common lot line provided that all of the following criteria are met:

(1) Both structures are applied for and approved concurrently;

(2) The opposite required yards on both lots are increased by the amount eliminated such that there will be no increase in the buildable area on either lot; and

(3) The applicant demonstrates the advantages gained for improved solar access.

c. POLICY STATEMENT IN SUPPORT OF SOLAR ENERGY. As a part of the City's support for the use of solar energy, applications for such modifications shall be given special consideration and regarded favorably as long as the modifications would not substantially impair other purposes and intents of the Zoning Ordinance.

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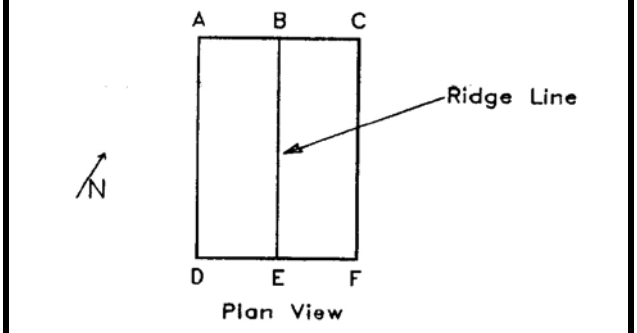
City of Santa Barbara

SOLAR ACCESS
SHADOW DIAGRAM PREPARATION INSTRUCTIONS

If your building does not meet the Solar Access Height limitations (SBMC §28.11.020), use the following procedure to prepare a shadow diagram for the hours of 9:00 a.m., Noon & 3:00 p.m. on December 21 to determine whether your structure qualifies for one of the exemptions contained in Section §28.11.030.E.

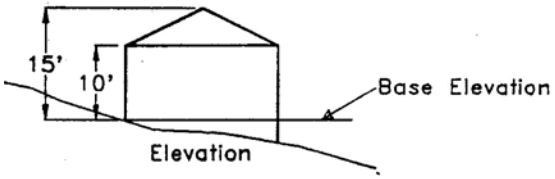
1. On the site plan, locate the prominent shadow casting portions of the proposed structure, such as ridge lines, eaves, and parapets. (Points A, B, C, D, E, and F in Figure 1).

Figure 1



2. Determine the height of each of these points above the adjacent property where shadows will be cast. (For simplicity you may assume that the property shown in Figure 2 is flat and at the same elevation as the "Base Elevation" of your structure as defined in SBMC 28.11.010.)

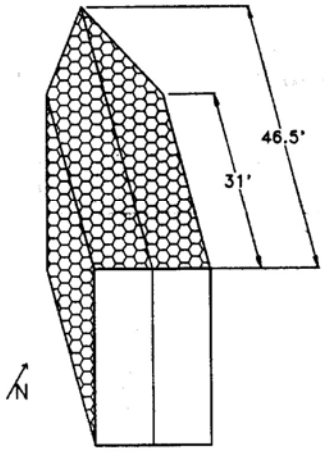
Figure 2

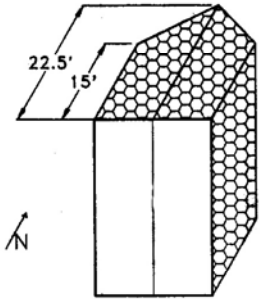


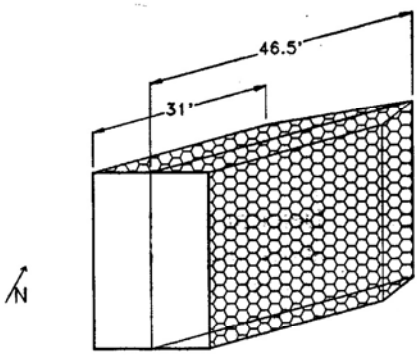
3. Use the following chart to determine the direction and length of shadows for the particular time of day in question.

	TIME OF DAY, DECEMBER 21 (WINTER SOLSTICE)		
	9:00 a.m.	**Noon**	**3:00 p.m.**
Direction of Shadow	Northwest (N 45 W)	North	Northeast (N 45 E)
Length of Shadow	3.1 times height	1.5 times height	3.1 times height

Draw lines accordingly on the site plan. Connect the ends of the shadow lines to create a shadow pattern for the structure. The prominent shadow casting portions of the proposed structure, such as ridge lines, eves and parapets are shown on the diagrams below.







Solar Energy Systems

City of Piedmont
COUNCIL AGENDA REPORT

DATE: September 5, 2006

FROM: Kate Black, City Planner

SUBJECT: **First Reading of an Ordinance Amending Chapter 17 Regarding Solar Panels, and Resolution to waive Building Permit fees for certain Solar Energy Systems**

RECOMMENDATION:

1. By motion, approve a first reading of Ordinance 666 N.S. (Exhibit A, page 4), which will amend Sections 17.20.4 (xviii) and 17.20.5.b. (viii), (ix), (x) and (xi) of Chapter 17, the Planning and Zoning Code; and

2. By motion, approve the attached resolution (Exhibit B, page 11) to waive the Building Permit fee for solar energy system applications that propose to install the exterior solar equipment on non-street facing roof slopes.

INTRODUCTION:

In 2005, the State of California enacted new legislation that prevents cities from adopting ordinances requiring design review for property owners who wish to install solar energy systems on their properties. The new law is attached as Exhibit C, page 12.

BACKGROUND:

For many years, the City of Piedmont required design review of exterior solar energy systems by either the Planning Commission or staff, depending on the scope and cost. Both types of review required notice to neighbors, and permitted neighbors to express support or concern about the project. More importantly, a site visit was made by either the Commission or staff to evaluate the proposed exterior location of the equipment in the context of neighboring properties, so it could be determined if there would be any adverse impacts. The solar energy systems usually involve solar voltaic receptors (usually called panels), conduit and other related physical equipment, and can be roof-mounted or ground-mounted. The primary goal of the site and context evaluation was to determine whether or not there might be too much glare reflecting off the surface of the panels into living spaces of upslope residences or onto adjacent streets. Additionally, applicants were routinely encouraged to install their panels on the rear roof slopes of their residences, so the equipment would not be very visible from the street and adjacent side properties.

In 2005, staff was unaware of the change in State law, but in an effort to streamline application processing, modified the Zoning Code to eliminate from design review applications proposing low-profile, non-reflective solar panels that are not visible from any street, as this type of solar project rarely caused negative impacts, and were routinely approved without neighbor objections. Only projects with reflective, high-profile panels on street-facing roofs were still required to go through Administrative Design Review with adjacent affected neighbor sign-off.

CHANGES CREATED BY THE NEW LAW:

Attached as Exhibit C, page 12, is the new legislation concerning solar energy systems which staff was made aware of earlier this year. The new law states in part:

> "local agencies [shall] not adopt ordinances that create unreasonable barriers to the installation of solar energy systems, including, but not limited to, design review for aesthetic purposes. . . . A city or county shall administratively approve applications to install solar energy systems through the issuance of a building permit or similar nondiscretionary permit. . . . The requirements of local law shall be limited to those standards and regulations necessary to ensure that the solar energy system will not have a specific, adverse impact upon the public health or safety."

Overall, it seems clear that the law is intended to prevent design review from becoming a barrier to the construction of solar facilities. However, the language states that cities are not permitted to adopt ordinances that require design review of solar equipment, but it does not address whether cities that *already have* design review ordinances (as is the case with Piedmont) can continue to apply them. There appear to be a few cities that seem to be making that interpretation. However, the City Attorney feels that the language of the law - although not drafted as well as it might have been – clearly intends to limit a jurisdiction's review of solar equipment to a ministerial review through a building permit. The law provides that the permit cannot be denied unless the Building Official finds that the solar energy systems would constitute a health and safety hazard.

When staff learned of the new legislation earlier this year, we contacted other cities to find out how they were interpreting the new legislation. Initially, we found a number of cities that were unaware of the new law, and in fact, it was our call that alerted them to it. As indicated on the attached table (Exhibit D, page 15), many cities simply stopped requiring design review for solar panels once they learned of the new law, but have not yet amended their codes. Since learning of the new law, Piedmont staff also stopped requiring design review of new solar equipment. However, in order to eliminate confusion and provide Piedmonters with a code that complies with State law, staff propose the attached code amendments (Exhibit A, page 4).

DESIGN ISSUES:

While most people would agree that regulations aimed at achieving energy conservation are a good thing, there are likely to be Piedmonters who will be disappointed to see solar panels being located on highly visible, street-facing roof slopes or yards. Given that staff

will no longer be able to work with applicants through design review to make sure that solar panels and related equipment are located so they are not visible from the street, staff looked for another way that property owners might be encouraged to install their equipment in less visible areas of their properties. To address this issue, staff is proposing that for applicants who install solar equipment on non-street facing roof slopes and yards, the building permit fee for the installation of the equipment be waived.

Coincidentally, the City recently received a request from the Sierra Club asking the City to lower our Building Permit fees to encourage homeowners to install solar equipment (Exhibit E, page 17). This change would be in line with their request since most solar applicants will be able to install their proposed equipment in non-street facing locations, and therefore, will not have to pay a permit fee at all. It would also be in keeping with the language of the statute which states:

> "It is the intent of the Legislature that local agencies comply not only with the language of this section, but also the legislative intent to encourage the installation of solar energy systems by removing obstacles to, and minimizing costs of, permitting for such systems."

While waiving the building permit fee for solar construction projects might serve as an incentive to homeowners, it should not make much of a dent in the overall balance between the City's revenue from application fees, and the cost of providing inspection services. Since 2001, the City has processed an average of 3 solar equipment applications per year, with the average fee being $735. Even with an anticipated increase in applications resulting from the recent dramatic rise in energy costs, the loss of revenue from the building permits should not be more than $3,675 annually (5 applications per year x $735). Compared against the total revenue from building permits in 2005, this would result in .01% of the total revenue from permits.

CONCLUSION:

In order to comply with State law, staff is proposing to amend Chapter 17 to eliminate design review as a requirement for applications seeking to install exterior solar energy systems. To address the City's long-standing goal of encouraging applicants to install solar systems on non-street facing roof slopes and yards, staff is proposing that the building permit fee be waived for applications that propose solar systems on structures and yards that are not visible from a street. This should have a very slight impact on building permit revenue, and may serve to minimize the visibility of solar equipment from public streets.

Date report prepared: August 30, 2006

EXHIBITS:

Exhibit A, page 4	Ordinance No. 666 N.S. Amending Chapter 17
Exhibit B, page 11	Resolution Waiving Fees for Certain Projects
Exhibit C, page 12	Government Code Section 65850.5
Exhibit D, page 15	Table of City Responses to New Law
Exhibit E, page 17	Letter from Sierra Club

EXHIBIT A

ORDINANCE NO. 666 N.S.

AN ORDINANCE AMENDING CHAPTER 17 OF THE MUNICIPAL CODE REGARDING SOLAR PANELS
(Changes are shown in strikethrough and italics formats in red type)

The City Council of the City of Piedmont hereby ordains:

SECTION 1.

It is the intent of the City Council in enacting this Ordinance to conform the city code to state regulations regarding installation of solar panels.

SECTION 2

Sections 17.20.4 and 17.20.5 of the Piedmont Municipal Code are hereby revised as follows:

"17.20.4: Exceptions: Scope of Review.

(a) Exceptions Listed. The following shall be excepted from the requirements of this section 17.20:

(i) Unless otherwise regulated by this City Code, interior remodeling of existing buildings where the use of the property, number of rooms eligible for use as a bedroom, and exterior form of the building is unchanged; (Ord. No. 579 N.S., 9/96, Ord. 648 N.S. 6/04)

(ii) Fences that are no greater than six feet (6') in height, not located in a front or street-side setback of a corner or through lot, and retaining walls retaining existing grade, that are less than thirty inches (30");
(Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(iii) On-grade or below-grade improvements, including but not limited to, walkways, patios and decks under 12 inches in height, irrigation lines and drainage works, unless a variance for hardscape surface coverage is required, or unless the improvement is a patio in the front yard setback, or a new or enlarged driveway or parking pad anywhere on the lot.
(Ord. No. 565 N S., 5/95; Ord. No. 579 N.S., 9/96, Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(iv) Normal repairs, replacement and maintenance of existing construction, so long as there is no change in the materials, design and size of the feature being repaired or replaced; (Ord. No. 562 N.S., 3/95; Ord. No. 579 N.S., 9/96, Ord. 648 N.S. 6/04)

(v) Minor construction related changes to previously approved plans which are architecturally compatible with approved new construction and existing construction, so long as the prior written approval of all affected neighbors has been obtained by the property owner and provided to the City Planner. (Ord. No. 562 N.S., 3/95)

(vi) A satellite dish less than one meter in diameter. (Ord. No. 562 N.S., 3/95; Ord. 594 N.S. 11/17/97)

(vii) A change in roof material, provided that the new roof material is not a light or reflective color or surface for the following changes:

1. Existing sloped roofs with wood shingles, wood shakes, tar and gravel or other granular material to composition shingles, or cap sheet to tar and gravel, provided that all sloped roofs for the entire house and detached structures are proposed to change. (Ord. 662 N.S. 1/06)

2. Existing flat roofs with any material to tar and gravel, or other similar material such as modified bitumen with a granular surface, provided that exposed seams are covered with a granular surface.
(Ord. 648 N.S. 6/04)

(viii) New or relocated electrical panels that are no greater than 200 amps, gas meters or alarm boxes, provided that they are not located on the front wall, street-facing side wall, or area of a side wall containing the front door; and such meters, boxes, panels, exposed lines, and exposed conduit are painted to match the structure color. (Ord. 648 N.S. 6/04)

(ix) The complete demolition and/or removal of (a.) outdoor features including fences, secondary structures, pools, decks, patios, awnings, greenhouses, storage sheds, solar panels and equipment, and exterior lighting not required by the Piedmont Building Code; (b.) non-original decorative architectural elements such as shutters and flower boxes; and (c.) exterior architectural elements including chimneys, skylights, vents, chases, stacks, and conduit, provided that the area is patched and painted to match the adjacent wall, eave, or roof material. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(x) The installation of downward-directed low voltage path lights and stair lights, and downward-directed wall lights required by the Piedmont Building Code of a maximum 60 watts, that have an opaque shade that completely covers the light bulb. (Ord. 648 N.S. 6/04)

(xi) The construction of mailboxes and non-structural decorative elements such as flower boxes, house numbers and mail-slots. (Ord. 648 N.S. 6/04)

(xii) New or relocated non-structural portable barbeques, bird baths and fountains that do not require electricity, gas or plumbing. (Ord. 648 N.S. 6/04)

(xiii) New or relocated copper gutters and downspouts and other wood or metal gutters and downspouts that are painted to match the existing structure or trim color. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(xiv) New or relocated low-profile flues, vents and spark arrestors that are mounted on the wall or roof, not including wall-mounted plumbing lines or stacks, that have no exterior fans or blowers, provided that the vents/flues/spark arrestors project less than 12 inches and are painted to match the adjacent wall, roof or chimney color. Roof-mounted attic or ridge vents may be covered in the matching roof material in lieu of painting. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(xv) New or relocated crawl space access doors that are not full height, and pet doors, not located on the front wall of a house that are painted to match the house color. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(xvi) The replacement of existing "bubble" skylights with flat-profile skylights, provided that there is no change in size or location. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(xvii) New or replacement flooring material on decks, balconies, patios, stairs, and entry porches and stairs, provided that the entire surface is replaced. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(xviii) ~~New or modified non-reflective roof-mounted solar panel, such as photovoltaic roof tiles, that project less than 12 inches (12") from the roof surface, provided that they are not located on any street-facing roof slope, or are located behind a parapet on a flat roof, and are not visible from any street or roadway. (Ord. 662 N.S. 1/06)~~

Solar energy systems and related equipment.

(xix) Modifications to prior approvals that otherwise are not regulated by this Chapter, subject to the approval of the Director of Public Works.

(b) Fees. Except when there is no change whatsoever in design, a review fee shall be collected for improvements described in sections 17.20.4(a), along with a building permit fee. The amount of the review fee shall be determined by the City Council from time to time. (Ord. No. 579 N.S., 9/96, Ord. 635 N.S. 1/03)

17.20.5: Administrative Design Review Approval. A project subject to design review under Section 17.20.2 shall nevertheless be approved, approved with conditions, or denied without notice and hearing by the Director of Public Works if the Director of Public Works finds that the change in design is so insubstantial that there is no foreseeable effect on the public welfare, and the project is one of the listed projects below. Findings shall be made for each of the three standards of Section 17.20.9 to approve the design of a project under this Section 17.20.5. Any applicant may appeal any action of the Director of Public Works as provided in Section 17.25. (Ord. 615 N.S. 3/00; Ord. 635 N.S. 1/03)

(a) Projects Not Requiring Adjacent Neighbor Sign-Off. The following projects may be approved without neighborhood notification or appeal, provided the project meets each of the three standards of Section 17.20.9(a) and is found to be in compliance with the criteria in the Residential Design Review Guidelines and approved city policies. At the discretion of the Director of Public Works, such application pursuant to this section may be deferred to the Staff Design Review process under 17.20.7:

(i) The removal of a window or door, or the reduction in size of a window or door within the existing opening, provided that the wall is patched and painted to match the surrounding wall; (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(ii) New chimney tie-downs, seismic bracing, and caps, provided that such bracings and caps are painted to match the structure walls, chimney or roof color; (Ord. 648 N.S. 6/04)

(iii) New or relocated gas meters, alarm boxes, and electrical panels that are no greater than 200 amps, proposed on the front wall, street-facing side wall, or area of a side wall containing a front door, provided they are painted to match the structure color; (Ord. 648 N.S. 6/04)

(iv) New or modified handrails on existing stairs and handrails on new or renovated on-grade stairs; (Ord. 648 N.S. 6/04)

(v) Changes to deck or stair railings to meet the current California Building Code, such as adding stiles to meet the minimum spacing requirement or increasing the height to meet the required minimum height, provided that there is no significant change in materials or design; (Ord. 648 N.S. 6/04)

(vi) The replacement of an existing feature not involving a change in size or location, such as a window, door, and garage door replacement, and the installation of a new garage door for a garage that does not currently have one; and (Ord. 662 N.S. 1/06)

(vii) Temporary handicap features such as wheelchair ramps, to accommodate handicapped and disabled residents for a period of up to one year. (Ord. 662 N.S. 1/06)

(viii) Other very minor changes to a structure subject to the approval of the Director of Public Works, provided that the change is very minor or is minor and not permanent. (Ord. 648 N.S. 6/04)

(ix) Modifications to prior approvals for projects that are eligible for Administrative Design Review without neighbor sign-off. (Ord. 662 N.S. 1/06)

(b) Projects Requiring Adjacent Neighbor Sign-Off. The following projects may be approved without neighborhood notification or appeal, provided that prior written approval of the property owners of all adjacent affected properties has been obtained by the applicant and submitted as part of the application, and provided that the project meets each of the three standards of Section 17.20.9*(a)* and is found to be in compliance with the criteria in the Residential Design Review Guidelines and approved city policies. If the applicant is not able to obtain adjacent affected property owner sign-off, or at the discretion of the Director of Public Works, such application pursuant to this section shall be ineligible for Administrative Design Review, and shall instead be subject to the provisions of the Staff Design Review process under 17.20.7:

(i) Minor design revisions to previously approved staff or Planning Commission design review applications including minor window changes (size, location, design); minor door changes (such as sliding to French); landscape material changes; the elimination of a feature previously approved (such as a window or exterior light fixture); the retention of an existing feature that was previously proposed to be removed (such as a window or exterior light

fixture), provided that the change is limited to a feature or aspect of the prior approval, and provided that there is no increase in structure coverage, hardscape surface coverage, or floor area ratio; (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(ii) Chimney extensions and minor chimney modifications not involving significant design or materials changes to meet the requirements of the California Building Code; (Ord. 648 N.S. 6/04)

(iii) Landscape lighting not otherwise regulated by this chapter, including up-lights, entry lights and wall or fence-mounted lights, and any other exterior lighting (Ord. 648 N.S. 6/04)

(iv) New, relocated or enlarged driveways and parking pads. (Ord. 648 N.S. 6/04)

(v) Storage structures not located in required setbacks or otherwise exempt from a building permit pursuant to Section 5.2.2 of the City Code. (Ord. 635 N.S. 1/03)

(vi) Minor modifications to existing decks, such as a new railing or stair design, not involving a change in deck size; (Ord. 648 N.S. 6/04)

(vii) New flat-profile skylights that project less than 12 inches provided that they are not located on any street-facing roof slope, or are located behind a parapet on a flat roof, and are not visible from any street or roadway; and (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

(viii) ~~New or modified solar panels not otherwise regulated by this Chapter; (Ord. 662 N.S. 1/06)~~

~~(ix)~~ New or relocated walls, fences or a combination of wall and fence greater than six feet (6') in height but no more than eight feet (8') in height, provided that the wall or fence are not located within the front yard setback**,** street side yard setback or rear yard setback of a through lot.
(Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

~~(x)~~ ~~New or modified roof-mounted solar panels that are reflective but project less than 12 inches (12") from the roof surface, provided that they are not located on any street-facing roof slope, or are located behind a parapet on a flat roof, and are not visible from any street or roadway. (Ord. 662 N.S. 1/06)~~

~~(xi)~~(*ix*) Other very minor changes to a structure subject to the approval of the Director of Public Works, provided that the change is very

minor, or is minor and not permanent. (Ord. 648 N.S. 6/04, Ord. 662 N.S. 1/06)

SECTION 3

This Ordinance shall be posted at City Hall after its second reading by the City Council for at least thirty (30) days and shall become effective thirty (30) days after the second reading.

EXHIBIT B

RESOLUTION NO. _____-06

A Resolution Waiving Building Permit Fees On Installation Of Solar Energy Systems Under Certain Circumstances

Resolved, pursuant to Section 5.2.5 of the Piedmont City Code which provides for establishing fees by the City Council and pursuant to the City of Piedmont Permit Fee Schedule, the City Council hereby amends such Permit Fee Schedule as follows:

(a) For installation of any solar energy systems on non-street facing roof slopes and yards, the normal building permit fee shall be waived.

EXHIBIT C

NEW (CURRENT) STATE LAW REGULATING SOLAR PANELS
(Government Code)

65850.5. (a) The implementation of consistent statewide standards to achieve the timely and cost-effective installation of solar energy systems is not a municipal affair, as that term is used in Section 5 of Article XI of the California Constitution, but is instead a matter of statewide concern. It is the intent of the Legislature that local agencies not adopt ordinances that create unreasonable barriers to the installation of solar energy systems, including, but not limited to, design review for aesthetic purposes, and not unreasonably restrict the ability of homeowners and agricultural and business concerns to install solar energy systems. It is the policy of the state to promote and encourage the use of solar energy systems and to limit obstacles to their use. It is the intent of the Legislature that local agencies comply not only with the language of this section, but also the legislative intent to encourage the installation of solar energy systems by removing obstacles to, and minimizing costs of, permitting for such systems.

(b) A city or county shall administratively approve applications to install solar energy systems through the issuance of a building permit or similar nondiscretionary permit. Review of the application to install a solar energy system shall be limited to the building official's review of whether it meets all health and safety requirements of local, state, and federal law. The requirements of local law shall be limited to those standards and regulations necessary to ensure that the solar energy system will not have a specific, adverse impact upon the public health or safety. However, if the building official of the city or county has a good faith belief that the solar energy system could have a specific, adverse impact upon the public health and safety, the city or county may require the applicant to apply for a use permit.

(c) A city or county may not deny an application for a use permit to install a solar energy system unless it makes written findings based upon substantial evidence in the record that the proposed installation would have a specific, adverse impact upon the public health or safety, and there is no feasible method to satisfactorily mitigate or avoid the specific, adverse impact. The findings shall include the basis for the rejection of potential feasible alternatives of preventing the adverse impact.

(d) The decision of the building official pursuant to subdivisions

(b) and (c) may be appealed to the planning commission of the city or county.

(e) Any conditions imposed on an application to install a solar energy system shall be designed to mitigate the specific, adverse impact upon the public health and safety at the lowest cost possible.

(f) (1) A solar energy system shall meet applicable health and safety standards and requirements imposed by state and local permitting authorities.

(2) A solar energy system for heating water shall be certified by the Solar Rating Certification Corporation (SRCC) or other nationally recognized certification agency. SRCC is a nonprofit third party supported by the United States Department of Energy. The certification shall be for the entire solar energy system and installation.

(3) A solar energy system for producing electricity shall meet all applicable safety and performance standards established by the National Electrical Code, the Institute of Electrical and Electronics Engineers, and accredited testing laboratories such as Underwriters Laboratories and, where applicable, rules of the Public Utilities Commission regarding safety and reliability.

(g) The following definitions apply to this section:

(1) "A feasible method to satisfactorily mitigate or avoid the specific, adverse impact" includes, but is not limited to, any cost-effective method, condition, or mitigation imposed by a city or county on another similarly situated application in a prior successful application for a permit. A city or county shall use its best efforts to ensure that the selected method, condition, or mitigation meets the conditions of subparagraphs (A) and (B) of paragraph (1) of subdivision (d) of Section 714 of the Civil Code.

(2) 'Solar energy system" has the same meaning set forth in paragraphs (1) and (2) of subdivision (a) of Section 801.5 of the Civil Code.

(3) A "specific, adverse impact" means a significant, quantifiable, direct, and unavoidable impact, based on objective, identified, and written public health or safety standards, policies, or conditions as they existed on the date the application was deemed complete.

65851. For such purposes the legislative body may divide a county, a city, or portions thereof, into zones of the number, shape and area it deems best suited to carry out the purpose of this chapter.

65852. All such regulations shall be uniform for each class or kind of building or use of land throughout each zone, but the regulation in one type of zone may differ from those in other types of zones.

EXHIBIT D

TABLE OF HOW OTHER CITIES ARE ADDRESSING NEW STATE LAW

City - Solar Equipment Background
Atherton - The only design review in Atherton is planning commission review. Solar panels are seen as accessory structures, will only deny if solar panels will cause building height to exceed the maximum of 30'. Impacts on neighbors are attempted to be mitigated during the over the counter permit process. Solar panels are reviewed on a case by case basis.
Belvedere - City interpreted new law as not permitted to impose stricter regulations than what already exists, or to make it more difficult to install, and cannot prevent the installation of solar panels. Cannot make the process more rigorous or expensive than prior to the State law. DR required, then building (electrical) permit. No intention of changing ordinance.
Carmel - City was unaware of new law. Still are reviewing solar panels administratively as they would review skylights, no intention of revising ordinances.
Lafayette - Recently changed the code so no DR required for projects pertaining to solar panels, but site/project based reviews, i.e. Hillside developments will trigger DR on solar panels because of potential impacts on aesthetics/ design as a whole.
Larkspur - Planning department sign-off is required before issuing building permit. Design review is required if height of solar panels exceed 3' off the roof. Larkspur is mostly concerned with building height in general. They are currently proposing to amend code criteria to make solar panels more permissive by adding a Solar energy systems guideline.
Monterey - Prior to state law, the planning department already encouraged the installation of solar energy as long as it is not installed on front roof slope. "Non-discretionary permits" from state law 65850.5(b) is clearly interpreted by Monterey as excluding design review. Since January, they no longer review solar panels and passed it onto the building department. They now only required a building permit. No written memos or staff reports recording the transition, just an internal staff meeting.
Moraga - Used to require design review prior to the state law. Eliminated design review early this year. Made change by memo to Lamorinda Building Department.
Orinda - Used to require DR for solar panels, but since State law was passed, Orinda decided to internally comply by no longer requiring design review on solar panels. No memos or reports followed the elimination of the design review process.

Sausalito - Until recently, did not know about State law, but only did design review if roof height was raised by solar panel. Now they only require building permit for solar panels.
Tiburon - City used to require design review, but since state law passed the process is eliminated and only a building permit is required. No written record accounting for the change in process.

City of Dixon

The Zoning Ordinance

Adopted by the City Council
On April 13, 1982

Updated February 25, 1999
Updated May 12, 2005
Updated June 1, 2007

12.19 DESIGN REVIEW COMMISSION

Sections:

12.19.01 Finding of Existence of Certain Conditions
12.19.02 Public and Private Injury Due to the Existence of Certain Conditions
12.19.03 Declaration of Purpose
12.19.04 Creation of Design Review Commission
12.19.05 Term of Office
12.19.06 Removal or Vacancy
12.19.07 Time of Regular Meetings
12.19.08 Appointment of Officers
12.19.09 Staff
12.19.10 Adoption of Rules
12.19.11 Commission Records
12.19.12 Quorum
12.19.13 Duties of Officers
12.19.14 Duty of Design Review Commission to Review Plans Prior to Application for Building Permit
12.19.15 Design Review for Single Family Dwellings/Secondary Living Units
12.19.16 Application for Design Review
12.19.17 Review Procedures
12.19.18 Application for Building Permit
12.19.19 Functions of Design Review Commission
12.19.20 Principles to be Followed
12.19.21 Single Family Residential and Secondary Living Units Design Standards
12.19.22 Commission May Impose Conditions
12.19.23 Procedure Upon Disapproval of Application
12.19.24 Time Limits
12.19.25 Appeal From Decision of Design Review Commission

12.19.01 Finding of Existence of Certain Conditons

The Council finds that there exists in land use districts in which residential, commercial, office, retail business, and industrial activities are carried on, an excessive similarity or dissimilarity, or both, in the design, development and maintenance of structures, landscaping, signs and that their general appearance is inappropriate or of poor quality of design.

12.19.02 Public and Private Injury Due to the Existence of Certain Conditions

The Council finds that the following conditions exist in land use districts characterized by the qualities described in Section 12.20.01.

A. The desirability of other properties within the vicinity for the uses for which they are zoned is adversely affected;

E. Details of fencing, public works items such as curb cuts, curbs, gutters, sidewalks, sidewalk design, drainage, fire hydrants;

F. Location, design and intensity of all exterior lighting;

G. Location and design of addressing system or graphics and mail delivery system;

H. Location and design of all required open space areas;

I. Exterior elevations or perspective drawings of structures including but not limited to building height, description of all building materials, building colors, screening of utility meters and mechanical equipment;

J. Design, placement, dimension, colors of all proposed signs and exterior graphics as required by this Ordinance.

K. Review of design and placement of facilities for disabled persons. (Ord. 05-001)

12.19.20 Principles to be Followed

In carrying out the purposes of this Section with respect to the external design of buildings and site plans of all proposed new buildings, structures or uses for which design review is required, the following principles shall be applicable:

A. It is the intent of this Section that the review exercised shall be the amount necessary to achieve the overall objectives of this Section;

B. Good architectural character is based upon the suitability of a building or site for its purpose; upon the appropriate use of sound materials, good relationship with other structures and the character of the City; and upon the principles of harmony, preparation and design in the elements of the building or site;

C. Good architectural character and site planning design are not, in themselves, more expensive than poor architectural character and poor site planning design, and are not dependent upon the particular styles of architectural or site plan design selected; (Ord. 05-001)

12.19.21 Single Family Residential and Secondary Living Units Design Standards (Ord. 05-007)

A. The architectural style, scale, height, material, setbacks and roof line of a single family dwelling shall be compatible with existing buildings in the area and with the goals and objectives of the General Plan.

B. Single Family dwellings shall have a variety of materials, colors and textures without producing excessive variety which would disrupt the unity of design.

C. A single family dwelling or secondary living unit shall have a roof pitch of not less than 3 inches of vertical rise for each 12 inches of horizontal run, unless the architectural style of the building makes it incompatible with the overall design.

D. A single family dwelling or secondary living unit shall have a roof overhang of not less than 12 inches measured from the vertical side of the structure, unless the architectural style of the building makes it incompatible with the overall design.

E. Roofing material for the single family dwelling or secondary living unit shall be of composition shingles, wood shingles or shakes, masonry tiles, or other materials commonly found on residential structures in the surrounding area. Shiny metallic roofing materials are discouraged.

F. Exterior siding material for single family dwellings and secondary living units shall be similar to that which is found commonly on residential structures in the surrounding area and should consist of the following: wood, stucco, glass, brick, stone or other masonry products. Synthetic products of a similar appearance and texture and equivalent durability may be permitted. Shiny metallic surfaces are discouraged.

G. The garage (either attached or detached) or a carport shall have exterior covering and roofing material the same as the single family dwelling or secondary living unit with which it is associated.

H. A single family dwelling should be designed and oriented on the lot to enhance its energy conservation features, including both passive and active solar systems. (Ord. 05-001)

I. Where feasible, the design should incorporate solar energy including, but not limited to, photovoltaic systems and solar hot water systems. Design shall comply with the City of Dixon Energy and Water Conservation Regulations, as provided in Section 12.27 of the Zoning Ordinance. (Ord. 05-007)

J. Where feasible, the design should allow for home “visitability” by disabled individuals, and, substantially comply with those visitability standards being developed by the California Department of Housing and Community Development in response to the Health & Safety Code Section 17959 and any related standards which may be adopted by the City Council. As defined in the California Department of Housing and Community Development draft model ordinance, visitability is the “[e]nhancement of the ability of a

12.27 ENERGY AND WATER CONSERVATION REGULATIONS

Sections:

12.27.01 Title and Purpose
12.27.02 Energy Conservation Guidelines
12.27.03 Water Conservation Guidelines

12.27.01 Title and Purpose

The provisions of this section shall be known as the Energy and Water Conservation Regulations. The purpose of these provisions are to encourage the conservation of depletable energy resources and water resources, and to facilitate the utilization of alternative, nondepletable energy resources, including solar energy.

12.27.02 Energy Conservation Guidelines

A. Circulation and Transportation

1. Subdivisions, planned unit developments, and large scale commercial developments shall be designed to encourage energy conserving transportation practices while discouraging unnecessary automobile use. Applications for site development plan approval of these developments shall include pedestrian and bicycle circulation systems which are orderly, well-maintained, and convenient to use.

2. Developments including civic, commercial and industrial use types shall provide bicycle racks for the use of their employees and the persons they serve.

B. Efficient Use of Solar Energy

1. Subdivision and residential planned developments shall be designed to the maximum extent possible so that dwelling units are oriented to the south to permit maximum exposure to the winter sun for solar heating. When necessary in order to achieve a southerly orientation for individual dwelling units the Planning Commission, upon application for conditional use permit as provided by Section 12.21, may waive minimum yard requirements.

2. Buildings, landscaping, vegetation, fences, and other solar screens should be located and sited to the minimum extent possible so that they do not preclude or discourage the use of solar energy in adjacent properties and buildings. Where necessary, the Planning Director may require submission of a map showing shadows cast by solar screens, including landscaping and vegetation at maturity, for 12 noon (Solar Time) on December 21.

3. Exterior clothes drying facilities shall not be prohibited in subdivisions and shall be provided in apartment house and condominium developments.

4. Exterior active and passive solar energy collectors and ancillary equipment shall not be prohibited in subdivisions, apartment houses, and condominiums.

12.27.03 Water Conservation Guidelines

All vegetation and landscaping required by the zoning regulations shall employ drought resistant species.

Fillmore County Zoning Ordinance

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SECTION 7

General Regulations and Performance Standards

701. Purpose

The performance standards established in this Section are designed to encourage a high standard of development by providing assurance that neighboring land uses will be compatible. The performance standards are designed to prevent and eliminate those conditions that cause blight or are detrimental to the environment. All future development in all districts shall be required to meet these standards and the standards shall also apply to existing development where so stated. Before any zoning permit is approved, the Zoning Administrator shall determine whether the proposed use will conform to the performance standards. The developer or landowners shall supply data necessary to demonstrate such conformance. Such data may include a description of equipment to be used, hours of operation, method of refuse disposal, and type and location of exterior storage. If said data complies with all parts of this Ordinance, the Zoning Administrator shall issue the necessary zoning permit.

702. Apartments, Townhouses and Other Multiple Family Dwelling Unit Structures

702.01. Districts Where Permitted

All multiple family dwelling unit structures allowed in the R-1 district shall be subject to the following standards.

702.02. Standards for Multiple Family Dwelling Unit Structures

All requests for building or conditional use permits shall be accompanied by a series of site plans and data showing:

1) Building locations, dimensions, and elevations, all signs, structures, entry areas, storage sites, and other structural improvements to the site.
2) Circulation plans for both pedestrian and vehicular traffic.
3) Fences and screening devices.
4) Solid waste disposal provisions and facilities.
5) Storm drainage plans.
6) Fire fighting and other public safety facilities and provisions such as hydrant locations and fire lanes.
7) Data pertaining to numbers of dwelling units, size, lot area, ratio, etc.
8) Exterior wall materials and design information.
9) A minimum of a two (2) foot contour topographical map of the existing site.
10) A grading plan illustrating the proposed grade changes from the original topographical map. All site areas, when fully developed, shall be completely graded so as to adequately drain and dispose of all surface water, storm water and groundwater in such a manner as to preclude large scale erosion, unwanted ponding and surface chemical runoff.
11) A recreation plan illustrating in detail all recreational facilities and structures.
12) A landscape plan. The site, when fully developed, shall be landscaped according to a

over width or over length.
4) A utility company representative must accompany the move if the structure is over height.
5) All moves must be during daylight hours.
6) All movers must obtain permits from all units of government that have jurisdiction over each road used in the move.

708.04. Further regulations and restrictions

The County Engineer may also:
1) Modify any moving plan as being proposed.
2) Alter any route to mitigate adverse effects to roads and bridges.
3) Impose any other requirements on a Moving Permit necessary to protect the health, safety, and general welfare of the citizens of Fillmore County.

709. Solar Energy Systems and Solar and Earth-Sheltered Structures

709.01. Permitted Use

Solar energy systems and solar and earth-sheltered structures shall be a permitted use in all districts provided the system is in compliance with minimum lot requirements and setbacks and the system is maintained in good repair as an integral part of the structure.

709.02. Solar Access

In a residential district no owner, occupier or person in control of property shall allow vegetation or structures to be placed or planted so as to cast a shadow on a solar energy system which is greater than the shadow cast by a hypothetical wall ten (10) feet high located along the boundary line of said property between the hours of 9:30 a.m. and 2:30 p.m. Central standard Time on December 21 provided, however, this standard shall not apply to vegetation or structures which cast a shadow upon the solar energy system at the time of installation of said solar energy system or to vegetation existing at the time of installation of said solar energy system. Violation of this standard shall constitute a private nuisance, and any owner or occupant whose solar energy system is shaded because of such violation, so that performance of the system is impaired, may have in tort for the damages sustained thereby and may have such nuisance abated.

709.03. Documentation of Conditions

As a means of evidencing existing conditions, the owner of a solar energy system may file notarized photographs of the effected area with the County Zoning Administrator prior to installation of said system.

710. Wind Energy Conversion Systems (WECS)

710.01. Conditional Use Permit

Each Wind Energy Conversion System shall require a conditional use permit.

710.02. Plans

Each application for a conditional use permit shall be accompanied by a dimensional representation of the tower including the conversion system, base and footings and an accurate plan containing the following information:

1) Property lines.
2) Proposed location of tower on site.
3) Location of all existing structures on site.
4) All above ground utility lines.
5) All underground utility lines within a radius equal to the proposed WECS height.
6) Boundaries of all adjacent utility easements or reversed areas.

710.03. WECS Height

The total height of the tower (including any portion of the rotor or axis extending above the tower) shall not exceed the horizontal distance between the base of the tower and the nearest lot line or building line. Except the horizontal distance may extend beyond the nearest lot line or building line provided there are no overhead utility lines or easements therefore or if the abutting area is a public alleyway. Furthermore, the County Board may allow the height requirements to be exceeded provided it is satisfied that the proposed structure will withstand the wind loads in the area. As evidence of this, the County Board shall require the following information:

1) Dimensional representation of the various structural components of the tower construction including the base and footings.
2) Design data which shall indicate basis of design, including manufacturer's dimensional drawings, installation and operation instructions.
3) Certification by an independent Registered Professional Engineer that the tower is sufficient to withstand wind load requirements for structures as established by the local Building Construction Codes.

710.04. Tower Access

Climbing access to the WECS tower shall be limited either by means of a fence six (6) feet high around the tower base with a locking portal, or by limiting tower climbing apparatus to no lower than twelve (12) feet from the ground.

710.05. Wind Access

Contiguous property owners and planned developments may construct a WECS for their use in common. If property held by more than one single owner is used to meet the setback requirements, a site plan establishing easements or reserved areas must be submitted for approval.

710.06. Noise

A WECS operation shall not produce noise in excess of the limits established by the state standards.

710.07. Limited Use

Wind energy conversion systems installed in accordance with the requirements of this Section shall not generate power as a commercial enterprise as defined by the Public Utilities Commission.

710.08. Electromagnetic Interference

A WECS shall not be installed in any location along the major axis of an existing microwave communications link where the operation of the WECS is likely to produce an unacceptable level of electromagnetic interference as determined by the Zoning Administrator.

710.09. Airspace

A WECS shall be located or installed in compliance with the regulations of the airport approach zones and Federal Aviation Regulations for clearance around VOR and DVOR stations.

710.10. Interconnect

A WECS, if interconnected to an electric utility distribution system, shall meet the interconnect requirements of the Electric Utility Company. In any case, the interconnect shall include a manual disconnect which complies with the National Electric Code.

710.11. Codes

Construction, design and installation of a WECS shall comply with all local, state and national electrical codes in effect at the time of installation.

710.12. Liability

No building permit shall be issued for the construction of a WECS until and unless the applicant for the building permit deposits a policy of liability insurance indemnifying applicant from liability for personal injury or property damage in the sum of at least $500,000.00. The policy of insurance so deposited shall contain a clause obligating the company issuing the same to give at least thirty (30) days written notice to the County before cancellation thereof, the building permit to be automatically revoked upon the lapse or termination of said policy.

Houston (Texas), County of. *Zoning Ordinance*.
Adopted: November 21, 2006; Published: December 13, 2006

SECTION 28 ~ GENERAL PROVISIONS

0110.2808 SOLAR ENERGY SYSTEMS AND SOLAR STRUCTURES

Subdivision l. Permitted by District. Solar energy systems and solar structures shall be a permitted use in all districts except the flood plain districts provided the system is in compliance with minimum lot requirements and setbacks. Within the flood plain district, solar structures shall be a conditional use.

Subd. 2. Setback Exemptions. Solar energy systems and solar structures may be exempted from setback, height, and lot coverage restrictions in all districts by variance.

Subd. 3. Access to Sun Light. In a residential zone, no owner, occupier, or person in control of property shall allow vegetation or structures to be placed or grow so as to cast a shadow on a solar energy system which is greater than the shadow cast by a hypothetical wall ten (l0) feet high located along the boundary line of the property between the hours of 9:30 a.m. and 2:30 p.m. Central Standard Time on December 21 provided, however, this standard shall not apply to vegetation or structures which cast a shadow upon the solar energy system at the time of installation of the system.

Subd. 4. Establishment of Right to Sun Light. As a means of evidencing existing conditions, the owner of a solar energy system may file notarized photographs of the area with the County prior to installation of the system.

Subd. 5. Violation Constitutes a Private Nuisance. Violation of this standard shall constitute a private nuisance and any owner or occupant whose solar energy system is shaded because of such violation, so that performance of the system is impaired, may have in tort for the damages sustained thereby and may have such nuisance abated.

NOTICE OF ADOPTION OF LOCAL LAW

NOTICE IS HEREBY GIVEN that at a regular meeting held on the 16th day of October 2006, the Town Board of the Town of Ithaca duly adopted the following local law:

A LOCAL LAW AMENDING CHAPTER 270 OF THE TOWN OF ITHACA CODE, ENTITLED ZONING, REGARDING SOLAR COLLECTORS AND INSTALLATIONS

Be it enacted by the Town Board of the Town of Ithaca as follows:

Section 1. Chapter 270, Article III, Section 270-5 of the Town of Ithaca Code, entitled "Definitions," is amended by adding the following definitions for "QUALIFIED SOLAR INSTALLER," "SOLAR COLLECTOR," and "SOLAR STORAGE BATTERY":

"QUALIFIED SOLAR INSTALLER – A person who has skills and knowledge related to the construction and operation of solar electrical equipment and installations and has received safety training on the hazards involved. Persons who are on the list of eligible photovoltaic installers maintained by the New York State Energy Research and Development Authority (NYSERDA), or who are certified as a solar installer by the North American Board of Certified Energy Practitioners (NABCEP), shall be deemed to be qualified solar installers for the purposes of this section. Persons who are not on NYSERDA's list of eligible installers or NABCEP's list of certified installers may be deemed to be qualified solar installers if the Town determines such persons have had adequate training to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the installation safely. Such training shall include the proper use of special precautionary techniques and personal protective equipment, as well as the skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment and to determine the nominal voltage of exposed live parts."

"SOLAR COLLECTOR – A solar photovoltaic cell, panel, or array, or solar hot air or water collector device, which relies upon solar radiation as an energy source for the generation of electricity or transfer of stored heat."

"SOLAR STORAGE BATTERY – A device that stores energy from the sun and makes it available in an electrical form."

Section 2. Chapter 270, Article XXVI of the Town of Ithaca Code, entitled "Special Regulations," is amended by adding Section 270-219.1 as follows:

"§ 270-219.1 Solar collectors and installations.

A. Rooftop and building-mounted solar collectors are permitted in all zoning districts in the Town. Building permits shall be required for installation of rooftop and building–mounted solar collectors.

B. Ground-mounted and freestanding solar collectors are permitted as accessory structures in all zoning districts of the Town, subject to the following requirements:

(1) The location of the solar collector meets all applicable setback requirements of the zone in which it is located.

(2) The height of the solar collector and any mounts shall not exceed 20 feet when oriented at maximum tilt.

(3) The total surface area of all ground-mounted and freestanding solar collectors on the lot shall not exceed 1,000 square feet.

(4) A building permit has been obtained for the solar collector.

(5) The solar collector is located in a side or rear yard.

C. Where site plan approval is required elsewhere in this chapter for a development or activity, the site plan review shall include review of the adequacy, location, arrangement, size, design, and general site compatibility of proposed solar collectors. Where a site plan exists, an approved modified site plan shall be required if any of the thresholds specified in § 270-191 of this chapter are met, including but not limited to proposed changes to or additions of solar collectors where such changes or additions meet a § 270-191 threshold.

D. All solar collector installations must be performed by a qualified solar installer, and prior to operation the electrical connections must be inspected by the Town and by the New York Board of Fire Underwriters or other appropriate electrical inspection agency as determined by the Town. In addition, any connection to the public utility grid must be inspected by the appropriate public utility.

E. When solar storage batteries are included as part of the solar collector system, they must be placed in a secure container or enclosure meeting the requirements of the New York State Building Code when in use and when no longer used shall be disposed of in accordance with the laws and regulations of Tompkins County and other applicable laws and regulations.

F. If a solar collector ceases to perform its originally intended function for more than 12 consecutive months, the property owner shall remove the collector, mount and associated equipment and facilities by no later than 90 days after the end of the 12 month period."

Section 3. In the event that any portion of this law is declared invalid by a court of competent jurisdiction, the validity of the remaining portions shall not be affected by such declaration of invalidity.

Section 4. This local law shall take effect upon publication of the local law or an abstract of same in the official newspaper of the Town, or upon its filing with the New York Secretary of State, whichever is the last to occur.

A complete copy of the local law is available for reading and inspection at the Town Clerk's office, 215 N. Tioga St., Ithaca, NY 14850, Monday through Friday, between the hours of 8:30 a.m. and 4:30 p.m.

Dated: October 26, 2006
Tee-Ann Hunter
Town Clerk

TOWN OF ITHACA

215 N. Tioga Street, ITHACA, N.Y. 14850

607.273.1783 FAX 607. 273.1704

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FREESTANDING PHOTOVOLTAIC SYSTEMS

Building Permit Application Checklist

Please initial that each of the following is attached as part of your application package. (Write N/A for any lines that do not apply.) Checklist must accompany all applications. Incomplete packages will not be accepted.

_____ 1) completed application form (please put N/A to any questions that do not apply)

_____ 2) workers' comp, general liability, and NYS disability insurance

_____ 3) fee

_____ 4) 2 copies of all drawings and specifications (see attached list)

_____ 5) survey map or plot plan

_____ 6) attached PV worksheet

_____ 7) outdoor lighting details

_____ 8) statement of special inspections

Completed application packets may be submitted to the Town of Ithaca Town Hall at 215 N. Tioga Street Monday thru Friday 8:00 - 4:00. Please do not mail the application packet.

TOWN OF ITHACA

215 N. Tioga Street, ITHACA, N.Y. 14850

607.273.1783 FAX 607. 273.1704

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Fee Information

The fee is based on the value of improvement. This value must include materials and a fair labor price (even if the work is done by the homeowner with no actual labor fee). Please make checks payable to TOWN OF ITHACA.

Value of Improvement	Fee
$1 - $2,500.99	$25.00
$2,501 - $5,000.99	$35.00
$5,001 - $10,000.99	$45.00
$10,001 - $20,000.99	$60.00
$20,001 - $30,000.99	$70.00
$30,001 - $50,000.99	$100.00
$50,001 - $100,000.99	$200.00
$100,001 - $150,000.99	$350.00
$150,001 - $250,000.99	$550.00
$250,001 - $350,000.99	$700.00
$350,001 - $500,000.99	$850.00
$500,001 - $750,000.99	$1,000.00
$750,001 - $1,000,000.99	$1,500.00
$1,000,001 - $2,500,000.99	$2,000.00
$2,500,001 - $5,000,000.99	$4,000.00
$5,000,001 - $10,000,000.99	$6,000.00
$10,000,001 - $20,000,000.99	$8,000.00
Over $20,000,000.99	$.50 for each $1,000 of improvement value, minimum fee $10,000

TOWN OF ITHACA

215 N. Tioga Street, ITHACA, N.Y. 14850

607.273.1783 FAX 607. 273.1704

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Worksheet for Photovoltaic System Installation

Supplied Diagrams

_____ Is a basic site diagram supplied with the permit package?
Location of major equipment identified on plan.

_____ Is a one-line diagram supplied with the permit package?

_____ Array configuration shown
_____ Array wiring identified
_____ Combiner/junction box identified
_____ Conduit from Array to PV Power Source Disconnect identified
_____ Equipment grounding specified
_____ Disconnect specified
_____ Conduit from disconnect to inverter identified
_____ Inverter specified
_____ Conduit from inverter to disconnect to panel identified
_____ System grounding specified
_____ Point of connection attachment method identified

Inverter Information

_____ Are cut sheets provided for inverter?

_____ Inverter model number

_____ Is inverter listed for utility interactivity (see CED list of Eligible Inverters)

_____ Maximum continuous output power at 40°C

_____ Input voltage range of inverter

PV Module Information

_____ Are cut sheets provided for PV modules?

_____ Are the modules listed? (see CEC list of Eligible PV Modules)

_____ Open-circuit voltage (Voc) from listing label

_____ Maximum permissible system voltage from listing label

_____ Short-circuit current (Isc) from listing label

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215 N. Tioga Street, ITHACA, N.Y. 14850

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_____ Maximum series fuse rating from listing label

_____ Maximum power at Standard Test Conditions (Pmax on Label)

_____ Voltage at Pmax from listing label

_____ Current at Pmax from listing label

Array Information

_____ Number of modules in series

_____ Number of parallel source circuits

_____ Total number of modules

_____ Operating voltage
(number of modules in series x module voltage at Pmax)

_____ Operating current
(number of parallel source circuits x module current at Pmax)

_____ Maximum system voltage (690.7)

_____ Short-circuit current (690.8)

Wiring and Overcurrent Protection

_____ Wire type is 90°C wet rated

_____ Conductor ampacities are sufficient

_____ Maximum PV source circuit current
_____ Minimum PV source circuit conductor ampacity
_____ Minimum PV output circuit conductor ampacity
_____ Minimum inverter output circuit conductor ampacity

_____ Source circuit overcurrent protection is sufficient

_____ If inverter is not listed for no backfeed current, does each source circuit have overcurrent protection in compliance with the listed maximum series fuse?

_____ If inverter is listed for no backfeed current, overcurrent protection is not necessary if only two parallel strings are connected to the inverter.

_____ Overcurrent protection on Inverter Output Circuit is sufficient

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_____ Point of connection meets provisions of NEC 690.64

_____ Point of connection panel busbar rating

Roof Information (for rooftop systems)

_____ Are the conductors from the PV Array run through the house?
If yes, what method will be used to address the protection issues?

_____ Weight of array for rooftop systems
(pounds per square foot—include mounting hardware)

_____ Age of building (roof structure)

_____ Describe roof structural elements
Rafters:

_____ Size of rafters (e.g. 2" x 6")
_____ Span of rafters (e.g. 14')
_____ Spacing of rafters (e.g. 24")
_____ Engineer statement that equipment load will not adversely affect roof

_____ Identify roofing type (e.g. comp shingle, masonry tile, shake, etc…)

_____ Is the detail of PV panel mounting attachment to the roof-framing members provided?

_____ Identify method of sealing roof penetrations
(e.g. flashing, sealed with urethane caulk, etc…)

Ground Mounting Structure (for ground-mounted structures)

_____ Weight of array
(pounds per square foot—include mounting hardware)

_____ Are the details of the array supports, framing members, and foundation posts and footings provided?

_____ Is the information on mounting structure(s) construction provided?
(requires engineering calculations)

_____ Is the detail on module attachment method to mounting structure provided?

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Date Received _____	Permit Number_____
Fee Paid _____	Date of Permit _____
Check No. _____	Zoning District_____

SHORT FORM APPLICATION FOR BUILDING PERMIT

This application may be used for only for the projects listed below. All other projects require use of the full building permit application form.

Application is hereby made to:

_____ install or alter a pool

_____ construct or alter a fence or wall

_____ replace roof covering or siding with like materials (any work beyond replacing sheathing requires full application)

_____ Site work, including parking lots

_____ freestanding photovoltaic installation

_____ wood stove and chimney

_____ Construct or alter an agricultural building/structure determined to be exempt from NYS Building Code (call Code Enforcement Officer to verify)

_____ other minor accessory structure as allowed by the code enforcement officer (does not include any structures with roofs)

_____ demolition of building or structure

Brief Description of Work _____Value of Improvement $_____

Property Information:

Street Address _____

Tax Parcel Number _____

Property Owner:

Name _____ Daytime Telephone _____ Cell Number _____

Mailing Address _____

If owner is a corporation, names and addresses of responsible officers must be included.

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Builder:

Company _____ Office Telephone _____ Fax _____

Mailing Address _____

Project Manager_____ Daytime Telephone _____ Cell Number _____

Contact Person (Person listed will be the primary point of contact for all communications regarding the building permit):

Name _____ Daytime Telephone _____ Cell Phone_____

Percentage of Lot to be Occupied by *All* Structures _____

Is topsoil or fill material going to be moved onto or within the site in excess of 500 cubic yards? _____ yes _____ no
New York Board of Fire Underwriters Electrical Application will be applied for _____ yes _____ no
Does work involve any outdoor lighting? _____ yes _____ no

The UNDERSIGNED HEREBY APPLIES for permission to do the above in accordance with provisions of the Zoning Ordinance and other Laws and Regulations of the Town of Ithaca, or others having jurisdiction, AND AFFIRMS that all statements and information given herein are correct to the best of his/her knowledge and belief, AND FURTHER AFFIRMS that all work shall be performed in compliance with the Codes of the Town of Ithaca, the NYS Uniform Fire Prevention and Building Code, and all other applicable state and local laws, ordinances, and regulations.

I ALSO CERTIFY that the structure for which this Permit will be issued, or has been issued, will be built, or has been built, according to the latest standards of the New York State Uniform Fire Prevention and Building Code, AND FURTHER CERTIFY that the approved plans will not be deviated from without prior approval from the Architect/Engineer of record, if applicable, and the Town of Ithaca.

_____

Signature of Property Owner or Authorized Agent Date

Tompkins County Health Department - Approval of Septic System(s) and/or Well(s) Date Issued _____

Insurance Certificates: NYS Workers' Compensation, Disability, Liability . On File _____

Plumbing Permit - Water & Sewer Permit Number _____ Date Issued _____

Appropriate Highway Department: Culverts, Driveway, Work in Right-of-Way Date Issued _____

APPLICATION DENIED under Section _____

Date of ZBA Hearing _____ Date of Planning Board Approval _____

Decision _____ Type of Planning Board Approval _____

BUILDING PERMIT APPROVED BY _____

MANSFIELD TOWNSHIP
BURLINGTON COUNTY

ORDINANCE 2007-10

AN ORDINANCE TO AMEND CHAPTER 65 ZONING ORDINANCE, OF THE TOWNSHIP OF MANSFIELD, COUNTY OF BURLINGTON, STATE OF NEW JERSEY, TO AMEND ARTICLE IV, DEFINITIONS AND WORD USAGE, MEASUREMENTS, TO DEFINE SOLAR ENERGY SYSTEMS

WHEREAS, in recent years the technology of creating energy from solar panels has become economically feasible; and

WHEREAS, the solar energy industry has developed solar panel systems that can be located on principle structures, on accessory buildings, or as free standing ground mounted structures; and

WHEREAS, solar energy systems can be used on residential and non-residential sites; and

WHEREAS, there is a need to recognize and regulate solar energy systems because their locations affect site improvements and neighborhood aesthetics.

NOW THEREFORE BE IT RESOLVED that Article IV, Definitions And Word Usage; Measurements shall be amended to include a definition and regulations for solar energy systems as follows.

SECTION 1
The following definition and regulations shall be added to Article II, Definitions And Word Usage; Measurements:

SOLAR ENERGY SYSTEM

1. Definition
   An energy system which converts solar energy to usable thermal, mechanical, chemical or electrical energy to meet all or a significant part of a structures energy requirements.

2. Solar energy systems are a permitted use in all zoning districts.

3. Roof mounted systems on the principal building shall not be more than three (3) feet higher than the finished roof to which it is mounted. In no instance shall any part of the system extend beyond the edge of the roof.

4. Ground mounted systems and systems attached to accessory buildings shall be not less than 10 feet from any side or rear property line. Solar energy systems are prohibited in front yards, and shall not be located past the front wall of the principle building.

5. There is no limit to the number of modules and arrays installed on each property that comprise a solar energy system, except for the exclusions contained herein in number 6 and 8 below. The number of solar panels and supporting equipment shall be considered as one system.

6. Solar energy commercial operations are prohibited as a principle use. These are systems whose main purpose is to generate energy for sale back into the energy grid system, rather than being consumed on site.

7. Ground mounted solar energy systems shall not be categorized as accessory buildings.

8. If solar energy systems are attached to accessory buildings the number of accessory buildings allowed shall be regulated in accordance with the provisions set forth in the definition of Accessory Building.

9. The height of ground mounted solar energy systems and systems included on accessory buildings shall not exceed 12 feet in height.

10. Zoning permits and construction permits are required.

11. No more than 20% of a lot may be covered with a solar energy system.

12. Ground mounted systems shall be located on lots of one acre or more.

SECTION 2: REPEALER

Any and all Ordinances inconsistent with the terms of this Ordinance are hereby repealed to the extent of any such inconsistencies.

SECTION 3. SEVERABILITY

In the event that any clause, section, paragraph or sentence of this Ordinance is deemed to be invalid or unenforceable for any reason, then the Township Committee hereby declares its intent that the balance of the Ordinance not affected by said invalidity shall remain in full force and effect to the extent that it allows the Township to meet the goals of the Ordinance.

SECTION 4. EFFECTIVE DATE

This Ordinance shall take effect upon proper passage in accordance with the law.

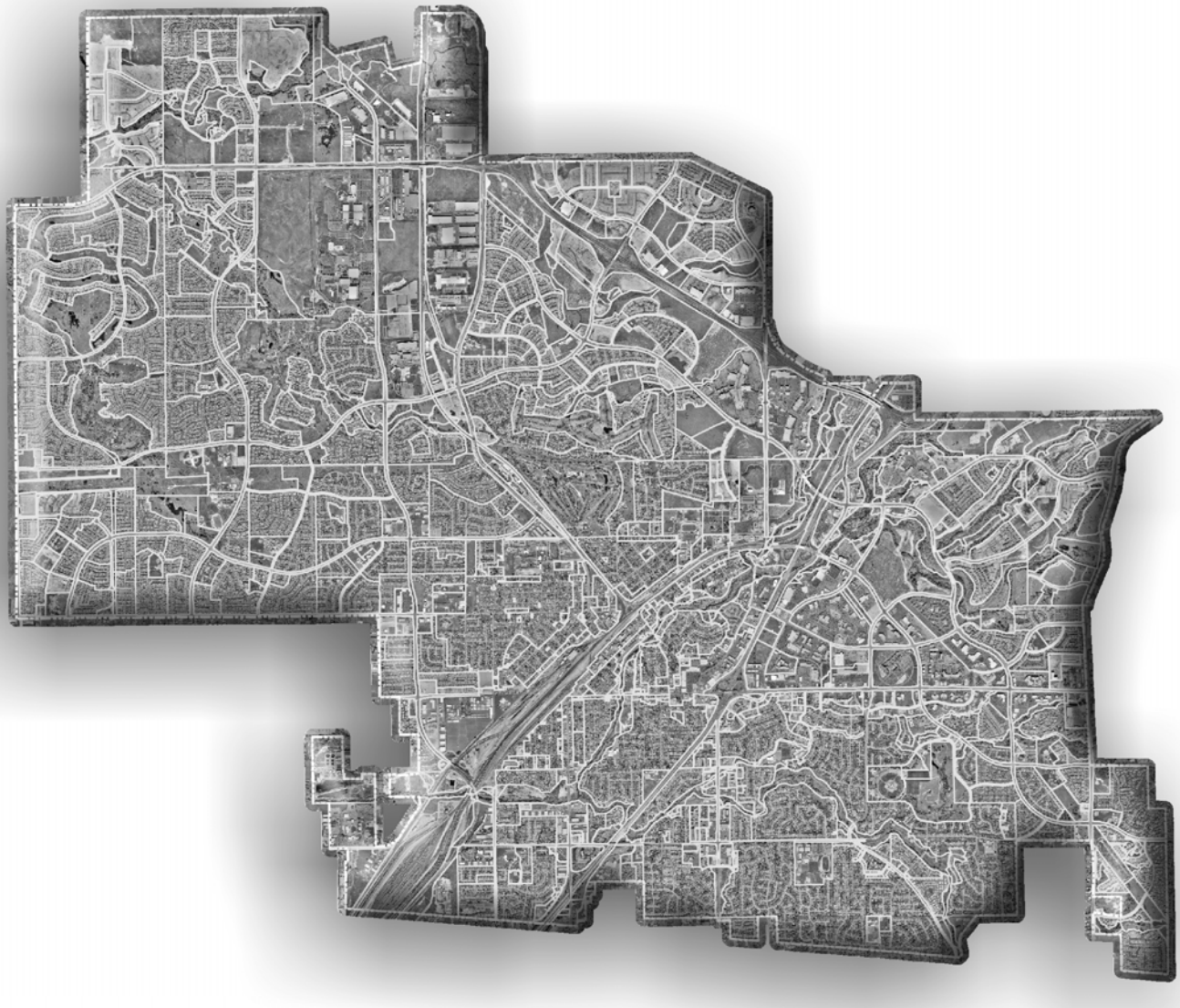
_____

LINDA SEMUS., RMC
Municipal Clerk

First Reading/Introduction: February 28, 2007

Second Reading Final Adoption: March 14, 2007

City of Roseville



Zoning Ordinance

Update: August 2006

CITY OF ROSEVILLE CALIFORNIA

Section 19.08.070 - Civic Use Types

Civic use types include governmental and quasi-governmental agencies providing utility, educational, cultural, major medical, protective, governmental, and other uses which are strongly vested with public or social importance. Specific Civic Use Types referred to in this Title are:

A. **Community Assembly**, includes the activities typically performed by, or at, the following institutions or installations:

- Churches, temples, synagogues, and other places or worship;
- Public and private non-profit clubs, lodges, and meeting halls; and
- Public community recreation facilities including; community centers, amphitheaters and museums.

B. **Community Services**, includes uses provided by public agencies which are necessary to support the communities health, safety and welfare. Typical Community Services include:

- Cemeteries;
- Community water storage, wells and associated treatment facilities;
- Corporation yards, including storage, repair and processing of materials and equipment, and vehicles operated by governmental entities;
- Detention basins;
- Electrical substations (up to 60kV);
- Intermodal Facilities;
- Libraries;
- Park and Ride Lots;
- Police and Fire Stations (including antennas, antenna towers and communication facilities);
- Post Offices, excluding major processing centers;
- Public Parks and Golf Courses; and
- Satellite Government Facilities.

C. **Essential Services**, includes services which are necessary to support development and involve only minor structures such as bus stops, gas distribution pipelines, electrical distribution lines (up to and including 60kV), utility poles, transformers (12kV or less), water and sanitary sewer, drainage facilities, communication facilities for community services provided by a public agency, and neighborhood parks.

D. **Reserved.**

E. **Hospital Services.**

1. **General Hospital Services,** includes medical, or surgical services for sick or injured persons primarily on an in-patient basis, and includes accessory facilities for out-patient and emergency medical services, diagnostic services, training, research, administration, and services to patients, employees, or visitors.

2. **Psychiatric Hospital Services,** includes psychiatric services for persons primarily on an in-patient basis, and includes accessory facilities for out-patient and diagnostic services, training, research, administration, and services to patients, employees, or visitors.

F. **Intensive Public Facilities,** includes public services and utilities which because of location, are objectionable due to production of offensive odor, dust, noise, bright lights, vibration or the storage of hazardous materials or products. Typical uses are electric receiving stations (60kV to 230kV), sanitary landfills, public airports and heliports, or correctional institutions.

G. **Libraries and Museums,** Private, includes permanent, public and quasi-public facilities generally of a non-commercial nature such as libraries, museums, art exhibitions, planetariums, aquariums, botanical gardens, and arboretums. Also includes historic sites, exhibits, and zoos located in a public park.

H. **Power Generating Facilities** - These facilities consist of temporary support facilities used to supply electrical power on an interim basis when power outages occur, or facilities that are used on a permanent basis to generate a power supply for a single use or multiple users if connected to a power grid. Power generating facilities generally include technologies that produce electricity from fossil fuels, natural gas, solar, wind, hydro-or biomass fuels in order to provide back-up power, augment utility power supplies or if grid-connected, to sell power. Power generating facilities may include, but are not limited to, the following specifically defined facilities:

1. **General Power Production Facility** - A facility whose sole purpose is for the resale and production of power which may consist of a natural gas fired facility, co-generating facility, solar, wind, waste, photovoltaic, geothermal operated, or other alternative fuel source, that produces electricity primarily for the transmission of electricity associated with the overall power grid. This type of facility may be a peak load facility that only operates during the period in which the power demand for the overall power grid is at its peak usage.

2. **Supplemental/Individual Use Power Facility** - A facility that is utilized to provide electrical power as either a supplement to power supplied by the existing grid or as a permanent power source for an individual user and does not provide off-site sale to the power grid. For commercial and industrial developments these types of facilities may consist of a natural gas fired facility, co-generating facility, solar, wind, waste, photovoltaic, geothermal operated, or other alternative fuel source, that produces electricity. Residential uses will be restricted to facilities, which do not materially change the character of the zone district or impact adjacent residential uses (i.e. solar and photovoltaic).

3. **Emergency Power Facility** - A facility that acts as a stand-by generator used to supply electric power during the event of a power outage by the local electric utility. These types of facilities maybe permanent in nature or temporary portable gas/diesel generators.

4. **Passive Power Facility** - These facilities are considered to produce power when using clean fuel such as sunlight or other similar natural resource to generate power. Typical facilities would be solar or photo voltaic power generators. Residential zones will be restricted to these types of facilities for power generation on a permanent basis.

I. **Public Parking Services,** includes parking services involving buildings or lots which are publicly owned or operated.

J. **Schools**

1. **College and University,** includes community colleges, public or private colleges, universities and professional schools granting associate arts degrees, certificates, undergraduate and graduate degrees and requiring for admission at least a high school diploma or equivalent general academic training.

2. **Elementary and Secondary,** includes public elementary, middle, junior high and high schools serving grades K through 12.

3. **Private Elementary and Secondary,** includes private and religious schools. It does not include schools included within the Commercial, Schools Specialized Education and Training Use Type.

CHAPTER 19.10 – RESIDENTIAL ZONES

Section 19.10.010 - Purpose

This chapter provides regulations applicable to primary uses in the residential zoning districts established by Section 19.06.010 (Zoning Districts Established). The residential zoning districts are as follows:

A. **Single-Family Residential (R1) District.** The R-1, Single-Family Residential district is intended for detached, single-family homes and similar and related uses inclusive of half-plexes.

B. **Small Lot Residential (RS) District.** The R-S, Small Lot Residential district is intended to allow either attached or detached single-family dwellings, and similar and related compatible uses.

C. **Two-Family Residential (R2) District.** The R-2, Two-Family Residential district is intended to allow two dwellings per lot, either detached single-family dwellings or duplexes, and similar and related compatible uses.

D. **Attached Housing (R3) District.** The R-3, Attached Housing district is intended for multiple-family housing. The types of land use intended for the R-3 zoning district include apartments, condominiums, townhomes, and similar and related compatible uses.

E. **Residential Mixed Use (RMU) District.** The Residential Mixed-Use district is intended to promote a variety of residential uses/dwelling types and the flexible citing of uses that are typically considered to be compatible with residential development. The RMU zoning district establishes a mix of uses, through the use of overlay zones, to ensure that different residential uses and densities will be successfully integrated into desirable, cohesive residential neighborhoods. The RMU zoning district shall always be applied in conjunction with either the -DS (Development Standards) or -SA (Special Area) overlay zones. (Also see Chapter 19.18.)

(Ord. 3270 § 2 (part), 1998; Ord. 3014 (part), 1996.)

Section 19.10.020 - Permitted Use Types

Primary uses are permitted in residential zones subject to the requirements of this Title as designated below:

A. Principally permitted use, designated as "P";

B. Conditionally permitted use, designated as "CUP"; and

C. Administratively permitted use, designated as "A".

Primary use types not listed or designated by a dash (-) are not permitted in that zone district.

RESIDENTIAL ZONE DISTRICTS PERMITTED USES

AGRICULTURE AND OPEN SPACE USE TYPES	R1	RS	R2	R3	RMU
Animal Keeping	P	P	P	P	P
Resource Protection and Restoration	P	P	P	P	P
Resource Related Recreation	P	P	P	P	P

CIVIC USE TYPES	R1	RS	R2	R3	RMU
Community Assembly	CUP	CUP	CUP	P	P
Community Services	CUP	CUP	CUP	CUP	P
Essential Services	P	P	P	P	P
Schools, Elementary and Secondary	P	P	P	P	P
Schools, Private Elementary and Secondary	CUP	CUP	CUP	CUP	P
Power Generating Facilities (3)					
Emergency	P	P	P	P	P
Passive Power	P	P	P	P	P

RESIDENTIAL USE TYPES	R1	RS	R2	R3	RMU
Community Care Facilities, Small	P	P	P	P	P
Community Care Facilities, Large	CUP	CUP	CUP	P	P
Dwelling					
Multi-Family	-	-	-	P	P
Single-Family (1)	P	P	P	P	P
Two-Family	-	-	P	P	P
Family Day Care Homes, Small	P	P	P	P	P
Family Day Care Homes, Large (2)	A	A	A	A	P
Mobile Home Park	CUP	CUP	CUP	CUP	P
Rooming and Boarding House	-	-	-	P	P
Second Dwelling Unit (1)	A	A	-	-	A

COMMERCIAL USE TYPES	R1	RS	R2	R3	RMU
Commercial Recreation, Residential Recreation Facilities	CUP	CUP	CUP	CUP	P
Community Care Facility	-	-	-	P	P
Day Care Center	CUP	CUP	CUP	CUP	P
Long Term Care Facility	-	-	-	CUP	P
Neighborhood Commercial	-	-	-	CUP	P

CHAPTER 19.12 – COMMERCIAL ZONES

Section 19.12.010 - Purpose

This chapter provides regulations applicable to primary uses in the commercial zoning districts established by Section 19.06.010 (Zoning Districts Established). The commercial zoning districts are as follows:

A. **Business Professional (BP) District.** The Business Professional district is intended to provide locations for a wide variety of office uses and other uses which are related to and supportive of office uses.

B. **Neighborhood Commercial (NC) District.** The Neighborhood Commercial district is intended to be applied to properties in close proximity to residential areas providing for convenient retail and personal service facilities.

C. **Community Commercial (CC) District.** The Community Commercial district is intended to serve the principal retail shopping needs of the entire community by providing areas for shopping centers, and other retail and service uses.

D. **General Commercial (GC) District.** The General Commercial district is intended to serve the entire community by providing areas for commercial facilities that are more of a service or heavy commercial character than are permitted in the Community Commercial District, and may involve outdoor display, storage or activity areas.

E. **Highway Commercial (HC) District.** The Highway Commercial district is intended to be applied where commercial facilities serving the traveling public are necessary or desirable.

F. **Regional Commercial (RC) District.** The Regional Commercial district is intended to provide for commercial facilities serving Roseville and the greater South Placer Area.

G. **Central Business (CBD) District.** The Central Business district is intended to be applied to the older portions of the downtown area to provide flexibility in the types of uses typically found in the traditional downtown where a range of business and service, residential, and mixed use uses can be located to support the entire community.

H. **Commercial Mixed Use (CMU) District.** The Commercial Mixed Use district is intended to promote a variety of commercial uses types and the flexible citing of other uses that are typically considered to be compatible with commercial development. It is the intent of the CMU zoning district to establish a mix of uses, which will be accompanied by overlay zones, to ensure that different commercial uses will be successfully integrated into desirable, cohesive commercial districts. The CMU zoning district shall always be applied in conjunction with either the DS (Development Standards) or SA (Special Area) overlay zones. (Also see Chapter 19.18.)

I. **Old Town Historic (HD) District.** The Old Town Historic district is intended to be applied to the original commercial core of Roseville to acknowledge its historic and architectural significance. The HD zoning district is intended to ensure that new land uses and development within the district further the rehabilitation, revitalization, and preservation of the architectural, aesthetic, historic and economic health of the district. Each parcel within a Historic District shall be subject to the specific Historic district design guidelines contained within the City' s Community Design Guidelines as adopted by the City Council from time to time. Whenever a Design Review Permit is required for development of a parcel within the Historic District zone, the Historic District guidelines shall apply.

(Ord. 3014 (part), 1996.)

COMMERCIAL ZONE DISTRICTS PERMITTED USES

AGRICULTURE AND OPEN SPACE USE TYPES	BP	NC	CC	GC	HC	RC	CBD	CMU	HD
Resource Protection and Restoration	CUP	CUP	CUP	CUP	CUP	CUP	CUP	P	-
Resource Related Recreation	P	P	P	P	P	CUP	P	P	-

CIVIC USE TYPES	BP	NC	CC	GC	HC	RC	CBD	CMU	HD
Community Assembly	CUP	P	P	P	-	-	P	P	CUP
Community Services	P	CUP	P	P	P	P	P	P	P
Essential Services	P	P	P	P	P	P	P	P	P
Hospital Services									
General Hospital Services	-	-	CUP	CUP	-	-	CUP	P	P
Psychiatric Hospital Services	-	-	CUP	CUP	-	-	CUP	P	P
Libraries and Museums, Private	-	CUP	P	P	P	P	P	P	P
Public Parking Services	P	P	P	P	P	P	P	P	P
Schools									
College and University	A	-	P	P	-	P	P	P	-
Elementary and Secondary	P	P	P	P	P	P	P	P	P
Private Elementary and Secondary	-	CUP	CUP	CUP	-	-	CUP	P	CUP
Social Services									
Food Distribution	-	-	-	A/CUP (3)	A/CUP (3)	-	-	A/CUP (3)	-
Food Service	-	-	-	A/CUP (4)	A/CUP (4)	-	-	A/CUP (4)	-
Temporary Resident Shelter	-	-	-	A/CUP (5)	A/CUP (5)	-	-	A/CUP (5)	-
Power Generating Facilities (9)									
Emergency	A	A	A	A	A	A	A	A	A
Supplemental / Individual Use	CUP	CUP	CUP	CUP	CUP	CUP	CUP	CUP	CUP
Passive Power	A	A	A	A	A	A	A	A	A

CHAPTER 19.14 - INDUSTRIAL AND MANUFACTURING ZONES

Section 19.14.010 - Purpose

This chapter provides regulations applicable to primary uses in the industrial zoning districts established by Section 19.06.010 (Zoning Districts Established). The industrial districts are as follows:

A. **Industrial/Business Park (MP) District.** The Industrial/Business Park district is intended to designate areas appropriate for the development of a mixture of light industrial, office and commercial land uses. The use types permitted within the MP district do not include outdoor manufacturing but may include limited outdoor storage. These use types do not result in the emission of any appreciable amount of visible gasses, particulates, steam, heat odor, vibration, glare, dust, or excessive noise and can be conditioned to be compatible operating in close proximity to commercial and residential uses.

B. **Light Industrial (M1) District.** The Light Industrial district is intended to designate areas appropriate for light industrial uses such as manufacturing, processing, assembly, high technology, research and development and storage uses. The use types permitted within the M-1 district do not include outdoor manufacturing but may include limited outdoor storage and the emission of limited amount of visible gasses, particulates, steam, heat, odor, vibration, glare, dust, and noise. These uses may be compatible operating in relatively close proximity to commercial and residential uses.

C. **General Industrial (M2) District.** The General Industrial district is intended to designate areas suitable for a broad range of industrial uses including manufacturing, assembly, wholesale distribution, and warehousing.

D. **Industrial Mixed Use (MMU) District.** This district is intended to promote a variety of industrial use types and the flexible citing of uses that are typically considered to be compatible with industrial development. It is the intent of the MMU zoning district to establish a mix of uses, which will be accompanied by overlay zones, to ensure that different industrial uses will be successfully integrated into desirable, cohesive industrial districts. The MMU zoning district shall always be applied in conjunction with either the -DS (Development Standards) or -SA (Special Area) overlay zones as described in Chapter 19.18.

(Ord. 3014 (part), 1996.)

Section 19.14.020 - Permitted Use Types

Primary uses are permitted in industrial zones subject to the requirements of this Title as designated below:

A. Principally permitted use, designated as "P";

B. Conditionally permitted use, designated as "CUP"; and

C. Administratively permitted use, designated as "A".

Primary use types not listed or designated by a dash (-) are not permitted in that zone district.

INDUSTRIAL ZONE DISTRICTS PERMITTED USES

AGRICULTURAL AND OPEN SPACE USE TYPES	MP	M1	M2	MMU
Agricultural	-	P	P	P
Resource Protection and Restoration	P	P	P	P
Resource Protection and Restoration	P	P	P	P

CIVIC USE TYPES	MP	M1	M2	MMU
Community Assembly	CUP	CUP	CUP	P
Community Services	P	P	P	P
Essential Services	P	P	P	P
Intensive Public Facilities	-	-	CUP	P
Power Generating Facilities (7)				
Emergency	A	A	A	A
Supplemental/Individual Use	CUP	CUP	CUP	CUP
General Power Production	CUP	CUP	CUP	CUP
Passive Power	A	A	A	A
Public Parking Services	P	P	P	P
Schools, Private Elementary and Secondary	CUP	-	-	P
Social Services Food Distribution	-	A/CUP (2)	A/CUP (2)	A/CUP (2)
Food Service	-	A/CUP (3)	A/CUP (3)	A/CUP (3)
Temporary Resident Shelter	-	A/CUP (4)	A/CUP (4)	A/CUP (4)

RESIDENTIAL USE TYPES	MP	M1	M2	MMU
Caretaker/Employee Housing	CUP	A	A	P
Congregate Residence	-	CUP	CUP	CUP

CHAPTER 19.16 – CIVIC AND RESOURCE PROTECTION ZONES

Section 19.16.010 - Purpose

This chapter provides regulations applicable to primary uses in the Civic and Resource Protection zoning districts established by Section 19.06.010 (Zoning Districts Established). The Civic and Resource Protection districts are as follows:

A. **Open Space (OS) District**. The Open Space district is applied to public and private lands that are environmentally sensitive or otherwise significant due to wildlife habitat, flood hazard, or other natural features.

B. **Park and Recreation (PR) District.** The Park and Recreation district may be applied to both public and private recreation facilities. It is intended to be applied to larger parks especially community wide facilities, but may also be applied to smaller neighborhood facilities when it is important, due to the planned facilities or natural features, to designate the site for park and recreation uses.

C. **Public/Quasi-Public (P/QP) District.** The Public/Quasi-Public district is applied to land intended for education, religious assembly, governmental offices, municipal corporation yards, water treatment plants, power generating facilities (including privately owned facilities), and other publicly-owned facilities.

D. **Urban Reserve (UR) District.** The Urban Reserve district is applied to lands that are anticipated to receive urban land use entitlements, but are constrained on an interim basis by growth management policies, availability of services or other limitations.

(Ord. 3922 § 5 (part), 2003: Ord. 3014 (part), 1996.)

Section 19.16.020 - Permitted Use Types

Primary uses are permitted in Civic and Resource Protection zones subject to the requirements of this Title as designated below:

A. Principally permitted use, designated as "P";

B. Conditionally permitted use, designated as "CUP"; and

C. Administratively permitted use, designated as "A".

Primary use types not listed or designated by a dash (-) are not permitted in that zone district.

CIVIC AND RESOURCE PROTECTION ZONE DISTRICTS PERMITTED USES

AGRICULTURAL AND OPEN SPACE USE TYPES	PR	OS	P/QP	UR
AGRICULTURAL	-	P	-	P
Animal Keeping	-	-	-	P
Resource Protection and Restoration	P	P	P	P
Resource Related Recreation	P	P	P	P

CIVIC USE TYPES	PR	OS	P/QP	UR
Community Assembly	P	CUP	P	-
Community Services	P	P	P	-
Essential Services	P	P	P	P
Hospital Services				
General	-	-	P	-
Psychiatric	-	-	P	-
Intensive Public Facilities	-	-	P	-
Libraries and Museums, Private	P	CUP	P	-
Power Generating Facilities (1)				
Emergency	-	-	P	-
Supplemental / Individual Use	-	-	CUP	-
General Power Production	-	-	CUP	-
Passive Power	-	-	AP	-
Public Parking Services	-	-	P	-
SCHOOLS				
College and University	-	-	P	-
Elementary and Secondary	P	-	P	-
Private Elementary and Secondary	-	-	CUP	-

CHAPTER 19.55 – POWER GENERATING FACILITIES

Section 19.55.010 - Purpose

This chapter provides the requirements and standards for the location and operation of power generating facilities as defined in Section 19.08.070. It is the intent of this chapter to minimize the adverse impacts of such uses and their associated equipment by establishing permitting requirements and standards for locating the various types of facilities within residential, commercial, industrial and public/quasi-public zones.

(Ord. 3922 § 11 (part), 2003.)

Section 19.55.020 - General Requirements

A. **Exempt From Permit.** In addition to the requirements established by Article II, the following power generating facilities are exempt from permit:

1. Emergency power generating facilities such as temporary portable generators, permanent natural gas generators or similar emergency facilities are principally permitted within the residential zone districts when in conformance with the established residential standards.

2. Passive power generating facilities that conform to the residential standards and do not materially impact the character of the zone district or adjacent residential uses are exempt from obtaining a permit.

B. **Permit Required.**

1. Power Generating facilities requiring a permit are addressed in the permitted use types for residential zones (Section 19.10020). Commercial zones (Section 19.12.620) Industrial Zones (Section 19.14.020) and Civic and Resource protection zones (Section 19.16.020)

C. **Residential Standards.** The following requirements shall apply to power generating facilities in all residential zones established by Article II:

1. **Setbacks.** Permanent ground mounted and portable temporary generators shall comply with separation requirements from structures as required by all applicable Building and Fire codes.

2. **Front Yard Setback/Screening Required.** Permanent emergency generators shall not be placed in front yards and shall be screened from public view from streets and adjacent properties by fences, or walls of six (6) feet in height and/or landscaping. Portable temporary generators (gas/diesel) used during emergency power outages shall not be located within the front yard setback. Solar ground mounted panels or photovoltaic panels shall not be allowed within the front yard setback.

3. **Roof Mounting**. Solar panels and photovoltaic applications shall be allowed to be mounted on residential roofs with the provision that these improvements conform to the maximum height standards established in Article II. Additionally, solar panels and photo voltaics shall be mounted to the roof in a manner that does not detract from the surrounding neighborhood and preserves the residential nature of the house. Typical methods to achieve this would be to mount the panels as close to parallel to the pitch of the roof and in close proximity to the roofing material

D. Commercial and Industrial Standards. The following requirements shall apply to power generating facilities in all commercial and industrial zones established by Article II:

1. Development Standards. Emergency power generating facilities shall be sited so that they are screened from public view from streets and adjacent properties. Emergency power generating facilities and all other power generating facilities shall comply with all development standards of the applicable zoning district.

2. Roof Mounting. Power generating facilities are permitted to be mounted on the roof when the buildings parapet or roof design provides full screening of the facilities from public streets.

E. Operation. Emergency power generating facilities shall be limited in usage to times when power is unavailable from the local electric utility due to scheduled blackouts or due to natural disasters which have impacted the utilities ability to provide service. Limited testing of the facilities is permitted during times in which electricity is available from the utility. Emergency power generating facilities are not permitted to provide a substitute or supplemental power source under normal circumstances when the electric utility is capable of delivering power.

(Ord. 3922 § 11 (part), 2003.)

City of Santa Barbara
Building & Safety Division

Solar Energy System Submittal Requirements

Community Development
630 Garden Street
805-564-5485

General requirements:

- The minimum paper size is 18" x 24" and the maximum paper size is 36" x 42". (A maximum of (2) 8.5" x 11" sheets may be used if all information can be provided.)
- Plans must be complete, accurate and drawn to scale.
- Provide three complete sets of plans with numbered pages and a sheet index (if needed).
- All photovoltaic projects must meet the requirements listed on page 2 of this handout.
- For projects in a historic district (Brinkerhoff or Riviera Campus) or the Demolition Review Study Area or on a City Landmark or Structure of Merit, provide three sets of color photographs of the installation site. Photographs must be at least 3"x5", submitted on 8.5"x11" paper, and not Polaroid or instamatic.

Information required on the plans:

- The first sheet of the plans must contain the following:
  - ❑ Name, address and phone number of owner, engineer, architect or designer as appropriate
  - ❑ Address of proposed project with assessor's parcel number and land use zone
  - ❑ A complete site plan (as described above)
  - ❑ A complete description of the scope of work, including total panel square footage and kilowatt generation
- The site plan must show the following:
  - ❑ All property lines and easements
  - ❑ Existing structures with distances in between and from property lines (include patio covers, decks, trellises, pools, etc.)
  - ❑ Location of all proposed work, showing distances from property lines and other structures on the parcel
  - ❑ Maximum height of proposed work measured from natural or finished grade, whichever is lower
  - ❑ Distance between maximum height of proposed work and structure or ground it is mounted on.
  - ❑ North arrow
  - ❑ For ground mounted systems, show required open yard area on plans.
- Include plan details showing all structural elements including roof framing members affected (e.g., spacing and spans of roof joists), connectors and, if applicable, engineering calculations and design.
- An electrical plan must be included showing the following:
  - ❑ Location of new controlling equipment
  - ❑ Wiring methods and material between equipment
  - ❑ Single line diagram of existing and new equipment including grounding electrode system
  - ❑ All new equipment and specifications (kVA, size, weight, manufacturer, make)
  - ❑ Disconnecting means for both existing and new systems
  - ❑ Location of existing service

Optional information to include in plan submittals:

Height and location of nearest vegetation on neighboring properties. This may help determine neighboring property structures' future compliance with the State's solar access laws (Public Resources Code § 25980).

Installation requirements for photovoltaic systems:

The City of Santa Barbara's Community Development Department and/or Fire Department require photovoltaic systems to comply with the following:

1. Photovoltaic systems must comply with building height, setback, open yard area, solar access and other Zoning Ordinance requirements. See Municipal Code Title 28. In some cases, elevation drawings may be required to verify compliance with height and solar access Zoning Ordinance requirements, especially for systems installed at heights over 20'.
2. All photovoltaic systems and equipment must be listed or otherwise approved by Building & Safety Inspection Staff for its use (California Electrical Code 110-3).
3. Photovoltaic systems shall comply with all applicable portions of Article 690 of the California Electrical Code including, but not limited to, the following:
    a. Disconnecting means, at a readily accessible location, shall be provided for both the DC and AC output of the photovoltaic systems (CEC 690-17, 690-53, 705-21). DC disconnecting means shall also be provided for all roof-mounted arrays, with one disconnect per group or array of panels. The AC disconnecting means shall be provided at a readily accessible location within view of the electrical service entrance, as per local utility requirements.
    b. Signage shall be provided at all disconnects indicating function. Signage shall be permanent and conspicuous and shall comply with CEC 690-17. Marking and identification of all wiring and equipment is required (CEC 690-51-53).
    c. All photovoltaic systems and equipment shall be grounded, and individual panel arrays and equipment shall be grounded continuously without interruption (CEC 690). The size of grounding conductors shall comply with CEC 690-45.
    d. Roof-mounted photovoltaic arrays located on dwellings shall be provided with ground-fault protection (CEC 690-5).
    e. Connectors shall be polarized, of a latching or locking type, non-interchangeable and secured against inadvertent contact with live parts by persons (CEC 690-33).
    f. Wiring, where exposed to the direct rays of the sun, shall be of type SE, UF, or USE or other wiring listed and approved as suitable for wet locations and exposed to sunlight per CEC 690-31(b).
    g. Working space for switch boards, panel boards, inverters, disconnects and other equipment shall be provided per Table 110-26(a) of the CEC, which requires that equipment clearances shall be at least 30" wide and 36" deep for equipment operating from 0-150 volts to ground.
    h. Working space for equipment shall be level, illuminated and have a minimum headroom of 6'6". (6' is minimum headroom if equipment is installed in an existing dwelling unit.) (CEC 110-26)
    i. All structural attachment methods and details utilized in the field shall match what is shown on the approved plans.

City of Seattle Legislative Information Service
Seattle Municipal Code
http://clerk.ci.seattle.wa.us/~public/code1.htm
Information current as of 6/11/07

Title 23 - LAND USE CODE
Subtitle III Land Use Regulations
Division 2 Authorized Uses and Development Standards
Chapter 23.44 - Residential, Single-Family
Subchapter III Accessory Uses

SMC 23.44.046 Solar collectors.

A. Solar collectors are permitted outright as an accessory use to any principal use permitted outright or to a permitted conditional use subject to the following development standards:

1. Solar collectors, including solar greenhouses which meet minimum standards and maximum size limits as determined by the Director, shall not be counted in lot coverage.

2. Solar collectors except solar greenhouses attached to principal use structures may exceed the height limits of single-family zones by four (4) feet or extend four (4) feet above the ridge of a pitched roof. However, the total height from existing grade to the top of the solar collector may not extend more than nine (9) feet above the height limit established for the zone (see Exhibit 23.44.046 A). A solar collector which exceeds the height limit for single-family zones shall be placed so as not to shade an existing solar collector or property to the north on January 21st, at noon, any more than would a structure built to the maximum permitted height and bulk.

3. Solar collectors and solar greenhouses meeting minimum written energy conservation standards administered by the Director may be located in required yards according to the following conditions:

a. In a side yard, no closer than three (3) feet from the side property line; or

b. In a rear yard, no closer than fifteen (15) feet from the rear property line unless there is a dedicated alley, in which case the solar collector shall be no closer than fifteen (15) feet from the centerline of the alley; or

c. In a front yard, solar greenhouses which are integrated with the principal structure and have a maximum height of twelve (12) feet may extend up to six (6) feet into the front yard. In no case shall the greenhouse be located closer than five (5) feet from the front property line.

B. Nonconforming Solar Collectors. The Director may permit the installation of solar collectors which cause an existing structure to become nonconforming, or which increase an existing nonconformity, as a special exception pursuant to Chapter 23.76, Procedures for Master Use Permits and Council Land Use Decisions. Such installation may be
permitted even if it exceeds the height limit established in Section 23.44.046 A2, so long as total structure height including solar collectors does not exceed thirty-nine (39) feet above existing grade and the following conditions are met:

1. There is no feasible alternative to placing the collector(s) on the roof;

2. Such collector(s) are located so as to minimize view blockage for surrounding properties and shading of property to the north, while still providing adequate solar access for the collectors;

3. Such collector(s) meet minimum written energy conservation standards administered by the Director; and

4. The collector(s) add no more than seven (7) feet of height to the existing structure. To minimize view blockage or shadow impacts, the Director shall have the authority to limit a nonconforming solar collector to less than seven (7) additional feet of height.

(Ord. 113401 Section 3, 1987: Ord. 111590 Section 1,
1984: Ord. 110793 Section 6, 1982; Ord. 110669 Sections 13(part), 32(part), 1982: Ord. 110381 Section 1(part), 1982.)

Title 23 *- LAND USE CODE*
Subtitle III Land Use Regulations
Division 2 Authorized Uses and Development Standards
Chapter 23.42 - General Use Provisions

SMC 23.42.130 Nonconforming solar collectors.

The installation of solar collectors that do not conform to development standards or that increase an existing nonconformity may be permitted as follows:

A. In single-family zones, pursuant to subsection B of Section 23.44.046;

B. In multifamily zones, pursuant to subsection D of Section 23.45.146;

C. In NC zones or C zones, pursuant to subsection Section 23.47A.012 E.

(Ord. 122311 , Section 29, 2006; Ord. 120293 Section 1 (part), 2001.)

Title 23 - LAND USE CODE
Subtitle III Land Use Regulations
Division 2 Authorized Uses and Development Standards
Chapter 23.45 - Residential, Multi-Family
Subchapter III Accessory Uses

SMC 23.45.146 Solar collectors.

A. Solar Greenhouses in Required Setbacks. Solar greenhouses attached and integrated with the principal structure and no more than twelve (12) feet in height are permitted as accessory uses. Such solar greenhouses may extend a maximum of six (6) feet into required front and side setbacks. Attached solar greenhouses in required setbacks shall be no closer than:

1. Three (3) feet from side lot lines; and

2. Eight (8) feet from front lot lines.

3. Solar greenhouses may be built to a rear lot line which abuts an alley, provided that the greenhouse is no taller than ten (10) feet along the rear property line, and of no greater average height than twelve (12) feet for a depth of fifteen (15) feet from the rear property line, and the greenhouse is no wider that fifty (50) percent of lot width for a depth of fifteen (15) feet from the rear property line. Otherwise solar greenhouses shall be no closer than five (5) feet from the rear lot line.

B. Solar Collectors in Required Setbacks. Solar collectors which meet minimum written energy conservation standards administered by the Director are permitted in required setbacks according to the following provisions:

1. Detached solar collectors shall be permitted in required rear setbacks. Such collectors shall be no closer than five (5) feet to any other principal or accessory structure.

2. Detached solar collectors shall be permitted in required side setbacks. Such collectors shall be no closer than five (5) feet to any other principal or accessory structure, and no closer than three (3) feet to the side lot line.

3. The area covered or enclosed by solar collectors may be counted as required open space.

4. Sunshades which provide shade for solar collectors which meet minimum written energy conservation standards administered by the Director may project into southern front or rear setbacks. Those which begin at eight (8) feet or more above finished grade may be no closer than three (3) feet from the property line. Sunshades which are between finished grade and eight (8) feet above finished grade shall be no closer than five (5) feet to the property line.

C. Solar Collectors on Rooftops.

1. Lowrise Zones. Solar collectors which are located on rooftops and which meet minimum written energy conservation standards administered by the Director shall be permitted to project up to four (4) feet above the maximum height limit. The four (4) feet permitted for rooftop solar collectors shall not be added to extra height allowed for pitched roofs.

2. Midrise and Highrise Zones.

a. Solar greenhouses which meet minimum energy conservation standards administered by the Director shall be permitted to project up to ten (10) feet above the maximum height limit, including the additional height allowed for sloped lots. The combined total coverage of all rooftop features shall not exceed fifteen (15) percent if the total includes screened mechanical equipment.

b. Rooftop solar collectors other than solar greenhouses shall be permitted to project up to seven (7) feet above the maximum height limit, including the additional height allowed for sloped lots.

c. Extra height permitted for rooftop solar collectors shall not be added to extra height allowed for pitched roofs.

D. Nonconforming Solar Collectors. The Director may permit the installation of solar collectors which cause an existing structure to become nonconforming, or which increase an existing nonconformity, as a special exception pursuant to Chapter 23.76, Master Use Permit. Such an installation may be permitted even if it exceeds the height limits
established in Section 23.45.146 C if the following conditions are met:

1. There is no feasible alternative solution to placing the collector(s) on the roof;

2. Such collector(s) are located so as to minimize view blockage for surrounding properties and shading of property to the north, while still providing adequate solar access for the collectors; and

3. Such collector(s) meet minimum energy standards administered by the Director.

(Ord. 115043 Section 9, 1990; Ord. 113401 Section 4,
1987; Ord. 112971 Section 11, 1986; Ord. 111591 Section 1, 1984; Ord.
110793 Section 47, 1982; Ord. 110570 Section 3(part), 1982.)

Title 23 - LAND USE CODE
Subtitle III Land Use Regulations
Division 2 Authorized Uses andDevelopment Standards
Chapter 23.47A - Commercial

SMC 23.47A.012 Structure height.

D. Rooftop Features.

3. Solar Collectors.

a. In zones with mapped height limits of thirty (30) or forty (40) feet, solar collectors may extend up to four (4) feet above the otherwise applicable height limit, with unlimited rooftop coverage.

b. In zones with height limits of sixty-five (65) feet or more, solar collectors may extend up to seven (7) feet above the otherwise applicable height limit, with unlimited rooftop coverage.

4. The following rooftop features may extend up to fifteen (15) feet above the otherwise applicable height limit, so long as the combined total coverage of all features listed in this subsection does not exceed twenty (20) percent of the roof area or twenty-five (25) percent of the roof area if the total includes stair or elevator penthouses or screened mechanical equipment:

a. Solar collectors;

Renewable Energy Incentives

CHELAN COUNTY CODE
Chelan County, Washington
2007

Chapter 12.28
CLUSTER SUBDIVISIONS

12.28.040 Application of zoning regulations.

The use of this chapter supersedes the individual lot size requirements found in the Chelan County zoning regulations. For the purposes of this chapter, the minimum lot size for the zoning district shall be divided into the gross area of the project size to ascertain the maximum number of lots that can be created through the use of this procedure. When these calculations result in fractional numbers or decimal numbers, the decimal result of the number shall be rounded to the next higher number of allowed units. Where this clustering provision is used, a density bonus allows the maximum number of lots to be increased up to one hundred fifty percent, or not to exceed two hundred percent, with incentive features listed in subsection (1) of this section, of that which would otherwise be allowed in the zoning district. All other zoning regulations and use limitations shall remain in full force and effect.

(1) Optional Density Bonus. Up to two hundred percent of the density of the underlying district may be credited if any of the incentive features contained in Table A are included as part of the cluster development design.

(A) Incentive Features. The maximum residential density can be earned only when a combination of incentive features totals a maximum of fifty percent to a maximum density of two hundred percent for the cluster development design. The residential density may in no case exceed two hundred percent of the density in the underlying district.

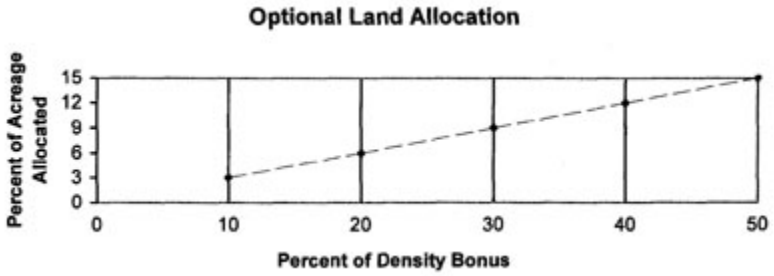
(B) All optional incentive features shall be considered for approval by the Chelan County administrator or hearing examiner.

Table A

Incentive Features	**Maximum Percentage** (Calculated toward 50% density bonus)
a. Open Space Credits	See Table B
b. Road Design/Consolidated/Joint Access	5%
Ungated development allowing through access to the public, interconnected roadway system without cul-de-sacs.	
c. Within Open Space Wildlife and Vegetative Enhancement	10%
(Screening, planting) approved by the Washington State Department of Fish and Wildlife. Corridor connectivity must be included to receive full credit.	
d. Allocation of Land	10%
Through recreation easements to private agencies or dedications to local public agencies, e.g., schools, cities, counties, utility purveyors and/or libraries. (Maximum 15% of acreage = 50% density bonus.)	
e. Within Private Lots: Wildlife Protection Design Measures (Native Landscaping)	5%
As approved by the Washington State Department of Fish and Wildlife.	
f. Pedestrian Trails (No Motorized Vehicles)	5%
g. Visual Screening	5%
Visual screening for non-single-family residential structures; parking shall not be visible from any public road or public vantage point.	
h. Open Space (Greenbelt of Minimum of 20 Feet Wide)	15%
Abuts adjacent open space. The connecting property boundary must be a minimum of 50% of lot depth and designated open space to ensure adequate corridor connectivity.	
i. Contiguous Lots	10%
Development lots contiguous with adjacent cluster developed contiguous lots.	

j. Fire Prevention Measures or Fire Plan Approved by the Fire Marshal	10%
Measures could include extra fire credits, fire sprinklers, accessibility, or vegetation.	
k. Energy and Conservation/Construction	15%
Development uses alternative energy sources and/or uses energy conservative construction design and materials.	
l. Historic Preservation	15%
Archaeological sites and historic buildings.	

Table B
Density Bonus for Allocation of Land to Open Space



(C) This table details an optional density bonus as specified in item (a) in Table A.

(i) Multiply the density bonus desired by 0.3 to calculate acreage allocation percent.

(ii) Density bonus shall not exceed fifty percent.

(iii) Acreage allocated shall not exceed fifteen percent of total acreage. The maximum number of lots shall not exceed the zoning district's maximum density as outlined in the provisions of this section. The remainder of the property shall be held in open space to be preserved and maintained for its scenic value, recreation, conservation, or habitat purposes. (Res. 2007-99 (part), 7/2/07: Res. 2006-43 § 706, 4/4/06: Res. 2003-10, 1/21/03: Res. 2000-128 § 706, 10/17/00).

CHAPTER IA: PLANNED UNIT DEVELOPMENT

SECTION I - PURPOSE

SECTION II - PERMITTED USES

SECTION III - STANDARDS
- Allowable base density
- Affordable Housing
- Open Space
- Off-street parking
- Buffer Yards
- Traffic Impacts
- Public Utilities and Service Impacts
- Dimensional Standards

SECTION IV - DENSITY BONUS PROVISIONS AND STANDARDS

SECTION V - PLANNED UNIT DEVELOPMENT ZONING DESIGNATION
- Pre-application conference
- Application for Zoning Amendment
- General Plan for Planned Unit Development
- Review Procedures for General Plan and Zoning Amendment
- Required findings
- Amendments to General Plan

SECTION VI - PLANNED UNIT DEVELOPMENT SITE PLAN APPROVAL

SECTION VII - WAIVER

SECTION IV - DENSITY BONUS PROVISIONS AND STANDARDS

A. A maximum density bonus of twenty-five (25) percent over the allowable base density for residential and nonresidential uses as set forth in Section III of this chapter may be approved in accordance with the following standards. The density bonuses may be granted, at the discretion of the Town Council, if the proposed density bonuses promote the purposes of the planned unit development zoning district set forth in Section I of this chapter. For residential uses, density bonuses shall be applied to the maximum number of dwelling units. For nonresidential uses, density bonuses shall be applied to gross floor area and maximum impervious surface requirements.

1. Dedicated open space - Increasing the dedicated open space area by a minimum of ten (10) percent of the net acreage of the tract may qualify for a bonus of up to five (5) percent above the allowable base density.

2. Active recreation - Facilities and areas for active recreation exceeding by fifty (50) percent the minimum requirement of Chapter II, Section IV.B.8 may qualify for a bonus of up to five (5) percent above the allowable base density. Active recreation facilities may include, but are not limited to tennis courts, swimming pools, ball fields, picnic or cookout facilities and tot lots.

3. Bike paths/greenway systems - An integrated system of bike paths or pedestrian greenways may qualify for a density bonus of five (5) percent above the allowable base density.

4. Solar access/energy efficiency - Design, layout and construction of a planned unit development providing solar access to forty (40) percent of the dwelling units and ensuring through appropriate deed restrictions that dwelling units will effectively utilize solar energy systems for water and space heating purposes, or design and construction of all structures in a planned unit development in compliance with current Energy Efficiency Building Performance Standards of the Maine Office of Energy Resources pursuant to 10 M.R.S.A. 1411 et seq., may qualify for a bonus of five (5) percent above the allowable base density.

5. Moderate Pricing - Providing a minimum of ten percent (10%) of all dwelling units to be marketed and sold to moderate income household with incomes of less than or equal to 80% of the area median income, adjusted by family size, as established by the Maine State Housing Authority or the Department of Economic and Community Development, which require monthly mortgage payments not exceeding 30% of the household's gross monthly income, may qualify for a bonus of up to ten percent (10%) above the allowable base density.

   Designated moderately priced units shall be identical in external design and construction to the other units in the project and shall be integrated throughout the planned unit development. The developer must enter into a binding agreement with the town to maintain the affordability of these units.

6. Rental units - Providing a minimum of ten percent (10%) of all dwelling units as rental housing for households with incomes of less than or equal to 80% of the area median income, adjusted by family size, as established by the Maine State Housing Authority or the Department of Housing and Urban Development, which have monthly rental payments not exceeding 30% of the households' gross monthly income, may qualify for a bonus of up to ten percent (10%) above the allowable base density. The developer must enter into a binding agreement with the town to maintain the designated units at twenty percent (20%) below market rate for households with incomes of less than or equal to 80% of the area median income.

7. Underground parking - Providing for parking below structures for at least seventy-five percent (75%) of the dwelling units or fifty percent (50%) of the required spaces for non-residential uses may qualify for a bonus of up to ten percent (10%) above the allowable base density.

8. Day Care - Development of a public use day care facility for children may qualify for a bonus of up to five percent (5%) above the allowable base density. The developer must enter into a binding agreement with the town to dedicate the facility for day care and to provide a viable management and operations structure.

9. Public transportation/public transit - Providing public transportation to town residents may qualify for a bonus of up to five percent (5%) above the allowable base density.

Chapter 18.18

RPD RESIDENTIAL PLANNED DEVELOPMENT OVERLAY DISTRICT

Sections:

18.18.010 Purpose of district.
18.18.020 Permitted uses.
18.18.030 Accessory uses.
18.18.040 Conditional uses.
18.18.050 Applicability.
18.18.060 Amenities--Number required.
18.18.070 Amenities--Designated.
18.18.080 Lot coverage.
18.18.090 Off-street parking.
18.18.095 Minimum lot size.
18.18.100 Open space area.
18.18.110 Density bonus conditions.
18.18.120 Development plan--Contents--Submittal.
18.18.140 Development plan--Review and approval.
18.18.150 Subdivision requirements.

18.18.010 Purpose of district.

The RPD residential planned development overlay district is intended to permit and encourage flexibility of site planning, with appropriate safeguards and controls for residential development, by allowing variations from the standards specified elsewhere in Division I of this title. Relaxation of lot sizes, yards and density requirements will be permitted when, in the opinion of the planning commission and approval of the city council, the proposed development will enhance the area in which it is proposed, by exceptional design and arrangement of buildings, provision of open space and landscaping, the protection of the welfare and privacy of adjoining property, or the construction and reservation of housing units for lower income or senior households. (Ord. 1009 N.S. § 1 (part), 1991: Ord. 559 N.S. § A (part), 1981)

18.18.095 Minimum lot size.

A. Where variation in development standards is permitted under the provisions of this chapter, exceptions to minimum lot sizes in all RE and R-1 districts shall be permitted up to a maximum of 25 percent below the base district requirements, provided that all provisions of this chapter are satisfied. This exception to minimum lot size shall not apply to duet units on corner lots in the RE and R-1 zones, except as provided below:

1. In the R-1-12,000 district, duet units on corner lots may be on lots that are a minimum of four thousand, two hundred square feet provided that when added to the size of the adjoining duet lot, the two lots in aggregate are at least nine thousand square feet.

2. Variation in minimum lot sizes in the R-2 and R-3 zoning districts shall be established as part of the RPD approval process.

3. Where single-family detached dwellings are located on a common lot, a defined front, side and rear yard space shall be provided for each dwelling equal to no less than 75 percent of the base district requirements, exclusive of any common driveways or shared access easements and exclusive of the common area outside of the defined yard spaces for each dwelling. (Ord. 1473 N.S. § 25, 2000: Ord. 1272 N.S. § 3, 1996; Ord. 1228 N.S. § 19, 1995)

18.18.100 Open space area.

A. Minimum open space area required shall be provided for at the following residential zoning category rates:

1. R-E, R-1 densities, sixty percent;

2. R-2 density, fifty percent;

3. R-3 density, forty percent, unless waived or modified as provided for under Section 18.18.060(B).

B. At least one-half of the total open space requirements shall be devoted to open space usable by the residents, and for such use be suitable in the following particulars: Physical surface characteristics, area dimensions, location, and physical improvements. (Ord. 1009 N.S. § 1 (part), 1991: Ord. 559 N.S. § A (part), 1981)

18.18.110 Density bonus conditions.

A. The planning commission may authorize an increase in allowable dwelling unit density for a residential project design which is exceptionally beneficial to the residents and users of the project and to the neighborhood or for those residential projects that assist in meeting the

lower income or senior housing needs of the community. When a developer has complied with the requirements of Chapter 18.78 or has received the maximum number of evaluation points under the corresponding section of Chapter 18.78 and the planning commission makes the finding that the proposed residential development meets the minimum requirements for building allotments or the amenities exceed the minimum required and are considered of exceptionally high-quality design by the planning commission, the planning commission may, with the approval of precise development plans, award a density increase. The total density bonus shall not exceed twenty-five percent of the density normally allowed inclusive of bonuses for both project design and affordability.

B. The applicant may be awarded maximum density bonuses in each of the following categories:

1. Providing housing units for lower income or senior households as provided in Chapter 18.47, up to a twenty-five percent density bonus;

2. Providing energy conservation measures and installation of alternative energy equipment, i.e., including but not limited to solar-powered heaters, or other innovative technological solutions (corresponding Section 18.78.280), five-percent density bonus;

3. Providing architectural design, site and landscape which:

a. Compliments surrounding architectural development,

b. Pedestrian circulation that ties into surrounding development by extending well-designed pedestrian walkways and pathways as a part of a master planned system,

c. Compliments specific city design plans, (Street beautification, linear park, buffer along incompatible land use, etc.) five-percent density bonus;

4. Providing for the incorporation of transfer of development credits from another site to the development, up to a maximum 25 percent density bonus. (Ord. 1215 N.S. § 22, 1995; Ord. 1009 N.S. § 1 (part), 1991: Ord. 899 N.S. § 2 (part), 1989; Ord. 559 N.S. § A (part), 1981)

18.18.120 Development plan--Contents--Submittal.

A. New residential planned development and residential condominiums shall be subject to Chapter 18.78 of this title. A request for the establishment of a residential planned development district shall be accompanied by the following information, unless the overlay district is initiated by the city, in which case the requirements shall be the responsibility of any subsequent applicant.

B. The development plan shall contain the following information:

1. Scale, North arrow, and title block;

2. Name and address of owner, project engineer and project architect;

3. Vicinity map and legal description;

Chapter 17.107

PLANNED RESIDENTIAL DEVELOPMENT

Sections:

17.107.010 Purposes
17.107.020 Where Permitted
17.107.030 Uses Allowed
17.107.040 Development Standards
17.107.050 Procedure for Approval and Effect of Approval
17.107.060 Subdivision
17.107.070 Changes to Approved Projects
17.107.080 Revocation or Extension of Approval and Reversion to Underlying Zone
17.107.090 Additional Regulations

17.107.010 Purposes. The purposes of this Chapter are

(1) to provide the city with an alternative form of residential development which will promote flexibility and creativity in the layout and design of new residential developments and which will protect the environment through the increased use of open space.

(2) to provide an alternative to traditional lot-by-lot development by accomplishing, among other things, the following:

(a) the preservation of natural landscapes, trees, streams, or other valuable community amenities;

(b) the clustering of structures to preserve or create open spaces, especially where steep slopes or other environmentally sensitive areas exist;

(c) the provision of a more efficient street and utility system serving units in a cluster, thus lowering housing, land development, and maintenance costs and reducing the amount of impervious surfaces.

otherwise by this Chapter. (Ord. 87-9 §1, 1987).

17.107.040 Development Standards. In considering a proposed PRD project the City Council may, if allowed in this section, approve a change from regular development regulations. Standards for the development of PRDs are as follows:

(1) PRD Size. The minimum size of a PRD shall be one (1) acre or five (5) lots, whichever is greater.

(2) Residential Density. The number of dwelling units allowed in a PRD shall be determined as follows:

(a) Basic Density. The number of dwelling units shall be calculated by dividing the net developable area by the minimum lot area per dwelling unit required by the zone in which the site is located. Net developable area is determined by subtracting the area set aside for public streets and nonresidential uses such as schools, churches or service or trade uses from the total development area.

(b) PRD Bonus Density. An increase in residential density above the level established in 17.107.040(2)(a) shall be allowed at a rate of a one (1) percent increase in density for each density bonus point if a PRD incorporates the following features:

(i) Energy Conservation. Up to a maximum of five (5) density bonus points shall be awarded to any PRD incorporating any combination of the following energy conservation features:

(aa) Five (5) density bonus points shall be awarded if seventy (70) percent or more of all proposed structures intended for human occupancy have a calculated heating/ cooling energy consumption less than that required by the Washington State Energy Code standards;

(bb) Two and one-half (2-1/2) density bonus points shall be awarded if legally guaranteed solar access is provided to the south-facing surfaces of fifty (50) percent or more of all proposed structures that are intended for human occupancy;

(cc) Two and one-half (2-1/2) density bonus points shall be awarded if fifty (50) percent or more of all proposed structures intended for human occupancy derive fifty (50) percent or more of their space heating/cooling, water heating, or electrical power needs from active, passive, or photovoltaic solar systems; or

(dd) Two and one-half (2-1/2) density bonus points shall be awarded if natural topography, grading, and planting are effectively used to decrease the energy consumption of structures in the PRD and to enhance the seasonal use of private or common open spaces.

(ii) Open Space. Up to a maximum of five (5) density bonus points shall be awarded to any PRD that provides more than the required open space. The amount of the bonus will be determined by the amount of additional open space reserved, with a one (1) percent bonus being awarded for each additional one (1) percent open space reserved.

(iii) Active Recreational Facilities. Up to a maximum of five (5) density bonus points shall be awarded to any PRD that provides for common, active recreational facilities such as a swimming pool, tennis court, or playground. These facilities shall be sized and designed to meet the needs of the PRD residents and their guests. The density bonus points awarded may range