Attachment Two

A template for planning for and undertaking eco-industrial development

Successful businesses do not make or direct significant investments or launch product lines without a good business plan. Sustainable development, in particular, requires a sustainable planning process. A number of planning issues are, however, unique to industrial development planning and in particular for eco-industrial development planning.

Communities contemplating eco-industrial development first need to identify specific goals, the resources needed to meet those goals, and obstacles to meeting goals. Then they must prioritize the goals and the strategies for meeting those goals.

Planning for eco-industrial development

- Solicit viewpoints from all stakeholder perspectives in the decision-making process.
- *Conduct relevant background analysis to allow educated decisions.*
- *Create alternative development scenarios to evaluate and compare risks and opportunities.*
- Evaluate and prioritize implementation strategies.

Planning phase

1. Involve community and community leaders

The active involvement and participation of the community targeted for EID will be a foundation for completing the EID Development Plan, and is necessary to ensure that the EID concepts are aligned with the community's priorities on economic growth, environmental quality and social goals. It may be useful and necessary to establish an EID project team to provide leadership throughout the project—roles would be determined by public and private stakeholders in the proposed EID.

2. Conduct background research

Although traditional industrial development research and analyses are necessary for EID planning, these typically fall short of the study necessary for most eco-industrial development. For EID to occur, additional assessments are also necessary: Data specific to community where the EID would be located is essential to support EID development that is consistent with community priorities.

The research conducted in this phase represents the initial "set-up" information. As the community starts to identify and consider EID concepts, additional research, specific to those concepts, will be pursued.

Traditional planning baseline analysis

Assess land availability __and consistency with the comprehensive plan.

Evaluate infrastructural capacity—sewer, water, transportation, electric, storm water.

Analyze access to markets— local markets, regional markets, national markets, obstacles to moving goods and services.

Analyze access to capital— public sources, private and venture capital, local sources of capital.

Analyze labor force.—size and training level of local workforce, market wages, availability of housing, and access to transportation routes or transit.

Additional EID baseline analysis

Analyze regional industrial resource flows. Gather information on material, energy and water flows (inputs and outputs) within a geographic region targeted for EID. Match with projected industrial loads based on profiles of preferred candidate tenants.

Inventory regional and site-specific amenities and infrastructure. Identify existing and proposed industrial infrastructure, utilities and facilities in region. This would include an analysis of water supplies, existing and potential renewable energy options (thermal and electric). Qualify access to transportation networks and appropriate scale for new industrial ventures.

Collect and analyze data on existing businesses and production activities in community. What kinds of manufacturing processes and technologies does the existing industrial development use? What technologies could allow both retooling of existing industry for greater resource and economic efficiency, while allowing new industrial development?

Collect and analyze data on material flows in community – inputs, by-products and wastes, product output. What are the existing household, industrial, commercial, and agricultural waste streams that could be a feedstock for new industrial development, or that could be co-managed more effectively with new industrial infrastructure?

Develop site evaluation and profiles. Conduct assessments of potential industrial sites in the region to determine options for EID. Determine the feasibility of each site or combination of sites for locating processing and conversion facilities along with manufacturing ventures. Site profiles will include materials handling and storage options, infrastructure assessments, existing assets, community development capabilities, alignment with local policies, and compatibility with regional suppliers. Determine preferred “eco-industrial” site characteristics.

Identify end-users of by-products and wastes produced within the community.

Create an energy profile for the community – production, demand, prices, environmental aspects. What kinds and capacity of distribution, generation, and transmission system infrastructure currently exist in the community? How could existing infrastructure facilitate use of waste heat, co-generation systems, distributed generation, or aggregation of energy use?

Natural resources available for development. What underutilized resources can be sustainably harvested, including forest resources, agricultural resources, minerals, and water resources?

Inventory of local suppliers and services. What kinds of locally produced goods and services can be used in new businesses, locally capturing the added value of existing businesses?

Review and characterize previous related planning work.

Economic and environmental performance evaluation

Determine economic and environmental performance standards, measures an evaluation process. Earlier project phases will inform these tasks. Appropriate performance

measures should be determined. Results should be used to inform development and commercialization efforts as well as future policies and investments. Life cycle methodology should be inherent in the approach.

Model economic impacts. Conduct economic impact modeling of the proposed eco-industrial supply chain. Applying a credible computer-based economic model, create projections of the localized economic impacts of an eco-industrial cluster will be developed.

Evaluate economics of environmental benefits. Applied research to develop and determine environmental and economic metrics that qualify and quantify the economic value of the environmental benefits associated with an eco-industrial cluster.

Analyze proposed industrial value-chain. An applied economics model can be used to determine the costs and value-added for each step of the industrial supply chain. This financial analysis can help determine the optimal market-based industrial system.

3. Conduct technology and market analysis

Assess technology and financial status. Conduct appropriate technical and financial assessments to determine the commercial scale viability of the materials handling, processing, wastewater treatment, manufacturing and renewable energy technology components of a eco-industrial cluster. Included will be; independent technology validation, materials and product performance testing, cost-benefit analysis, and a systems mass balance.

Profile candidate tenants. Parallel with site profiles, conduct profiles of candidate manufacturing, commercial, and/or service businesses that could locate within select sites or become part of an eco-industrial cluster. Candidate profiles will include a business prospectus, assessments of material and energy needs, facility requirements, product specifications, market assessments, and identification of supply chain production and networking synergies. Determine the necessary conditions for core and ancillary tenants.

4. Create alternative development scenarios

Each community must identify eco-industrial goals and consider eco-industrial development scenarios based upon its unique set of assets, resources, and obstacles. A community with an abundance of agricultural resources will likely consider very different scenarios than a community with an abundance of existing manufacturing businesses. Example: An agricultural community located within prime farmland will face distinct possible development scenarios from a community located in more marginal farmland. Example: A prime-farmland community with existing value-added processing will create distinct scenarios from a farmland community without processing infrastructure.

5. Evaluate and prioritize implementation strategies

After setting the goals and identifying possible development scenarios, the community must consider and prioritize implementation strategies. Strategies need to consider financing, organization, and regulation.

EID development financing. Where is the investment dollar coming from, and what strings are attached? What public investment must be made? What should be the realm of private investment? All development projects that use public investment should leverage substantial private investment. Similarly, local investment should leverage non-local investment.

Organization. Who is protecting the community's goals in the development and management of the eco-industry? A number of development and management models can be used, ranging from

fully private (e.g. private for-profit, private nonprofit), to any of the various forms of public/private models (e.g. quasi-public), to fully public ownership and management (e.g. stand-alone public, agency of local government). Example: an Economic Development Authority resolution which includes EID criteria. Each organizational form carries with it strengths and weaknesses for meeting the community's eco-industrial goals and for ensuring economic sustainability for the businesses.

Regulation. What public sector incentives and disincentives need to be changed? Zoning, performance standards, transportation standards, and other regulation should protect the community's interests, but should not unnecessarily burden eco-industrial development goals. Can some public regulation be eliminated through private sector regulation (covenants and easements) without compromising either development goals or quality of life?

Design phase

Based on the information gathered through research, analysis, and careful discussion with the community, the EID project team can create EID design concepts that reflect priorities for the region and the existing material flows of the local economy. The process of creating these concepts will be fluid, organic, and iterative; no formula exists with which to create an EID. Conceptual ideas will be developed and discussed, resulting in questions that will require further research and analysis.

Prepare conceptual EID site or cluster scenarios. Based on results of site and tenant profiles, conceptual site plans can be developed and will include scenarios that provide facility design/layout options, infrastructure connections, opportunities for shared facilities/amenities and sustainable design.

Develop site master plans. Development of site plans complimentary to community comprehensive plans. Determine principle uses of site/s: how to zone, conditions, restrictions, development guidelines. Determine necessary oversight authority and structure of development entity.

Develop schematic design and engineering. Based on previous work, develop schematic design and engineering plans for commercial scale operations. These plans should include facility design/layout, material handling/storage/processing flow, transportation interfaces, engineering specifications for integrating the modular renewable energy component, waste and wastewater recovery system design, and sustainable design guidelines for buildings and site.

Develop model codes, covenants, and restrictions and establish oversight authority. Develop model codes, covenants, site and building guidelines, conditions and restrictions that set the parameters for the EID. These would be established by the property owners or the EID oversight authority. These conditions would guide design, operations, and shared amenities and promote continuous high performance (environmental, economic, community).

Umbrella permitting model. In the process of working with several proposed community EID projects, a "site-wide umbrella permitting" model can be developed. A one-stop-shop model coordinates permitting activities to streamline the process for developers and companies building facilities, thus cutting time and costs.

In contrast a more ambitious concept, umbrella permitting, can benefit both companies and regulators. This would make site-wide management of materials and energy flows (inputs and outputs) feasible. It would be performance based and foster innovation beyond regulatory thresholds. Accompanying the umbrella permitting model could be an oversight authority (see

Devens Enterprise Commission) model that could administer regulatory permitting, compliance, and monitoring of environmental performance for co-located facilities.

EID construction phase

The next phase of the EID project will involve preparing a schedule for subsequent construction of the EID. This task is highly dependent on the work that would be completed up to this point in the project, especially related to EID concept development and site identification. Subsequent development activities must be based on the actual accomplishments of those earlier tasks and include:

- Infrastructure and site preparation;
- Regulatory approvals; and
- General construction schedule.

A high priority should be placed on identifying energy and resource conservation strategies for infrastructure and buildings, so the technical work needed to integrate those strategies into actual construction will be included as part of the development schedule. These strategies also will be highly sensitive to the results of the preceding tasks.

EID construction financing. This task will address financing approaches for actual construction of the EID. As with previous tasks, project financing will be influenced greatly by the nature of the EID concept and potential tenant businesses. As part of this task, it is unlikely that actual pro-forma financial statements are prepared. Instead, the result of this task is likely to be a statement of "Sources and Uses" budget for development.

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