08. Sustainable Strategies, Opportunities, & Policy Options

8.1 INTRODUCTION

Throughout the planning process, stakeholders have expressed interest in a "green" mixed-use neighborhood that would retain industrial and manufacturing uses, attract re-investment, create jobs, and provide mixed-income and affordable housing. Initial discussions for the industrial portion of the plan focused on recycling land uses and encouraging businesses that endorse sustainable values or manufacture of green products to locate in the east end. Affordable housing, transportation choices, and bicycle connections to the river, Rims, CBD, and MetraPark were stated priorities. During the design charrette, these ideas were expanded to include preliminary discussions of water-sensitive urban design, solid waste recycling, alternative energy and district heating concepts (including cogeneration of heat and power), and green-collar job creation. Review of emerging trends and research of eco-industrial parks and sustainable planning case studies reveal a broad range of sustainable planning strategies and principles of industrial ecology that could be applied to the area to capitalize on the synergy of the existing and proposed land uses and resources.

The following sections provide integrated sustainability strategies that may provide a distinct identity and unique market niche for the neighborhood using a systems approach that will offer advantages not found elsewhere in the City of Billings or region.

Green strategies may include some or all of the following:

- Attracting businesses who manufacture or sell green products.
- Locating training and job incubator centers that focus on green collar and green technologies.
- Building to green standards such as USGBC LEED.
- Designing and managing the district to employ state-of-the-art strategies.

The more comprehensive the green and sustainable strategies are for this neighborhood, the stronger the branding will be and the greater the attraction. It is possible that businesses will actually pay more to be in a center that promotes sustainable values, thereby providing heightened identity and an address.

State-of-the-art strategies may include the use of renewable energy technologies, combined heat and power, recycled water, byproduct exchange (BPX) and/or an exchange network, as well as shared facilities for rail access, shipping and receiving, loading, transporting, and parking. An example of one type of green strategy could include "industrial symbiosis," in which companies in a region or expanded study area collaborate to utilize each other's byproducts and otherwise share resources. For example, an industrial

symbiosis network in Kalundborg, Denmark, links a 1,500 MW coal-fired power plant with the community and other companies. Surplus heat from this power plant is used to heat 3,500 local homes in addition to a nearby fish farm, whose sludge is then sold as fertilizer. Steam from the power plant is sold to a pharmaceutical and enzyme manufacturer, in addition to a Statoil plant. This reuse of heat reduces the amount of thermal pollution discharged to a nearby fjord. Additionally, a byproduct from the power plant's sulfur dioxide scrubber contains gypsum, which is then sold to a wallboard manufacturer. Almost all of the manufacturer's gypsum needs are met this way, reducing the amount of open-pit mining needed. Furthermore, fly ash and clinker from the power plant are utilized for road building and cement production.

The EBURD study area contains prominent industrial uses (e.g., oil refineries, waste water treatment plants, scrap metal yards, utilities, industrial agricultural uses, automobile shops, etc.) that could be coordinated in a similar manner to capitalize on the synergy of existing uses while also attracting progressive businesses interested in sustainable manufacturing or other uses. The distinction of being the region's only green mixed-use neighborhood and/or eco-industrial park would likely attract both public and private reinvestment.

8.2 APPROACH AND BENEFITS

The study area and surrounding industrial and public lands could be planned, designed, and built employing a holistic systems approach, in which infrastructure and building designs and operations are integrated to address multiple objectives. By working together, the City of Billings and businesses within the study area may realize a collective benefit from this approach that is greater than the sum of individual benefits. Sustainable infrastructure planning should address water, energy, ecological, and waste systems considering efficiency, durability, function, and aesthetics.

The study area has the potential to be a model for emerging practices of sustainable community design and industrial ecology in a manner consistent with the community's vision, values, and goals for the area. Ideally, sustainable planning for energy, water, and waste management systems would extend beyond the study area to include the City's wastewater treatment plant, nearby refineries, MetraPark, state-owned lands and open lands south of the study area, and the main line of the railroad to take advantage of the synergy of these uses.

Currently, the County is exploring wind power at MetraPark, and the City is exploring pumping water from the wastewater treatment plant to the refineries with the goal of reducing the amount of water removed from the Yellowstone River. In addition, the Conoco refinery already recycles or reprocesses byproducts including gypsum and other materials. A green neighborhood could build upon and integrate these processes and explorations into a larger plan for the east side of Billings, from the Rims to the Yellowstone River, including the south side industries. It is possible that the expanded study area could attract new businesses by offering green power, renewable energy, recycled water, and a waste management and BPX network.

8.3 ACTION PLAN

The feasibility of an expanded mixed-use study area with an eco-industrial focus should be explored in partnership with the community, EBURD property owners, the City of Billings, Yellowstone County, Conoco, and other adjacent industries as a new model of industrial and infrastructure efficiency, cooperation,

and environmental responsibility. The expanded eco-industrial park (or eco park) concept and methods would enable real estate developers, industrialists, policy makers, regulators, investors, and communities to collaborate in the vital search for local sustainable development. Following recruitment of partners, a critical next step will be mapping and conducting an inventory of energy, water, and waste materials to characterize flows.

In nearly all the case studies of sustainable neighborhoods or eco-industrial sites reviewed, the role of the community and a robust public involvement program were central to success. Although in several communities local government, businesses, and/or consultants have played a more central role, those projects that involved citizens early in the process have been able to rally the community around a common objective -- creating jobs, protecting the environment, and preserving community social values. In general, however, communities lack the technical expertise or resources needed to develop their site's industrial ecology, design their baseline study, attract businesses, and successfully manage all components. For this reason, they have looked to federal, state, and local resources to help launch their projects.

8.4 OUTCOMES

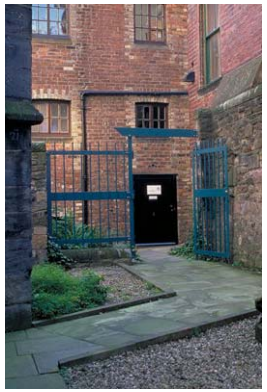
Member businesses might realize enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues. Investment in sustainable strategies may serve as a stimulus for economic diversification in the community or region. Anchor tenants, such as product manufacturers or waste-to-energy facilities, may attract complementary businesses as suppliers, scavengers/recyclers, service providers, downstream users, and other businesses that could benefit from eco-industrial strategies.

The eco park, informed by eco-industrial park (EIP) planning principles, could be planned, designed, and built in such a way to make it easier for businesses to cooperate, resulting in a more financially sound, environmentally friendly project for the landowners and community. Based on the concepts of industrial ecology, collaborative strategies not only include byproduct synergy ("waste-to-feed" exchanges), but can also take the form of wastewater cascading, shared logistics and shipping & receiving facilities, shared parking, green technology purchasing blocks, multi-partner green building retrofit, district energy systems, and local education & resource centers.

8.5 SPECIFIC OPPORTUNITIES

The EBURD master planning process and the consultant team's research have revealed several potential opportunities including:

- A recycling business cluster.
- A collection of environmental technology companies.
- A collection of companies making green products.
- A designated area for green workforce training, service hub, and/or supply center.
- An industrial park designed around renewable energy (wind, solar, and/or combined heat and power).
- A designated area with environmentally friendly infrastructure or construction.
- A mixed-use area with complementary industrial, commercial, and new residential neighborhood or campus.



- A single BPX or facilitating the creation of a local or regional network of exchanges.

Specific opportunities are summarized below for water, energy, transportation, waste management/flow, land conservation, district management, construction, and community integration.

Water

Design water flows to conserve resources and reduce pollution through cascading uses at different quality levels. EBURD opportunities may include:

- Reuse and distribution of waste water or stormwater from City waste water treatment plant or main storm drains for irrigation, industrial processes, or uses such as vehicle washing.
- Capture and store stormwater for irrigation on open lands or in below-grade cisterns.
- Provide for groundwater recharge.
- Recycle gray water from building irrigation and industrial processes.
- Install green roofs to reduce stormwater run-off, improve air quality, reduce heat island effect, etc.
- Reduce stormwater by managing upstream, in new and existing parks, green spaces, and streetscapes or though policies that require more on-site retention for longer periods of time.
- Stormwater and gray water are resources; identify sources and policies for their redistribution in the expanded study area.

Next steps:

- Undertake a water balance study of the area (and its surroundings) to determine all water flows in and out of the system. This will enable appropriate planning to minimize potable water requirements and maximize the potential for rainwater or stormwater diversion, collection, and storage; consider the potential for gray water collection and reuse and determine treatment volumes. Water balance studies can often lead to a reduction in water-related infrastructure costs.
- Using the results of the water balance study, create a water-stormwater master plan for the area, incorporating stormwater and gray water uses and creative harvesting, retention, and detention strategies.
- Consider further development/expansion of water-sensitive urban design techniques incorporated thoroughly within the streetscape of the expanded study area to ensure that water running off hard surfaces, particularly from those areas where water is likely to pick up contaminants, is appropriately cleaned before entering other water courses, such as the river or Yegen Drain.
- Adopt policies that support the reuse of storm and gray water, perhaps even allowing businesses to harvest from the large drain in N 15th Street.

Energy /Power

Maximize energy efficiency through facility design or refurbishment, high-efficiancy plant co-generation[1], energy cascading,[2] and other means. Use renewable

[1] CO-GENERATION IS THE CAPTURING AND USING OF OTHERWISE "WASTED" HEAT FROM THE ELECTRICAL GENERATING PROCESS.

[2] ENERGY CASCADING IS USING RESIDUAL HEAT IN LIQUIDS OR STEAM FROM A PRIMARY PROCESS TO PROVIDE HEATING OR COOLING TO A LATER PROCESS. FOR EXAMPLE, EXCESS STEAM FROM A POWER PLANT OR REFINERY MAY BE USED IN A FOOD PROCESSING PLANT OR GREENHOUSE.

sources extensively. EBURD opportunities may include:

- District heating networks using waste heat from adjacent industrial processes such as the refinery or recycling facilities.
- District heating networks using co-generation plant connecting complementary heat uses in the expanded study area and building complexes, providing highly efficient (and therefore lower running cost) heat and power. A centralized plant also provides flexibility in the future regarding fuel supply. Excess heat generated in the summer can be used to provide chilled water for cooling in the summer if required (heat is used to drive absorption chillers).
- Generation of heat and/or power from locally produced manure as fuel within an anaerobic digestion plant. This might also seasonally be used to manage waste from the fairground activities.
- Wind generators on roofs of public or private buildings or on open lands owned by County, state, or adjacent industries. Building integrated renewables could supply the buildings directly, with excess power going to the grid. Free-standing renewables such as wind turbines could be linked to buildings or be directly connected to the grid. As an example, the Oregon Department of Transportation has installed photovoltaic cells in the interstate right-of-way.
- Ensure that codes and development standards do not preclude the use of renewable energy technologies.
- Geothermic options should be explored.

Next steps:

- Carry out a heat mapping exercise to identify if there are significant waste sources of heat in locations of appropriate proximity to existing or proposed users of heat. Buildings with complementary heat loads (e.g., a daytime user adjacent to a nighttime user) should be co-located to maximize the potential for use of technology such as a combined heat and power (CHP) plant (which ideally runs for a minimum of 4,000 hours a year to make it economically viable). Examples of ideal anchor heat load building types for a CHP include a hospital maintenance facility, leisure center, or hotel facilities, linked up with office and/or residential blocks which have daytime and morning/evening energy requirements, respectively.
- Explore the feasibility of setting up an energy services company to build, operate, and maintain the district energy network including or providing renewable energy services to the expanded study area.
- Investigate whether the refinery is discharging heat into the river or atmosphere that could be usefully harnessed to heat homes or offices. Investigate the underpasses as potential routing for a district heating pipeline.
- Carry out a wind study to identify whether local wind speeds are sufficient to make either urban scale or larger scale turbines viable.

- Carry out a study of existing and future planned area of roof space for potential installation sites for photovoltaic panels and solar water heating panels, considering, for example, structural loading of existing roofs and shading.
- Investigate the potential for requiring a minimum percentage of renewable energy generation to be incorporated into all new development in the expanded study area.
- Investigate the potential for requiring a percent energy efficiency performance increase over local energy code requirements (or national ASHRAE 90.1: 2004 or updated/current version).
- Quantify the amount of manure produced in the stockyards south of the railway and the fairgrounds as a potential fuel source for a local biodigestor plant.
- Mobilize educational resources to help the community's businesses and government operations increase energy efficiency and prevent pollution.

Transportation

Provide and enhance transportation alternatives for people and freight. Preserve access to industrial lands, highways, and existing rail capacity. EBURD opportunities may include:

- Preservation, enhancement, and extension of the rail spur to support existing and new businesses.
- Shared public parking for new and proposed uses, particularly near the west end of the study area.
- Shared rail loading dock(s).
- Expanded transit, pedestrian, and non-motorized connections from the study area to the Rims, river, downtown neighborhoods, and CBD (as proposed in other sections of this plan).
- Design junctions to prioritize the bicycle over the car in most of the study area (as proposed in other sections of this plan).
- Design attractive public realm of connecting streets (e.g., street trees, wide pavements, cycle lanes) to encourage journeys by foot or bicycle (as proposed in other sections of this plan).

Next steps:

- Require new development to incorporate significant bicycle storage facilities.
- Encourage new development to develop a green travel plan for employees and visitors.
- Identify and acquire land for shared public parking, rail shipping, receiving, and loading.

Materials Flows and "Waste" Management for the Whole Site

Emphasize cleaner production and pollution prevention, especially with toxic substances. Seek maximum re-use and recycling of materials among area businesses. Reduce toxic materials risks through materials substitutions and integrated site-level waste treatment. Link the tenants to companies in the surrounding region

as consumers and generators of usable byproducts via resource exchanges and recycling networks. Quantify industrial and manufacturing byproducts of existing uses and seek to utilize rather than disposing of them. EBURD opportunities may include:

- Establishing Billings as a national model for waste recycling and BPX by organizing formal exchange programs.

Next steps:

- Highlight and map existing exchanges of byproducts and potential opportunities for new or existing businesses to use waste products produced by another.
- Gather data on resource flows of companies that are interested in or are committed to the BPX.
- Identify companies that could process selected materials, provide collection services for specific byproducts, or otherwise support the operation of the BPX.
- Provide training, tools, and support to the development process and data gathering and analysis.

Land and Resource Conservation

Minimize local environmental impacts by integrating the redevelopment into the local landscape, hydrologic setting, and ecosystem (as proposed in other sections of this plan). EBURD opportunities may include:

- Manage storm drainage on open lands in and south of the study area in a manner that enhances habitat, visual character, and hydrological connections including harvesting, filtration, and infiltration of water. This landscape might also add visual and interpretive interest to the expanded trail system.
- Integrate planning of water to manage flooding, provide a complete and functional storm drainage system, and provide dependable supply of non-potable water for landscape irrigation. This may be achieved by diverting water from storm mains into cisterns and managing upstream flows, perhaps in North Park, new parks and greenways, and/or underground cisterns.

Next steps:

- Explore the feasibility and acceptance of these techniques with City Engineering and public works and incorporate into infrastructure engineering plans.

Eco Park Management

In addition to standard business park recruitment, management, and maintenance functions, address recycling and reuse programs. Actively recruit green businesses or clusters of businesses who will use each others' byproducts. As companies change over time, support and award improvement in environmental performance for individual companies and the district as a whole, operating a site-wide information system that supports inter-company communications, informing members of local environmental conditions, and providing feedback on performance.

EBURD opportunities and next steps may include:

- Support from BSEDA, Downtown Billings Partnership, City of Billings Public Works Department, Yellowstone County, major industries, and EBURD property owners in the promotion, recruitment, business retention, and maintenance functions.
- Appealing to major industries and employers.
- Distinctive regional branding.
- Directory of businesses in the study area and branding / naming of study area or districts.
- Encouraging / facilitating new development and major refurbishment to pursue LEED certification of neighborhoods and buildings, providing the potential for the eco park to have all LEED certified buildings.

Construction / Rehabilitation

With new construction or rehabilitation of existing buildings, follow best environmental practices in materials selection and building technology. These include recycling or reuse of materials and consideration of lifecycle environmental implications of materials and technologies. EBURD opportunities may include:

- Renovation or remodeling and adaptive reuse of existing structures for new uses with supportive building and development codes.
- Financial, technical support, or infrastructure incentives for reinvestment in the area.
- Encourage and reward the use of LEED CI (commercial interiors) and LEED NC (new construction) for major refurbishment projects.

Integration into the Host Community

Seek to benefit the local economy and social systems through training and education programs, community business development, building of employee housing, and collaborative urban planning. Eco park strategies will be more likely to succeed if part of broader community initiatives. EBURD opportunities may include:

- Public outreach to engage and educate stakeholders and the community of opportunities and benefits.
- Creation of a strategic plan for reducing the total waste stream (residential, commercial, public, and industrial).
- Development of a highly effective regional BPX, providing markets for materials currently considered waste.
- Strengthening economic development planning to encourage businesses that fit the recruitment profile of the expanded study area or that turn wasted resources into products and jobs.
- Reducing greenhouse gas emissions through a project demonstration site.
- Financing of some development costs through public/private partnerships.
- Market-based instruments, such as in the use of taxes, low interest loans, subsidies, and other such methods, to provide financial incentives for environmentally beneficial decisions.

Next Steps for Green Strategy Implementation

1. Mobilize and organize support through outreach, education, and partnerships.
2. Identify public and private partners including government industries and businesses and property owners.
3. Planning and analysis to assess financial feasibility.
4. Inventory energy, water, waste materials, and byproducts of uses and businesses.
5. Create a network to link up existing businesses and recruit synergistic businesses.