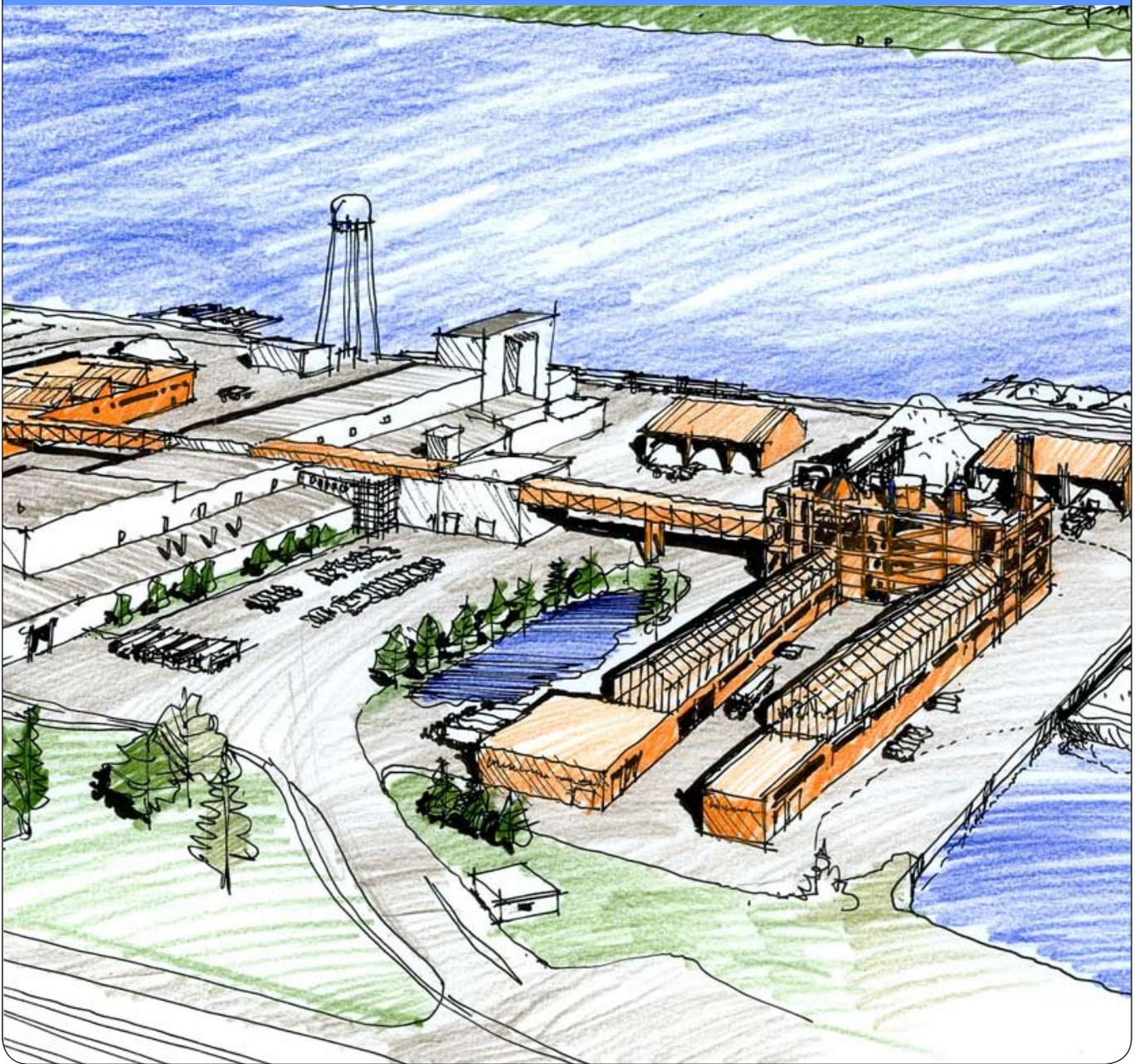


The Greater Duluth – Superior Area Eco-Industrial Development Initiative

Report to the John S. and James L. Knight Foundation



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Executive Summary

Major companies, communities, and citizens want to make progress toward integrating social, economic, and environmental concerns in a strategic way. To accomplish this, we must address problems as highly interrelated rather than fragmented. Rather than any individual set of issues (demographic patterns, land use, economic development, resource disparity), it is the convergence of economic, social, and major environmental issues that will drive current 20th century industrial systems toward sustainable 21st century systems. Transformation of the industrial sector is paramount, and many progressive companies, governments, and communities have begun to take significant actions to devise more sustainable systems.

The greater Duluth-Superior area and the region of northeastern Minnesota and northwestern Wisconsin are uniquely positioned to be at the forefront of eco-industrial development (EID). The area's diverse history and beautiful, bountiful natural resources—the world-class Superior North Shore and Boundary Waters area to the northwest and the Chequamegon forest region and national scenic lakeshore to the east—have instilled a strong environmental ethic in the region's citizens and communities. Thus, applying an eco-industrial framework as a primary strategy for new industrial development can be a way to capitalize on the region's assets and ethics to fuel a transition toward sustainable development.

The current economic and political conditions present a real opportunity for this region to transcend its divisive economic problems, enhance the environment, and improve community prosperity.

Opportunity for transition

Small and large communities and companies across the country are faced with choices to either harness the forces of change or be left at a competitive disadvantage. Eco-industrial development provides an avenue to seize the moment based on the premise that:

- The sustainability revolution is underway.
- Global changes will drive alternative solutions and innovation.
- Political support will follow a growing public demand for environmentally sensitive solutions.
- Industrial ecology and sustainable development support business profitability—the *economic bottom line*.
- Commerce and community benefits will ensue from pursuing the *triple bottom line*: increasing financial profitability, protecting local and global resources, and strengthening relationships within the community.

Eco-Industrial Development—Why Go There

Successfully undertaking EID requires a high level of collaboration as well as “transformational thinking.” EID is rarely an industry or government endeavor alone but rather a convergence of public and private sector partners collaborating over a number of years to institute the relationships and resources needed to be effective.

Eco-industrial development offers an alternative approach to current economic development models by integrating sustainable development principles as a primary driver. This concept is especially applicable to the northeastern Minnesota and northwestern Wisconsin region because it:

- **Aligns with the values of the region:** environmental stewardship and the ecological awareness of its citizens.
- **Offers an opportunity to expand and attract clean industries** that manufacture products with low environmental impacts and create new economic opportunities while supporting community development.
- **Applies an approach that requires cross-sector public and private collaboration**, which can help overcome traditional adversarial relationships and lead to competitive advantages for local industries *and* enhance the unique identity and quality of life of the region.
- **Is an emerging global trend:** The Duluth-Superior region can be a national, even a global leader, in fostering clean industries and new environmental technologies and products as well as become a model region and destination for new eco-based ventures.
- **Has the opportunity to market itself based on eco-branding.** Building outreach that brands this part of the Great Lakes region as an exceptional, healthy, and competitive place to live, work, invest, and play.

John S. and James L. Knight Foundation Grant

In late 2003, a critical mass of eco-industrial development (EID) activities converged in the Duluth, Minnesota, and Superior, Wisconsin, area. Separate from this, other efforts in both the Twin Ports area and communities in the region were grappling with how to drive a transition toward sustainable development. These efforts varied in their level of progress.

In October 2004 the Knight Foundation awarded seed funding for the **Duluth-Superior Area Eco-Industrial Development Initiative Phase One**. The project officially began in January 2005 extending until December 2006. The primary focus was to explore the circumstances, conditions, and readiness of the region to undertake eco-industrial development. The final project leveraged investment at a ratio of over six to one from project partners matching Knight Funds.

Phase One Accomplishments

Phase One was clearly a stage of discovery and vision building, but more so, an investigation to sort out opportunities and create circumstances to advance eco-industrial development. Although Phase One was underfunded and without precedent, the project demonstrates that a comprehensive eco-industrial development approach can unify many diverse interests under a common vision and create a path toward a significantly different future for the region. Phase One accomplishments include:

- Provided direct technical assistance to advance the development of eco-industrial projects and related eco-ventures.
- Initiated a regional baseline characterizaion to inform regional eco-industrial activities.
- Formed an Eco-Industrial Network as a resource for EID projects and eco-efficiency best practices.
- Educated and supported local governments in their efforts to establish strategies and policies that enable eco-industrial development.
- Established the Coalition for Eco-Industrial Development as a means to build local capacity to undertake EID projects.

The Coalition for Eco-Industrial Development

A growing list of regional partners in northeastern Minnesota and northwestern Wisconsin has formed the Coalition for Eco-Industrial Development (CEID), which will use a multi-faceted approach to advance EID in the region by focusing on early adopters, defining project areas, and harnessing innovation. The CEID is not conventional economic development but will be a catalyst to create opportunities and enhance existing economic development and environmental programs.

- Promotes and supports applied industrial ecology.
- Provides organized and targeted intellectual capital to its partners.
- Assists in the development of new high performance businesses.
- Improves the productivity of and repositions existing businesses.
- Creates a platform for business success.

The Coalition for Eco-Industrial Development will undertake Phase Two to implement a five-year strategic plan. If Phase Two is fully embraced and fueled by a significant injection of resources—specialized expertise, responsiveness, financial support, and committed public and private partners—the CEID will be the catalyst to mainstreaming sustainable industrial development and position the region on the leading edge of this transformation.

1. Introduction

Success in the 21st century for all sectors—communities, businesses, governments, institutions—will depend on how rapidly we adopt innovation, achieve new levels of collaboration, and shift from individual consciousness to systemic consciousness. Escalating forces that will necessitate a major transformation to more sustainable systems can be debated but are no longer avoidable. The ecological footprint of humanity is already moving beyond the carrying capacity of the earth. There are those who will maintain conventional patterns and others who will innovate to create new solutions to our major ecological, economic, and social challenges. Successfully overcoming these 21st century challenges will require transformational thinking and new ways of acting *together* rather than independently.

Major companies, communities, and citizens want to make progress toward integrating social, economic, and environmental concerns in a strategic way. To accomplish this change, we must address problems as highly interrelated rather than fragmented. Rather than any individual set of issues—demographic patterns, land use, economic development, resource disparity—it is the convergence of economic, social, and major environmental issues that will drive current non-sustainable 20th century industrial systems toward sustainable 21st century systems. Transformation of the industrial sector is paramount, and many more progressive companies, governments, and communities, have begun to take significant actions to devise more sustainable systems.

Source	Consensus on Problem Areas							
	Water Quality and Access	Climate Change	Biodiversity	Indoor Air Quality	Air Pollution	Food Production/Soil Degradation	Over-Fishing	Deforestation
World Resources 2000-2001: People and Ecosystems (WRI) ¹								
OECD Environmental Outlook ²								
World Development Report 2003 (World Bank) ³								
Global Environment Outlook 3 (UNEP) ⁶								
Global Trends 2015 (CIA) ⁷								
The Environmental Future: Emerging Challenges and Opportunities for the EPA (NACEPT) ⁸								

: Problem is a serious threat to the global environment and continued economic development.
: Problem is a threat to the global environment.

“When an innovative idea for solving an intractable problem is developed, Knight will throw its support.... Whenever the potential for transformation exists, that’s where Knight will join the visionaries who strive toward a different reality.”

–2005 Knight Foundation Annual Report

The John S. and James L. Knight Foundation provides a clear mission to invest in communities willing to lead in such transformation and undertake the “execution of big ideas.”

The concept of eco-industrial development (EID) is one of those “big ideas” and provides a holistic approach to transforming conventional industries to become more environmentally benign and economically competitive and will enable progressive communities to gain a competitive advantage. Changing our industrial systems in a significant way is necessary for EID to fulfill its potential. This requires major innovation on a number of levels—in systems thinking, in the function of our production and consumption systems, in the way our economic system internalizes full costs and values diminished environmental impacts, and in collaboration across sectors and governmental jurisdictions.

The greater Duluth-Superior area is uniquely positioned to be at the forefront of eco-industrial development because of its natural resource assets and strong inherent citizen environmental ethic. The time is right and this could become the place. This region is well positioned to brand, market, and identify itself as one committed to ecological innovation that improves economic and community prosperity. Successful eco-industrial development has the potential to help the region transcend its divisive economic problems, enhance the environment, and improve community prosperity.



Twin Ports Harbor (looking out from downtown Duluth) is considered the world’s largest inland seaport.

2. Background and Overview

Twin Ports' Industrial History

Vast natural resources and the confluence of the St. Louis River with Lake Superior was the foundation for settlement in the Duluth-Superior area known as the Twin Ports. By 1793, French settlers established a permanent trading post at the mouth of the St. Louis River, near the natural entrance to what would become Duluth Harbor. The fur industry dominated the region's economy through the first half of the 1800s. In the 1870s, the development of a shipping canal and the extension of a new railroad led to sustained regional population growth fueled by an economy rich in agricultural, timber, and iron ore resources. Minnesota iron ore along with coal and lime from across the Great Lakes region, transported by boat and rail to Duluth, helped establish the city as a major center for steel production. By 1900, Duluth was considered a major port, with annual shipments of iron ore, lumber, grain, and general merchandise totaling nearly 12 million tons.

In conjunction with this early industrial development pattern, manufacturing facilities associated with steel, timber, and agriculture prospered until the 1950s when these industries began to decline from the depletion of regional timber reserves, technological innovations, and fierce competition from larger Chicago mills and foreign steel. While the city of Duluth has changed dramatically over the past 100 years, it has retained a strong sense of community heritage. The city has transitioned from a predominantly industrial and manufacturing economy into one with multiple, diversified service sectors, including health care, aviation, higher education, and technological and financial services. Duluth's current regional and local economy, coupled with its location as an inland seaport, has helped to foster new commercial growth, residential expansion, and tourism, as well as helped to stabilize the city's manufacturing sector. (Source: *Duluth Works: A Reuse Planning Report for the U.S. Steel Superfund Site - E2 Inc. 2003*)

Today, the Twin Ports area is considered the world's largest, farthest-inland seaport. Both freshwater ships and "salties" carry iron ore, grain, and coal across the Great Lakes—2,432 miles to the Atlantic Ocean—then to ports around the world. With the renewable energy sector growing rapidly in the region, the Twin Ports is beginning to accommodate other goods such as large wind machines from Europe.

A diverse history, beautiful and bountiful natural resources—the world-class Superior North Shore and Boundary Waters area to the northwest and the Chequamegon forest region and national scenic lakeshore to the east—has instilled a strong environmental ethic in the regions citizens and communities. This along with the continuing transition from a "resource



extraction” based economy provides a major opportunity to transform the region to compete effectively in the new economy by capitalizing on the major environmental challenges we face in the 21st century. Thus, applying an eco-industrial framework as a primary strategy for new industrial development can be a way to capitalize on the region’s assets and ethics to fuel a transition toward sustainable development.



The economies of Iron Range communities like this one in northern Minnesota were historically based on resource extraction.

Emergence of a Regional Eco-industrial Development Initiative: Phase One

In December 2003, there was a convergence of eco-industrial development (EID) activities in the Duluth, Minnesota, and Superior, Wisconsin, area. The newly elected mayor of Duluth asked the Sandbulte

Chair from the College of St. Scholastica to establish an eco-industrial development committee to explore how to move this concept forward. Parallel to this was a statewide focus by the then Minnesota Office of Environmental Assistance to advance the implementation of eco-industrial development as well as an array of related local efforts. Two notable activities included an ongoing dialogue by communities in northwest Wisconsin to gain state support for eco-industrial development and a local manufacturing company, Truride Inc., exploring the opportunity for an eco-industrial park in Duluth. For several years prior to this, many efforts in both the Twin Ports area and other parts of northwestern Wisconsin and northeastern Minnesota were attempting to drive a transition toward sustainable development. Some of those efforts fell by the wayside, and others are still in varying degrees of application.

In 2004, the Eco-Industrial Development Committee, with representation from both Minnesota and Wisconsin, developed a *Strategic Framework for Eco-industrial Development in the Duluth-Superior Area*. In October of that year, the Knight Foundation awarded seed funding to begin implementation. These funds were combined with resources from the College of St. Scholastica, the Minnesota Office of Environmental Assistance, the city of Duluth, the University of Wisconsin-Superior Extension, and an array of other partners from northeastern Minnesota and northwestern Wisconsin.

The primary activities during Phase One involved creating a baseline of regional data to support and inform eco-industrial development activities, identifying and assisting emerging projects, organizing a network of partners and support resources, and progressively establishing the local capacity to undertake eco-industrial development projects and recruit and enhance businesses whose technologies, products, or services can be categorized as an eco-industry.

EID—Why Go There

Eco-industrial development offers an alternative approach to current economic development models by integrating sustainable development principles as a primary driver. A key component is the creation of a network of businesses that cooperate with one another and with local communities to improve resource productivity, restore the local environment, and eliminate pollution and associated costs. The aim is for higher environmental performance and economic value creation.

This concept is especially applicable to the northeastern Minnesota and northwestern Wisconsin region because it:

- **Aligns with the values of the region**—environmental stewardship and the ecological awareness of its citizens.
- **Offers an opportunity to expand and attract clean industries** that manufacture products with low environmental impacts and create new economic opportunities while supporting community development.
- **Applies an approach that requires cross-sector public and private collaboration**, which can help overcome traditional adversarial relationships and lead to competitive advantages for local industries and enhance the unique identity and quality of life of the region.
- **Is an emerging global trend:** The Duluth-Superior region can be a national, even a global leader, in fostering clean industries and new environmental technologies and products as well as become a model region and destination for new eco-based ventures.
- **Has the opportunity to market itself based on eco-branding.** Building outreach that brands part of the Great Lakes region as an exceptional, healthy, and competitive place to live, work, invest, and play.

Eco-industrial development has multiple facets with no one-fits-all model. There are numerous examples of previously tested EID concepts—cogeneration and shared energy use or resource recovery of waste materials from one company used as feedstocks for another. The real innovation in creating a true eco-industrial park or complex is bringing such ideas together in a whole system. By integrating as many of these well-tested individual strategies as possible, much higher levels of environmental and economic performance beyond our current fragmented approach are feasible. With this integrative approach, each addition to the industrial system adds to the value of the other elements in the system, resulting in cost savings, adoption of cleaner production processes, and enhanced progress toward zero emissions to the environment.

Accomplishing this bodes well for the community of manufacturing and service businesses located together on a common property or linked together in a cluster. Through collaboration in managing environmental and resource issues, the community of businesses seeks a collective benefit that is greater than the sum of individual benefits each company would realize by only optimizing its individual performance.

Indicators of Sustainable Industrial Development

- Sustainable growth integrates environmental, societal, and economic values (localized to community, shareholder, consumer, etc.).
- Internalized costs of consumption and environmental degradation.
- Prevents pollution in contrast to applying control technologies or managing emissions, discharges, and waste. Environment impacts are benign.
- Uses renewable materials.
- Applies new business model in which societal values are integrated into products and services.
- Integrates science; interdisciplinary, innovations, new technology
- Applies hybrid business models; collocated facilities; inter corporate, industrial networks; system wide.
- Eco-efficiency provides more value with less impact. Cyclically recovers materials at the end of their useful lives.
- Increases profits per unit of manufacture while minimizing waste, emissions, and environmental impact per unit.
- Creates “smart materials” that simplify the delivery of value and follow new protocols that eliminate waste streams and use less energy and materials.
- Maximizes use of knowledge and lowers use of materials to create economic value such as increased shareholder value-added per pound of production.

“The enhanced economic performance of participating businesses will make EID a powerful economic development tool for communities. Such developments are likely to attract leading-edge corporations and open niches for new or expanded local ventures. Both will create new jobs in much cleaner industrial facilities. Companies in the region will gain new clients for services and buyers for products. Development of Eco-Industrial Parks will create programs for extending their economic and environmental benefits across a community’s whole industrial sector. This promises cleaner air, land, and water, that are more effective for the environment while less burdensome to business.”

–Eco-Industrial Park Handbook - Ernie Lowe Indigo Development, 2001

Opportunity for Transition

Based on the history of the region and current conditions, a transition toward a more sustainable regional economy will be difficult. Some of the primary challenges include:

- Looming global environmental conditions (climate change, energy security, resource scarcity) are escalating.
- Economic development and environmental values are perceived to be in conflict.
- Industrial/manufacturing consumes natural resources, water, and energy, and generates waste.
- Transportation and logistics increasingly restrict business development in rural America.

Expertise to solve these problems is scattered and poorly utilized. However where there are challenges, there are opportunities. Intractable problems such as climate change and geopolitical conditions surrounding dependence on a fossil-fuel-based energy system coupled with regional conditions such as the decline in manufacturing and competitive pressures faced by core industries (e.g. wood products) are forces of change. Small and large communities and companies across the country are faced with choices to either harness these forces to drive change or be left at a competitive disadvantage. Eco-industrial development provides an avenue to seize the moment based on the premise that.

- The sustainability revolution is underway.
- Global changes will drive alternative solutions.
- Political support will follow a growing public demand for environmentally sensitive solutions.
- Industrial ecology and sustainable development support business profitability—focuses on the *economic bottom line*.
- Businesses benefit from pursuing the *triple bottom line*: increase economic profitability, protect local and global resources, strengthen relationships within the community.

Establishing the Coalition for Eco-Industrial Development: Phase Two

Based on the successful completion of Phase One, The Coalition for Eco-Industrial Development (CEID) Phase Two is the next step in an evolving regional approach to expand and transform the region's industrial base to more efficient and environmentally sound production. A five-year plan has been developed (available at www.eidnetwork.com), and regional partners are working to consolidate this momentum with the resources that will provide the supporting capacity to implement a successful transformation.

“EIDs offer government, at all levels, a laboratory for creation of policy and regulations. Developing an eco-industrial project is a complex undertaking, demanding integration across many fields of design and decision-making. Success depends upon a new level of collaboration among public agencies, design professions, project contractors, and companies locating in the park. The possible inability to overcome traditional fragmentation within and between these groups is a major risk.”
(Eco-Industrial Park Handbook - Ernie Lowe Indigo Development, 2001)

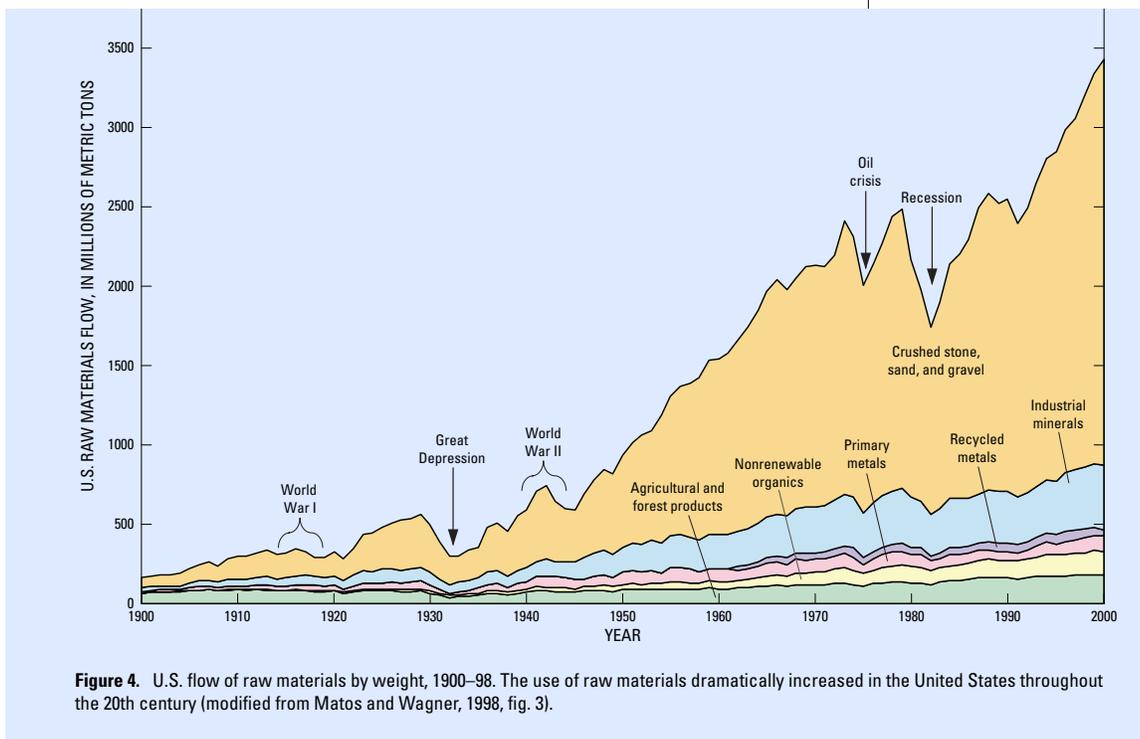


Figure 4. U.S. flow of raw materials by weight, 1900–98. The use of raw materials dramatically increased in the United States throughout the 20th century (modified from Matos and Wagner, 1998, fig. 3).

Materials in the Economy— Material Flows, Scarcity, and the Environment,
Lorie A. Wagner, U.S. Department of the Interior, U.S. Geological Survey,
First printing, February 2002

3. Summary Phase One

2004 Proposed EID Initiative—The Potential for Win-Win

The original Knight Foundation grant proposal was submitted in summer 2004. By then, an EID committee representing the mayors of Duluth and Superior had been meeting for over six months to develop a draft *Strategic Framework for EID*. This involved a diverse list of representatives from various local organizations grappling with understanding EID concepts and methods while trying to determine how to pursue EID in the area. This was not a structured planning process, and participants had varying degrees of commitment and time to invest in strategic planning. It became evident that to progress the project needed coordinated leadership and more resources. Thus, through the College of St. Scholastica, the committee, specifically several key partner organizations, put forth a proposal to the John S. and James L. Knight Foundation.

Eco-Industrial Development involves “Networks of businesses that work with each other and in conjunction with their communities to improve resource productivity, expand markets, eliminate pollution, and catalyze economic growth through enhanced profits, wages, and local investment.” (North American Eco-Industrial Development Council, 2003)

Eco-industrial development provides a pragmatic application of industrial ecology concepts. It involves a network of businesses that cooperate and view the community as a partner to improve resource productivity, restore the local environment, and eliminate pollution and associated costs. The networks of relationships are between core businesses within a given development or industrial park, those core businesses and the community or region, the core eco-industries and other regional businesses like materials, energy, or component suppliers that may result in facilities “collocated” in an industrial park or an “industrial cluster” in a defined geographic area.

Industrial Ecology involves designing businesses and groups of businesses as if they were a series of interlocking ecosystems, which interface benignly with the environment. Industrial ecology takes the pattern of the natural environment as a model for solving environmental problems and creating the most efficient industrial processes.

“Industrial ecology is the study of the flows of materials and energy in industrial and consumer activities, of the effects of these flows on the environment, and of the influences of economic, political, regulatory, and social factors on the flow, use, and transformation of resources.” —Robert White, President National Academy of Engineering, 1994

Triple Bottom Line captures an expanded spectrum of values and criteria for measuring organizational (and societal) success— economic, environmental, and social. For some, a commitment to corporate social responsibility brings with it a need to institute triple bottom line reporting. The triple bottom line is rapidly gaining recognition as a framework for measuring business performance.

In practical terms, triple bottom line accounting usually means expanding the traditional company reporting framework to take into account not just financial outcomes but also environmental and social performance. The phrase was coined by John Elkington, co-founder of the business consultancy SustainAbility, in his 1998 book *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*.

The premise of that proposal was the basis for Phase One of a Duluth-Superior Area Eco-Industrial Development Initiative. As proposed, the project was intended to address the need for a paradigm shift in the interrelationships that presently exist between business, community groups, and the environment. The existing paradigm—that environmental quality and social equity impede economic growth and commerce—is no longer valid and that locally, nationally, and globally, we are in the midst of such a shift. Those businesses and communities on the forefront of this paradigm shift will be well positioned to capitalize on economic opportunities along with environmental and community benefits. To capture these opportunities, it would be necessary to alleviate adversarial tension between economic prosperity and environmental quality through collaboration and a comprehensive approach

to eco-industrial development. The basis of this was the competitive atmosphere of global competition and resulting vulnerability of traditional industries and a growing body of evidence that ecological policy translates into good economic policy.

The original EID project as proposed was for three years and described the need for an eco-industrial development initiative, in the context of the three pillars of sustainability. An extrapolation of this need discussion is included below.

Economic

Well-documented decline in the manufacturing sector over the last decade, lower wage jobs, and an overall stagnant economy is further exacerbated by the region's aging demographics. These conditions are also indicative of the larger northeastern Minnesota and northwestern Wisconsin economies. The need to promote economic development that is not reliant upon traditional industries is clear. Moving beyond the traditional resource-based industries is not only an economic challenge, but an environmental and cultural challenge as well. Given that reliance on these industries has taken an environmental toll on the region, an adversarial climate has emerged between developers and environmentalists.

Further, one economic development consultant's analysis funded by the Knight Foundation conveyed the following insights: 1) local investment is going elsewhere because it is easier and less adversarial toward business, 2) the region does not embrace change, there is no sense of compromise (projects are viewed in terms of winners and losers), 3) local entrepreneurs and business leaders are discouraged because the culture doesn't value entrepreneurship, 4) it is tough to figure out where community agrees, 5) there is a culture of employees not employers, 6) failure is anticipated vs. encouraging success, and 7) how to get things done has been forgotten.

Environmental

Environmental concerns included negative impacts on citizen health and local quality of life, along with degradation of local resources that undermine community assets including those that support the tourist economy (e.g. swimming beaches closed because of pollution). The industrial activities of the last century left significant land and harbor areas contaminated, burdening communities with extensive costs of cleanup. Until these brownfield areas are cleaned up, these sites remain undeveloped and a liability rather than an asset. In addition, traditional environmental advocacy often translates into anti-business, and environmental responsibility is viewed as adding costs to business, contributing to an anti-business perception.

Community

The Knight Foundation's expectation for the Duluth area was to "invest in local partnerships to increase regional economic development in northeastern Minnesota and in western Wisconsin." A Knight Community Advisory Committee had articulated funding objectives as part of a five-year investment plan. Several were and still are relevant to EID: 1) to improve the climate of doing business in the region and to enhance economic development by building alliances among government, business, and nonprofit sectors, 2) increase a sense of place to draw businesses, 3) increase business dialogue, 4) increase the profitability of area businesses through product and process innovation, and 5) increase the diversity of high value-added products and businesses.

Focus of the Knight Foundation Grant

The original project as proposed was for three years with a total budget of \$443,173, with \$215,130 requested Knight Funds. In the end, the Knight Foundation agreed to award a \$50,000 grant for a one-year project. The final project ended up extending to nearly two years with a leveraged investment from project partners matching Knight Funds at a ratio of over six to one. (see Appendix B – Final Project Budget and Narrative). As a result, the strategy was modified for a phased approach.

The project officially began in January 2005, extending until December 2006. The primary focus of this initial phase was to explore the circumstances, conditions, and readiness of the region to undertake a comprehensive approach to eco-industrial development. As discussed in section two of this report, EID is complex and requires a systems approach. EID is rarely an industry or government endeavor alone but rather a convergence of multiple public and private sector partners collaborating over a number of years to institute the relationships and resources to be effective. Successfully undertaking EID requires a high level of collaboration as well as "transformational thinking."

Original mission and goals

Phase One goals as funded by the Knight Foundation, were as follows:

1. Advance the development of potential eco-industrial related projects by providing direct development assistance.
2. Create an eco-industrial network that could become a centralized resource for EID projects and eco-efficiency best practices.
3. Support the development of businesses whose technologies, products, or services can be categorized as an eco-industry.
4. Help regional businesses adopt eco-efficient processes, practices, and technologies.

Applied approach

Phase One was in part an investigation to sort out opportunities for eco-industrial development and create circumstances to advance these opportunities. Phase One also included developing a baseline of regional information to support EID activities, organizing a network of partners and support resources, and progressively establishing the local capacity to undertake eco-industrial development projects. This clearly was a stage of discovery and vision building, but more so, an effort to profile opportunities and respond to them with a combination of specialized expertise and ability to actively link related efforts to accelerate these opportunities. This created a foundation for a “network for action” and a motivated will to move forward, further establish the specialized know-how, and tenaciously conduct successful eco-industrial development.

The overall approach originally proposed was to enlist the expertise of a senior staff member from the Minnesota Office of Environmental Assistance in St. Paul in the role of project coordinator for up to 75 percent time. This Eco-industrial Development Coordinator brought extensive knowledge and experience in the implementation of community-based sustainable development projects and eco-industrial development. As a board member of the North American Eco-Industrial Development Council, he also brought links to a network of EID practitioners. Much of this coordinator’s time was spent educating local stakeholders on eco-industrial development practices, initiating the development of key baseline information, networking with other related regional initiatives, identifying specific project opportunities, providing assistance to emerging ventures, and coordinating multiple strategies.

In support of this project coordinator was the Sandbulte Chair of Management and Ethics from the College of St. Scholastica. Dedicating up to 25 percent time, he acted as fiscal agent, main local contact for the project, and chair of the EID committee.

The EID committee was initially used to guide and troubleshoot the project. After about eight months, it became clear that an adhoc volunteer-based committee was unwieldy, and thus the committee was retired. However, a smaller group of the most active members continued on in the role of a working group that functioned to organize two EID stakeholder forums, prepare planning documents and presentations, advocated to advance EID, and constructed the Coalition for Industrial Development structure, marketing brochure, and plan.

Establishment of CSS Intern Team Pilot Project. To further provide support for the project, early on a Sustainable Industrial Development Student Internship Team was established at the College of St. Scholastica. It took six months until this team, made up of four students and directed by the Eco-industrial Development Coordinator and Sandbulte Chair was organized. The team functioned to provide some assistance on specific activities issues associated with the project, including collecting and analyzing baseline data information and conducting some research on current conditions in the region that relate to EID.

Highlights of this work included:

- Research and analysis on eco-businesses in the region to provide evidence of the economic benefits of engaging in sustainable production practices.
 - Creating a list of the top 10 to 12 eco-industries.
 - Collecting information on materials, energy, and water flows through surveys and interviews.
 - Profiling major eco-businesses in the area, such as Stora Enso, in order to identify regional patterns and trends in innovative sustainable practices.
 - Compiled information on potential industrial parks. Clyde Industrial Park, Georgia Pacific, U.S. Steel site, Garfield Enterprise Park, and Atlas Cement were some of the properties.
 - Identified local enterprises that promote sustainable practices in order to improve social, economic, and environmental performance.



Stora Enso and Minnesota Power Biomass Power facilities. Future potential for EID.

Summary of project activities

Overall the original strategic framework guided project activities. The initial eight months could be labeled the discovery stage and consisted of:

- Establishing the CSS Intern Team.
- Initiating baseline research including a professional services contract for an Industrial Real Estate Market Analysis.
- Investigating local organizations that could be considered EID stakeholders.
- Assisting Clyde Park as a potential EID project.
- Conducting educational presentations.
- Participating in and offering educational assistance to coinciding planning activities such as the Knight-funded Duluth Charrette, July 2005, and the Duluth Comprehensive Plan process.
- Applying technical assistance to several eco-ventures.
- Linking Office of Environmental Assistance grant resources to several emerging residential sustainable design projects.



Old Clyde Iron site, West Duluth. Proposed adaptive reuse of the site into an historically preserved mixed-use development.

As the project progressed and after some trial and error, it became clear that planned activities needed to be adjusted. The adhoc EID committee was not functioning to add value, the CSS intern team was time consuming, the Clyde Industrial park project could not move forward as originally conceived, and more importantly other opportunities surfaced. Thus, the second eight months shifted away from some of the baseline work to providing concentrated assistance to a significant emerging EID project identified in August 2005. This project, Elkhorn Industries, was in the early planning stages and was a profile of the type of project that could demonstrate and exemplify EID in the region. More details on this effort are discussed in section 6 of this report.

In addition, the project was also adjusted to focus building an eco-industrial development network to align regional partners and resources around a united vision. This activity included holding two EID forums to convene stakeholders, providing educational presentations, and creating dialogue around the potential for EID. Along with these forums, the EID coordinator continued to make presentations to various stakeholder groups and develop written materials. This served the purpose of not only education, but relationship building as a core foundation for a network. One such effort was participation in an annual northwestern Wisconsin lobbying effort called Superior Days, which culminated in an extensive event in February 2006 in Madison. This featured over 150 citizen representatives meeting with legislators and state officials. A proposed regional eco-industrial development initiative was elevated to one of the region's four leading issues.

The final eight months were used to build upon the results of earlier work and respond to the need to coalesce this work into a longer term initiative that could provide adequate capacity in the region to establish specialized value-added services to implement EID activities. Specifically, a significant convergence of interest in EID resulted from stakeholder forums, grassroots networking, Superior Days success, and a clearly identified EID project in Elkhorn, Inc. that helped convert the skeptical into EID supporters.

Changes in course and lessons learned—The need for transformation

There were setbacks in the project. In general, it was difficult for the project coordinator to conduct activities traveling from the Twin Cities rather than being present full time in the community. However, this also brought benefits, in that resources from a state agency could be effectively brought to bear during the project. Another challenge was the function of the adhoc EID committee. This led to the conclusion that to support a long-term EID initiative an authorized oversight group made up of committed stakeholders would be necessary. Hence, a functional board of skilled and vested members is being established for Phase Two implementation of CEID.

A good concept that has merit for a future program, the CSS intern team was difficult to manage from afar. The nature of student activities was hard to focus without a formal internal program. Though the student participants did produce good support information and it appears they in turn gained significant educational value in the process, it became a drain on the limited time of the EID coordinator. In Phase Two, it could be a very useful tool if college and university research assistance can be effectively applied to future EID activities.

Another challenge encountered during the project related to commitments by local units of government and other organizations. Each has their own agenda and most of the human resources are focused on their own activities. At times, this resulted in a lack of responsiveness to engage in EID activities and a tension over competition for resources. This circumstance made it difficult to achieve the level of priority and

commitment beyond those key partners already involved in the project. Thus, in Phase Two, the new CEID organization and structure is designed to better engage stakeholders and offer opportunities for various levels of support from partnering organizations.

Overall, the project needed to adapt and respond, changing course based on circumstances presented and opportunities identified. One example of this was the proposed application of the Network Systems Analysis, which was originally intended to be applied during the project but was later determined not applicable.

One key lesson is that this adaptability and opportunistic approach should be integrated into Phase Two and because circumstances are dynamic, it is important to be mobile and respond with credible know-how while focusing on early adopters. A second key lesson is understanding that “intractable problems” not only require creative solutions but that they also demand that we challenge convention to transcend the status quo, which from a systems thinking perspective, is often part of the cause for the problems. A third lesson is that there must be steadfast persistence to pursue collaborate relationships across “jurisdictions,” identify and unify EID champions, and to build piece by piece a foundation for a shared vision. In this case, the shared vision is the Coalition for Eco-Industrial Development and its proposed Phase Two implementation.

Transition to Phase Two



Faced by mounting challenges on a global scale, major transformation will need to occur in order to solve those challenges. This transformation some say will be equivalent to the next industrial revolution. Based on the multiple accomplishments resulting from this project, considering that it was underfunded and without precedent, the most important part of this work is that it has been evolutionary

in unifying many diverse interests under a common vision, and revolutionary in creating a path toward a significantly different future for the region. If Phase Two, The Coalition for Eco-Industrial Development is fully embraced and fueled by a significant injection of resources—financial, intellectual, and human capital—the time and place could be right to build the capacity to adopt sustainable industrial development so the region can be on the leading edge of this transformation.

4. Creation of a Regional Eco-Industrial Baseline

Baseline Assessment as a Foundation for Action

Approach

An important component of a comprehensive approach to eco-industrial Development involves understanding current conditions within the communities and region for which EID is proposed. This lay-of-the-land characterization should involve analysis on many levels so that real opportunities for EID can be identified and effective strategies developed for implementation. Quality data acquisition is an ongoing process and takes time, particularly when collecting data from the private sector. Often the nature of the information, such as the case of material-energy-water flows within the industrial sector, is based on disconnected sources that are rarely in the public realm.

The parameters for EID baseline characterization are not standardized nor are there many models available to replicate. The fundamental approach used during this project was more investigative rather than a methodical planning process. In other words the project coordinator initially pursued secondary sources. On a somewhat trial-and-error basis, a search for sources of primary data and anecdotal information that could provide a foundation for EID were explored. The result bore both fruits and dead ends. When the trail of information lead to tangible evidence of an activity—public or private sector—that related directly or indirectly to eco-industrial development, this activity was accounted for and pursued to determine if it could be connected to the larger EID initiative.

Related community activities and history

Another part of the overall approach was for the project coordinator to spend a significant amount of time gaining an understanding of past activities in the region and other community activities that would provide a foundation for building the local capacity to undertake eco-industrial development. This included establishing relationships with local organizations and individuals who would be interested in and excited by the potential for EID. Proactively seeking out potential stakeholders by conducting meetings, giving education presentations, and being present at their events was the basis for beginning to build an EID network. Responding with technical assistance was a way to gain credibility with these stakeholders. Convening two EID forums and inviting a broad cross section of interested participants was a way to educate about EID concepts, build enthusiasm, create momentum, and identify concrete action steps to further advance EID activities.

Results

- Initiated the development of a baseline analysis to inform regional eco-industrial activities.
- Assessed the eco-industrial commercial and industrial real estate market, including an analysis of the potential for eco-industrial development at available properties and areas targeted for industrial development.
- Identified and characterized current industrial activity and infrastructure, leverage points and barriers, community assets, and sustainable business practices with applications for regional companies.
- Initiated an ongoing effort to qualify, quantify, and measure the benefits of sustainable business practices.
- Developed a database of operating information on 143 manufacturing businesses in the greater Duluth-Superior area that will also include information on regional eco-industries.
- Developed a conceptual framework for a geographic information system (GIS) based analytical tool to organize all baseline data.

Industrial real estate assessment

Characterizing the local industrial real estate market is a core exercise of the EID baseline study. The Twin Ports analysis identified concentrations of industrial development (including owner-occupant and investment properties), inventoried relevant infrastructure, surveyed market conditions (recent construction, absorption, vacancy, pricing), and considered property development opportunities from both a conventional and eco-industrial perspective. The real estate analysis affords the various stakeholders an equal understanding of the local industrial property markets and assists in making the connections between traditional industrial development and eco-industrial development.

Market size: The Twin Ports industrial real estate market is considered a small third-tier property market, characterized by high levels of owner occupancy and limited speculative development. Growth in small third-tier markets is more frequently the result of the success of specific local companies or new business recruitment rather than general economic growth. As of March 2006, industrial properties in Duluth and Superior listed on Northland Connection included 580,000 square feet of total leasable space of which 460,000 was vacant (these figures exclude Clyde Industrial Park). Another 85,000 square feet is listed for sale. The figures do not include owner-occupied facilities or investment properties that are fully leased.

Infrastructure: For a small third-tier market, the Twin Ports area packs both breadth and depth in transportation infrastructure. The market is home to the westernmost port facilities of the Great Lakes-St. Lawrence Seaway system and has extensive railway connections. The market is adequately served by highways, and passenger and cargo air service is available through Duluth International Airport. The region is also well served by energy (electricity and natural gas) and telecommunications utilities.

Submarkets and nodes: The Twin Ports industrial real estate market is conveniently divided into the two submarkets of Duluth and Superior. The Duluth submarket contains two industrial market nodes: the Duluth seaport and the Duluth International Airport. The seaport node includes warehouse and docking facilities and a mix of manufacturing operations such as the Duluth Paper Mill of Stora Enso, Georgia-Pacific's hardboard plant, and BendTec (metal bending equipment). The airport node is anchored by the Duluth Airpark Industrial Park and includes surrounding industrial operations and available land for development. Cirrus Design, a global leader in personal aviation aircraft, is the largest manufacturer in the airport node. The Duluth Seaway Port Authority owns and manages much of the airpark land and markets sites in both nodes.

The Superior industrial real estate submarket contains three nodes: Winter Street, Connors Point, and Hill Avenue. Winter Street and Connors Point include Superior's port facilities. Hill Avenue includes a small concentration of warehouse and distribution facilities as well as Murphy Oil, the region's major oil refinery. The Superior industrial market is characterized by older warehouse and distribution facilities, a few small manufacturers, and two petroleum products producers—AMSOIL (synthetic lubricants) and Murphy Oil (oil refinery).

Industrial market pricing and market conditions: With a few exceptions, industrial facilities currently on the market for lease and sale consist of older buildings that meet few of the demands of modern industrial users. The market has been relatively stagnant but stable for the past five years. Building vacancy is difficult to determine without a complete inventory of leasable properties but is likely greater than 30 percent. Lease rates range from \$3 to \$5 per square foot for manufacturing/warehouse space, and \$7 to \$10 for office finish within industrial buildings.

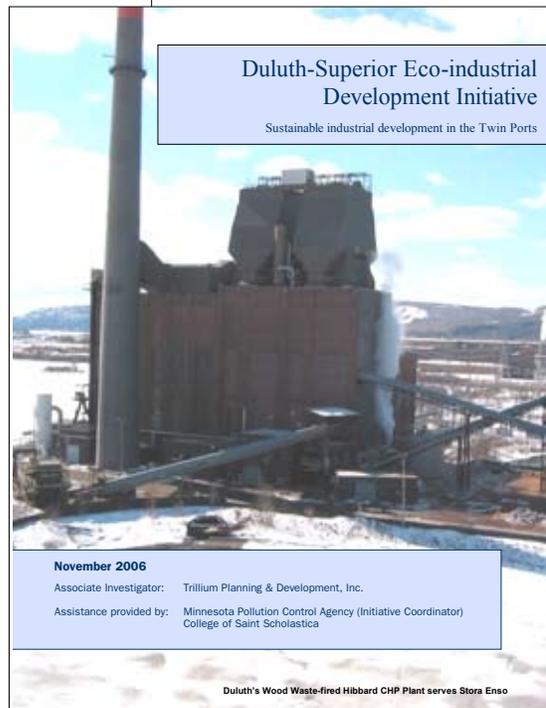
A number of industrial properties, mostly land only, are currently being marketed for sale. Land within existing industrial parks ranges in asking price from \$25,000 to \$98,000 per acre. However, future transactions for properties controlled by the cities of Duluth and Superior could involve economic development subsidies whereby land is sold at below-market values. Only a handful of industrial buildings are currently available, with pricing from \$22 to \$41 per square foot of building area.

Future development: The Twin Ports contain more than 600 acres of vacant brownfield and greenfield sites zoned and marketed for industrial uses. The following four locations offer the greatest opportunity for future multi-user industrial development including the potential for positioning as an eco-industrial park: 1) the contiguous Atlas Cement, Canadian National, and U.S. Steel sites, 2) the Airpark Industrial Park expansion in Duluth, 3) Winter Street Industrial Park in Superior, and 4) Parkland Industrial Park in Superior. Of these four sites, the Atlas Cement/U.S. Steel and The Winter Street locations offer the most desirable combination of features for consideration as an eco-industrial park.

Single-site EID opportunities: In addition to options presented above, there exist several adaptive building and site reuse opportunities that could incorporate eco-industrial and sustainable design strategies. A leading candidate for single-site eco-industrial development is the former Georgia

Pacific plant (now Elkhorn Industries) on Connors Point in Superior. Other single-site EID opportunities may be present at existing industrial operations such as Murphy Oil, Stora Enso, or Georgia Pacific. All three operations require considerable material and energy inputs and produce various by-products. Oil refineries, paper mills, and secondary wood processors across the U.S. and internationally have a long history of EID-style relationships.

In fact, the relationship between Stora Enso and Minnesota Power is already an outstanding example of eco-industrial networking and merits highlighting and possible leveraging by this initiative. In 1987, the city of Duluth retooled the M.L. Hibbard generation station to co-fire wood residues with coal and natural gas. Now the 70-megawatt (total electric capacity) plant operated by Minnesota Power serves the entire steam load of Stora Enso's adjacent paper mill and generates 48 megawatts of electricity. Approximately 80 percent of the fuel source of the Hibbard Energy Center is wood, including bark and wood waste from Stora Enso. One of the first tasks of a renewed baseline analysis should be to fully characterize this exchange and seek out further EID opportunities directly at Stora Enso and for the 14 acres of Stora Enso property available for development and designated JOBZ.



Profiles of eco-business activity

Another facet of baseline development was profiling existing business activities that could be categorized as eco-industries. This was pursued to some degree by the project intern team and coordinator as a way to identify early adopters and demonstrate the potential to

grow this sector. In the original proposal to the Knight Foundation, the EID project partners intended to take a more formalized survey approach to collect this information. As it turned out, this method was not practical because concrete knowledge of such companies was not consolidated in any form. Information on eco-business activity in the area was instead obtained by tapping the anecdotal knowledge of local economic development officials, environmental groups, and conducting some general research using the Harris Directory of manufacturing industries. Results of this work include the development of a template for categorizing eco-industries, a compilation of general information on known eco-based business activity, and some consolidation of market research on environmental industry information. Clearly, a more structured market analysis of this sector should be pursued in Phase Two.

Identifying EID Opportunities

Applying an investigative trial and error approach to seek out EID opportunities in the region resulted in several prospective projects that showed potential to integrate eco-industrial concepts. This entailed a combination of experience and knowledge by the EID coordinator, an alert response by local economic development professionals due to networking, and a proactive response to provide expert assistance to emerging projects.

Initially, the partners involved in this EID initiative saw potential in Clyde Park, a proposed mixed-use project in West Duluth. The Eco-Industrial Development Committee and EID coordinator began working with the Clyde Park developer and continued to do so for the first half of the two-year Knight grant. As time progressed, it became clear that for a variety of reasons this proposed development could not move forward as originally conceived. As the baseline research continued, so did the exploration for other EID opportunities. One significant project resulted, Elkhorn Industries in Superior, has progressively developed. A second project also surfaced in November 2006 in Duluth. More details about these projects are discussed in section 5 of this report.

Lessons Learned

Fundamentally the Eco-Industrial Development Baseline Assessment portion of this project was analogous to puzzle building. By identifying and consolidating pieces of the puzzle, a larger picture began to emerge. Not all the pieces were gathered nor can they be assembled neatly yet. Pursuit of baseline information for eco-industrial development must continue, and as this information is consolidated and analyzed, strategies on how best to apply resources toward advancing EID opportunities can be continuously improved. However, pursuit of baseline information should not supersede or delay time-sensitive opportunities to implement EID projects.

5. Eco-Industrial Applications

EID Model Development—Learning from Early Adopters

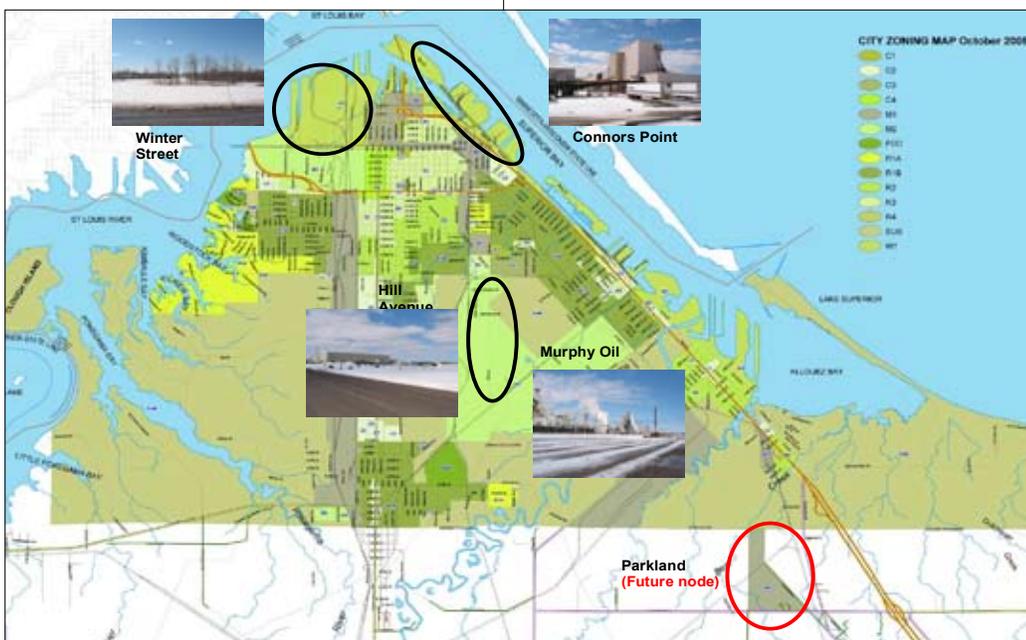
One considerable asset of the Duluth-Superior area EID project was the knowledge and experience provided by the project coordinator. Not only did he have extensive sustainable development expertise but he also had been working on various eco-industrial development activities in Minnesota for the previous five years. In 2004 a state agency, the Minnesota Office of Environmental Assistance (now part of the Minnesota Pollution Control Agency), began to focus educational and technical assistance in the Duluth area as a strategy to advance EID opportunities. This work culminated in the EID Initiative Phase One, which was funded by the Knight Foundation. This funding enabled the agency's EID expert to become the project coordinator, focusing a significant percentage of time in the Twin Ports area.

Eco-industrial development is an emerging field founded on the principles of industrial ecology. The concepts associated with industrial ecology are complex, and the practices and methods used in applications of eco-industrial development are diverse with no standardized approach available. Thus, in order to develop and apply an eco-industrial development strategy in the Duluth-Superior area, it was necessary to explore other EID projects that have been identified as early adopters. In so doing the intent was to develop a hybrid model customized to the conditions and opportunities in the northland region.

The combination of specialized EID expertise and connections with other EID practitioners enabled the project coordinator to assess, modify, and

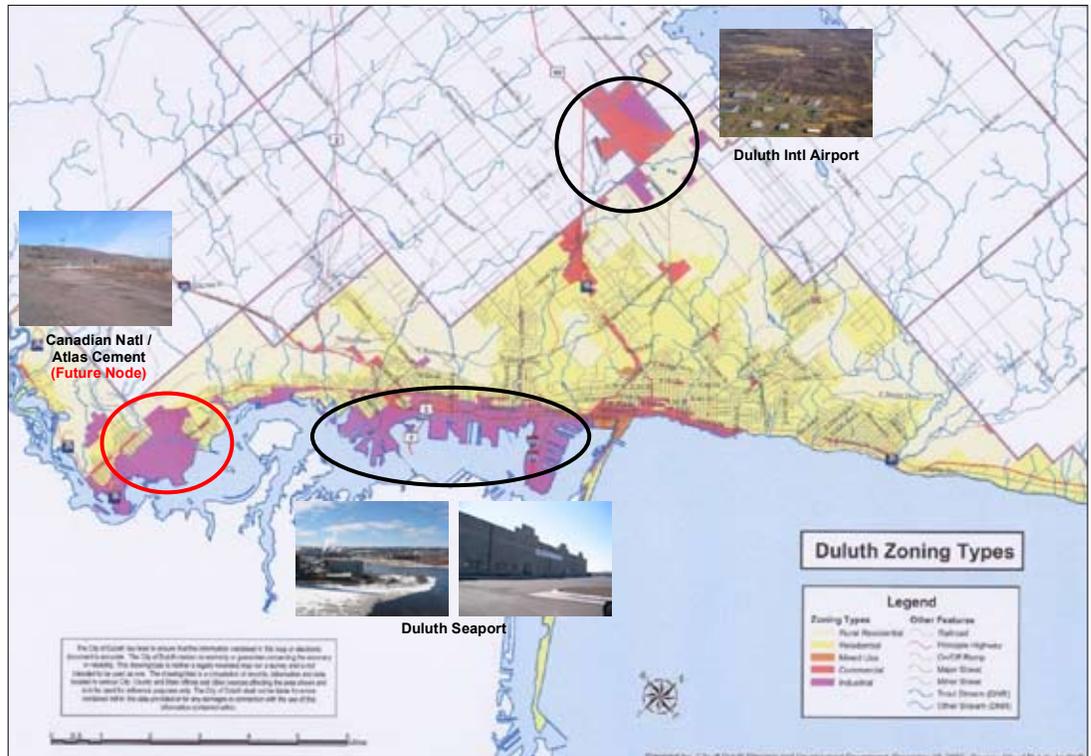
apply eco-industrial approaches from an array of other national and international projects. As a board member on the north American Eco-Industrial Development Council, he had direct access to unique expertise and information. During the term of this grant, the project coordinator participated in several international EID workshops in Vancouver, Halifax, and South Korea.

Superior industrial real estate nodes



Complementary to the expertise provided by the coordinator, a professional services contract was used to gain additional EID expertise to support the project. Specifically, these consulting services provided applied expertise in the following areas:

- Baseline analyses—planning and coordinating
- Industrial real estate analysis
- Strategic planning for EID initiative



Duluth industrial real estate nodes

Collaboration and Education

Important from the outset of this EID Initiative was the need for continuing education to diverse groups of stakeholders on what EID is or is not, concepts and practices, conditions driving the need for EID, and benefits and arguments that support public and private investments in EID. This was not an easy task and must continue if a long-term regional EID effort is to be sustained. Fundamental components of the approach to educate were to demonstrate a willingness to collaborate, proactively seek out related activities that could align with and support EID, build a network of supporting organizations and multi-sector stakeholders that would have a vested interest in successful EID, and follow up with assistance as necessary to demonstrate credibility. Below is an inventory of network building and educational activities.

Linking local initiatives complementary to EID— Collaboration and educational assistance activities

- Coordinate assistance from Office of Environmental Assistance green building staff to provide model information to the downtown Duluth Charrette Team.
- Active attendance at related community meetings.
- Presentations to city councils and others.
- Collaboration with APEX to provide assistance to emerging eco-based ventures.

- Investigate applications of baseline information and GIS model with economic development region portal developed by Northspan.
- Educational assistance to regional organizations such as Sustainable Duluth.
- Informational assistance to support the adoption of eco-industrial policies in the Duluth Comprehensive Plan.
- Technical assistance to Superior Days 2006 Initiative (an annual eight-county lobbying effort for northwest Wisconsin) adopted and promoted eco-industrial development as one of its four legislative priorities.



Old Atlas Cement Site (foreground) and large former U.S. Steel site (background) along St. Louis River estuary.

Providing Intellectual Capital and Specialized Assistance

Section 4 of this report provided a summary of why and how a baseline of information was consolidated and synthesized to provide a foundation for the continuing implementation of this EID Initiative. Further development and analysis of information in the areas of industrial resource flows, eco-business market research, regional-national-international conditions influencing EID, eco-based technologies and commercialization opportunities, and clean industrial production innovations will be necessary. Gathering and synthesizing this array of information, integrating it into useful tools that can be brought to bear on emerging EID opportunities, applying a systems-wide

approach, and utilizing this intellectual capital combined with human resources to effectively advance EID projects will be essential.

Simultaneous to establishing an EID baseline, EID expertise applied during Phase One did achieve a notable level of success consolidating and applying intellectual capital and providing value-added technical assistance to accelerate EID opportunities. This was done lacking adequate levels of human, financial, and partnership resources yet clearly demonstrates the potential for expanded success if such capacity to support EID did exist in the region. What follows is an inventory of activities that advanced each goal of this Phase One EID initiative.

Goal One—Advance the development of potential eco-industrial related projects by providing direct development assistance.

Elkhorn Industries-Georgia Pacific Site Connors Point Superior. Provided technical assistance in market planning, feedstock supplies, capital and operating pro formas, and developing a conceptual site plan. Organized and conducted an Eco-Industrial Design Workshop applying a team of designers, engineers, and EID experts.

Results included conceptual eco-industrial design renderings of the site (existing and proposed facilities), general narrative report of potential eco-industrial features and key issues to implement these features, recommendations on facility design and layout options, and scenarios for a potential eco-park complex.

Clyde Industrial Park. Consulting assistance to Clyde Industrial Park in the area of market analysis and positioning based on the potential to integrate eco-industrial features to create market advantages for prospective tenants.

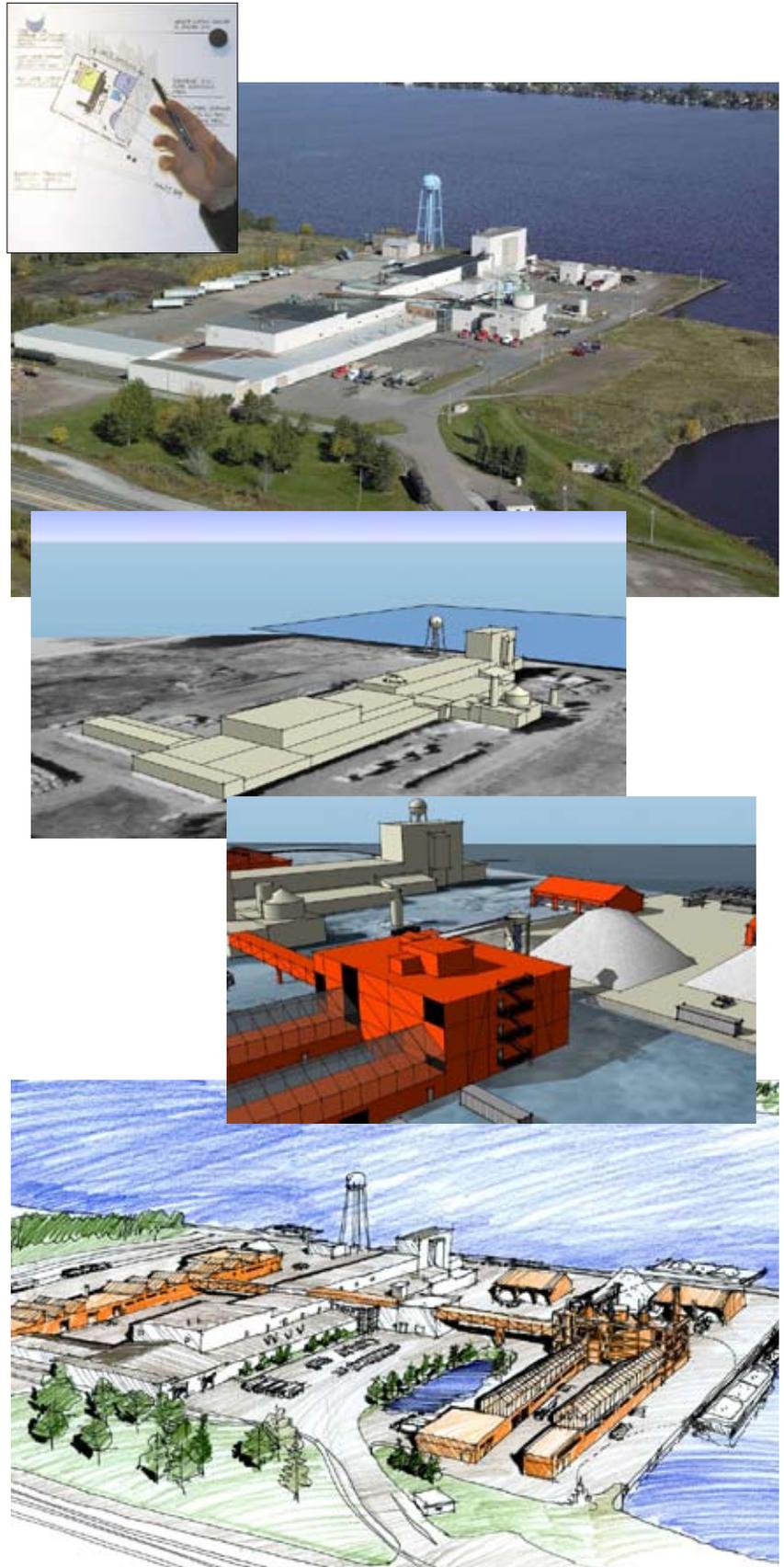
Sustainable Smithville. Technical assistance to the early stages of a new neighborhood development proposing comprehensive green design features.

Hawk Ridge Estates. The Minnesota office of Environmental Assistance provided a small grant to the Housing and Redevelopment Authority of Duluth for a Market Transformation for Solar Roof Technology project. As a result, a model home is being built that will include a solar roof system and other green design strategies. The project will measure the market value of solar roofs as a housing amenity and the responsiveness of consumers to solar roofs.

Goal Two—Create an eco-industrial network that could become a centralized resource for EID projects and eco-efficiency best practices.

Initiated the development of an Eco-Industrial Network that could become a centralized resource for EID projects and eco-efficiency best practices.

- Convened two EID stakeholder forums to educate and establish a network list of interested stakeholders.
- Provided technical assistance and information to assist regional organizations that promote eco-based economic development strategies.



Elkhorn EID site (from top): results of an EID design workshop, design process, existing facility, two computer models of EID features, final concept design for eco-park facilities

Goal Three—Support the development of businesses whose technologies, products, or services can be categorized as an eco-industry.

Collaborated with other regional organizations, such as APEX, Northspan, the Development Association of Douglas County, the Northern Center for Community and Economic Development, and the Bayfield County Economic Development Corp to identify and assist eco-based ventures.

- Provided early market development assistance to Tundra Composites now proposing to site a new manufacturing facility in Hoyt Lakes in 2007.
- Arranged prototype performance testing with the State of Minnesota for lead-free wheel weights on its internal fleet of vehicles.
- Included Tundra environmentally preferable fishing sinker products in Minnesota’s Get the Lead Out Campaign. Resulted in featuring Tundra brand at sinker exchange events creating market recognition of product. Provided facilitated regulatory assistance in early stage permitting activities for proposed facility at Laskin Energy Park, Hoyt Lakes.

Goal Four—Help regional businesses adopt eco-efficient processes, practices and technologies.

Trueride Inc. Provided early development guidance to company when they were considering a “Greenworks” Eco-industrial park development. Company did not pursue the concept of a new eco-park but instead choose to purchase an abandoned manufacturing facility. Provided early planning assistance for relocated operations including green building design tools and information associated with waste materials and green products. Company eco-efficiency improvements in the last two years include:

- Remediating a brownfield site.
- Adaptive reuse of a defunct manufacturing facility.
- A green building office and manufacturing facility.
- Company policies and production activities focused on waste reutilization into new products.

The company has also continued to evolve an environmentally responsible business philosophy and achieve very positive economic results.



Results of Project Activities

In trying to determine outcomes and measure success, a number of anticipated outcomes were identified at the beginning of the project. These outcomes if achieved were intended to be used to evaluate progress. There was no formal quantitative evaluation method employed. However, the qualitative results of individual activities were compared with other known national and international EID initiatives. Knowledge of EID methods and models came from the unique experience brought to bear via the project coordinator. Some of the project activities involved extensive investigation of other leading EID projects, including site visits to two notable projects in the northeastern United States, membership on the board of the North American Eco-Industrial Development Council, participation in three international EID forums, and a concentrated assessment of many other EID benchmark projects. Thus, progress toward anticipated outcomes and other results was based on a comparative assessment with other known EID projects essentially determining best practices and modifying them to create a hybrid that fits the circumstances of this region.

Initial anticipated outcomes

- Baseline information about eco-industrial opportunities and increased community awareness of these opportunities.
- A network of public and private stakeholders collaborating to advance EID.
- Identified eco-industrial development projects and scenarios for adopting eco-industrial features into these projects including quantifiable benefits.
- Profiles of eco-enterprises suited for the region and strategies to recruit these enterprises.
- A menu of local policies that support eco-industrial development.
- Recommended options on how the region can establish an ongoing initiative including an appropriate organizational structure.
- Commitments of additional resources to fund future EID activities.
- College of St. Scholastica Internship Pilot completed.

Final Phase One Accomplishments

Advanced the development of potential eco-industrial projects and related eco-ventures by providing direct technical assistance.

- Elkhorn Industries Georgia Pacific Site, Connors Point, Superior—early phase of commercialization of this eco-park.
- Tundra Composites—Announced new manufacturing facility in Hoyt Lakes in 2007.
- Hawk Ridge Estates Eco-Home—under construction and will be open for two years as a model demonstrating advanced green design features in the local housing market.

Initiated an Eco-Industrial Network as a resource for eco-industrial development projects and eco-efficiency best practices.

- Established an Eco-Industrial Network webpage as an information resource.
- Conducted educational presentations to various local stakeholders.

Initiated the development of a baseline analysis to inform regional eco-industrial activities.

- Eco-industrial commercial and industrial real estate market assessment, including an analysis of the potential for eco-industrial development at available properties and areas targeted for industrial development.
- Identified and characterized current industrial activity and infrastructure, leverage points and barriers, community assets, and sustainable business practices with applications for regional companies.
- Initiated an ongoing effort to qualify, quantify, and measure the benefits of sustainable business practices.
- Developed a database on 143 manufacturing businesses in the greater Duluth-Superior area that will include information on regional eco-industries.
- Developed a conceptual framework for a geographic information system (GIS) based analytical tool to organize all baseline data.

Educated and supported local governments in their efforts to establish strategies and policies that enable eco-industrial development.

- Eco-industrial policies are integrated into the 2006 Duluth Comprehensive Land-Use Plan. Superior Days 2006 Initiative (an annual eight-county lobbying effort for northwest Wisconsin) adopted and promoted eco-industrial development as one of its four legislative priorities. In 2007, advancing EID will be one of three legislative priorities for the region.
- Douglas County Board of Supervisor's passed a resolution to become an "Eco-County."

Established the Coalition for Eco-Industrial Development.

- Created CEID nonprofit corporation, pursuing 501(c)(3) status.
- Appointed an interim board.
- Four local units of government have committed financial and other support.

Shared visions

Many of the governing principles and policies in the *City of Duluth Comprehensive Land Use Plan* support eco-industrial development. The complete plan is available at <http://www.ci.duluth.mn.us/city/compplan/index.html>.

Governing principles

Reuse previously developed lands. Reuse of previously developed lands, including adaptive reuse of existing building stock and historic resources, directs new investment to sites which have the potential to perform at a higher level than their current state.

Support traditional economic base. Supporting Duluth's traditional economic foundation maintains jobs, tax base, and opportunity. Economic activity with specific location requirements may be subject to displacement or site competition with changes in real estate values.

Support emerging economic growth sectors. Emerging economic sectors add economic, cultural, and social diversity. These include higher education, medical, value-added manufacturing, commercial outdoor recreation, historic resources interpretation, arts and music, information technology, and visitor services.

Take sustainable actions. Initiate land use, site design, transportation, building design, and materials policies that reduce consumption of finite resources, generation of solid waste, and introduction of toxic materials to land, air, or waters.

Policies

Natural Resources Policies The city will consider performance standards and incentives related to site design, building design, building materials, and use of consumable materials to contribute to protection of natural resources through reducing production of toxic materials and their discharge into air, soil, and water.

Infrastructure and Public Services Policies. Prioritize areas for development, restoration, or adaptive reuse that increase utilization of Duluth's existing infrastructure and favor maintenance and reconstruction of older infrastructure over infrastructure expansions. Priority areas include vacant or underutilized industrial areas such as the U.S. Steel, Cement Plant, Clyde Iron, Rice's Point, and scattered infill sites.

The city will work with adjacent units of government and county, regional and state entities to ensure efficient provision of water, wastewater, transportation, energy, and communications infrastructure.

Mixed-use Policies. Large mixed-use development sites, such as U.S. Steel, the tower farm, and other sites identified as master-planned areas on the future land use map, will require master planning as market forces start to define possible new uses in these areas.

- protect critical natural functions
- enhance off-site natural systems where possible
- include internal open space and trail corridors and connections to external trail corridors

Economic Development Policies. The city will apply eco-industrial principles in economic redevelopment and in creating mixed-use areas with industrial, commercial, and residential uses whenever possible. The city will use its resources and influence private investment toward redevelopment in older industrial areas and brownfields to reduce blight, create economic and social activity in the central corridor of the city, and promote preservation or reuse of historic commercial or industrial structures.

6. Conclusions and Plan for Phase Two

Conclusions

The John S. and James L. Knight Foundation asks “where the greatest opportunity might be for transforming community into something better.” Further it proposes that “every execution of a big idea comes with know-how, or the ability to learn it” and that this will require transformational thinking. To achieve such transformation often common qualities come into play—discovery, vision, courage, know-how, tenacity—progressively enabling communities to transfer vision into concrete reality.

It is clear that Phase One of this Eco-industrial Development Initiative was a process of discovery and vision building. Investigating current conditions, existing related activities, and the overall dynamics that would be conducive to effectively undertaking a long-term EID effort was necessary and revealing. Barriers exist, including collective political will, lack of resources applied specifically to the implementation of EID and other sustainable development activities, and limits on existing know-how necessary to apply the integrated and holistic approach essential for success. These barriers are further complicated by other priority concerns that occupy the current agenda of governmental units and businesses. However, what also became clear is that there are many potential partners who understand the opportunity to apply eco-industrial development as a means to position the region as a place where new economic development could occur, capitalizing on emerging opportunities resulting from trends toward cleaner production, green design, growing demand for renewable based energy systems, and the need for eco-efficient technologies and products.

Two years of Phase One has concluded a period of trial and error. There was no roadmap to follow, and there was not adequate human and financial resources dedicated to this effort. Some things worked and some did not. Nonetheless significant accomplishments resulted and a strong foundation has been laid, momentum gained, and a vision established. Various forces discussed earlier in this report are driving change. Transformative thinking, new levels of collaboration, and essential specialized know-how can now come together in Phase Two. An injection of new investment by both public and even more so private organizations can be combined under a regional coalition to establish the capacity and long-term tenacity to advance eco-industrial development and capture economic, environmental, and social benefits.

Trends toward more sustainable systems are escalating on a local, national, and international level. In industrial terms, some say that the next industrial revolution is underway. Communities in northeastern Minnesota and northwestern Wisconsin can become leaders in this revolution only if they can transcend old ways and become a catalyst for

“In its early stages the Coalition for Eco-industrial Development provided essential services for our proposed eco-park. Their valuable knowledge and assistance is helping us turn our vision into a reality.

We are on the tip of the iceberg, with major environmental threats facing all industries and communities. The need to adopt sustainable manufacturing strategies is inevitable and the market potential finding solutions enormous. We as a region can lead by example and regain a strong position in the new economy by implementing eco-industrial strategies. We strongly support the vision and innovation CEID will bring to our business and community.”

*—Erik Monge, Vice President of Operations,
Elkhorn Industries, Inc., Superior,
Wisconsin*

innovation. This will not be easy and many conventional approaches will no longer work. Vested interests cannot stay entrenched, and challenging the status quo must become standard operating procedure. There is mounting evidence that the time is right and this could be the place.

Phase Two: The Coalition for Eco-Industrial Development

In response to one of the primary goals in Phase One, “*establish a coordinating organization to conduct regional eco-industrial development activities*,” a small working group of committed partners has been working over the last six months to devise a plan and organizational framework for a five-year EID initiative. As previously discussed, it became clear during Phase One that a specialized effort directed at implementing eco-industrial development while supporting other regional sustainable development efforts is essential. Unless the combination of specialized expertise, responsiveness, financial support, and committed public and private partners is consolidated, momentum will diminish and opportunity for substantive transformation lost.

To answer this challenge, a growing list of regional partners has formed the Coalition for Eco-Industrial Development (CEID) to undertake Phase Two to implement a five-year plan. The CEID is the next step in an evolving regional approach to expand and transform the region’s industrial base to more efficient and environmentally sound production. For the past two years, this “coalition in formation” has assisted businesses in northeastern Minnesota and northwestern Wisconsin by providing practical expertise to public and private stakeholders. The CEID and its structure were not developed arbitrarily but are instead based on Phase One successes, a careful review of other EID related projects, an understanding of related efforts in the region, consultation with many stakeholders, and the urgent need to put in place the local capacity to focus on its specific mission which does not currently exist.

The CEID will be designed as a hybrid model to bring to bear timely know-how to opportunities. It is not meant to respond by catering to the least common denominator but rather focus on early adopters, defined project areas, and harness innovation. The CEID is also not intended to be redundant with existing economic development or environmental programs but rather provide a support role in these efforts. Further, if successful, the CEID will continue to educate and raise awareness in order to mobilize action and leverage resources from public and private organizations interested in achieving sustainable industrial development. In short, the CEID will be a catalyst entity, creating opportunities and conveying the united message that this region is a place to grow eco-ventures.

“The future of our communities is in the balance. For the sake of our children and grand children, we must act now to create more sustainable communities and industries. The train is leaving the station, we can either be driving the train, be a passenger on the train, or miss the train altogether.”

—Bob Browne, Douglas County Board of Supervisors.

CEID purpose

The Coalition for Eco-Industrial Development, made up of partners in northeastern Minnesota and northwestern Wisconsin, fosters sustainable development and quality job growth in a new regional economy.

By providing services that enhance and leverage existing economic development efforts, the CEID:

- Promotes and supports applied industrial ecology.
- Provides organized and targeted intellectual capital to its partners.
- Assists in the development of new high performance businesses.
- Improves the productivity of and repositions existing businesses.
- Creates a platform for business success.

The CEID's basic business model will include:

- A nonprofit consulting group, CEID, Ltd., will support business development projects across the Northern Tier.
- Expert staff will be assembled for planning and management.
- Fees for consulting, publication, promotion, and project management will sustain positive cash flows.
- Permanent staff will be small—partners, champions, and consultants provide most of the mission critical support.

Applying this business model, the CEID will use a multi-faceted approach to advance eco-industrial development in the region. The basic method is to identify opportunities, qualify how best to advance these opportunities, and customize and deliver assistance with appropriate expertise.

Components of this approach include:

- Establish and provide regional eco-industrial services.
- Apply a unified and coordinated strategy.
- Coordinate communications and branding.
- Conduct regional baseline and market analyses.

Partner commitments to CEID

A fundamental strategy is to combine the newly established CEID capabilities with the resources already existing in the region that can provide technical and financial assistance and even devise supporting local policies to incent and catalyze the development of infrastructure and facilities to create a foundation for eco-industrial development to occur. Thus, it will be necessary to continue to build a true coalition fueled by local, state, and federal support that can then leverage private sector participation and investment. Participation from partner organizations is anticipated to be up to five years with each organization or individual demonstrating a willingness and capability to engage in:

- A commitment to concept.
- A partnership model of shared resources and benefits.
- A membership-based network model.
- Providing expertise on a case-by-case basis.
- Financial support.

Indicators of success

Conducting EID is a continuum and will require steadfast commitments over time. To achieve significant progress, often unconventional approaches will be necessary, as will challenges to the status quo. Key indicators that will be used to measure success include:

- Eco-industrial development projects initiated.
- Quantifiable increases in regional eco-based business activity.
- Qualifiable evidence identifying the region as a leader in eco-industrial development.
- EID network of 125 members across region, including 10 to 20 committed communities and counties.
- 200 to 400 new jobs (5-year goal).
- 40 to 50 new/renewed businesses (5-year goal).

Appendix A:

Eco-Industrial Development Definitions

Updated August 2006—Compiled and modified from various sources by Timothy Nolan, Sustainable Development Strategic Initiatives, MPCA, tim.nolan@state.mn.us

Biobased In contrast to the petroleum-based model which relies on materials photosynthesized millions of years ago, bio-based manufacturing processes use photosynthesis that occurred in the past decade in a predictable, natural manner. Bio-based processes use naturally occurring enzymes or organisms. Bio-based manufacturing processes generate by-products that are not hazardous, can be reused and are disposed of through biodegradable methods.

Biobased Product means commercial or industrial products, other than food or feed, derived from biomass feedstocks. Many of these products possess unique properties unmatched by petroleum-based products or can replace products and materials traditionally derived from petrochemicals.

Bioenergy means useful, renewable energy produced from organic matter – the conversion of the complex carbohydrates in organic matter to energy. Organic matter may either be used directly as a fuel processed into liquids and gasses, or be a residual of processing and conversion.

Biofuels means fuels made from biomass resources, or their processing and conversion derivatives. Biofuels include ethanol, biodiesel, and methanol.

Biomass means any organic matter that is available on a renewable or recurring basis, including agricultural crops and trees, wood and wood wastes and residues, plants (including aquatic plants), grasses, residues, fibers, and animal wastes, municipal wastes, and other waste materials.

Biopower means the use of biomass feedstock to produce electric power or heat through direct combustion of the feedstock, through gasification and then combustion of the resultant gas, or through other thermal conversion processes. Power is generated with engines, turbines, fuel cells, or other equipment.

Biochemicals is a term used to refer to chemicals that are produced from plant matter. These biochemicals are derived from renewable resources such as vegetable oils, fiber and grain crops, citrus fruits, nuts and trees. Plant matter-based chemicals such as soy methyl esters, ethyl lactate and grain-derived alcohol are used to produce a variety of industrial products for processing and manufacturing operations. Examples of applications for plant-based chemicals include industrial solvents, equipment lubricants, paints and coatings and plastics.

Clean Production takes advantage of opportunities to reduce and even eliminate the reliance on toxic materials in manufacturing, to prevent air and water pollution, and to avoid hazardous waste generation. This often involves moving away from a “cradle-to-grave” industrial model, where raw materials are extracted and processed and the substances not directly useful to a factory become unwanted waste, to “closed-loop” systems in which the byproducts of one factory become the feedstock of another.

Design for the Environment (DFE) is the systematic consideration during design of issues associated with environmental safety and health over the entire product life cycle. DfE can be thought of as the migration of traditional pollution prevention concepts upstream into the development phase of products before production and use. The objective is to minimize or eliminate, during design, the anticipated waste generation and resource consumption in all subsequent life cycle phases: construction, operation, and closure (or production, use, and disposal).

Eco-efficiency as defined by the World Business Council on Sustainable development is achieved by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the Earth's estimated carrying capacity. The WBCS has identified four key aspects of eco-efficiency that make it an indispensable strategy in today's knowledge-based economy:

- De-materialization: Companies are developing ways of substituting knowledge flows for material flows
- Closing production loops: The biological designs of nature provide a role model for sustainability
- Service extension: moving from a supply-driven economy to a demand-driven economy
- Functional extension: companies manufacturing smarter products with new and enhanced functionality and selling services to enhance the products' functional value.

Eco-efficiency is a management strategy that links financial and environmental performance to create more value with less ecological impact. Eco-efficiency gains can be achieved through:

- Optimized processes—moving from costly end-of-pipe solutions to approaches that prevent pollution in the first place.
- Waste recycling - using the by-products and wastes of one industry as raw materials and resources for another, thus creating zero waste.
- Eco-innovation—manufacturing “smarter” by using new knowledge to make old products more resource-efficient to produce and use.
- New services—such as, leasing products rather than selling them, changing companies' perceptions and spurring a shift to product durability and recycling.
- Networks and virtual organizations - shared resources increase the effective use of physical assets.

Eco-Industrial Development involves “Networks of businesses that work with each other and in conjunction with their communities to improve resource productivity, expand markets, eliminate pollution, and catalyze economic growth through enhanced profits, wages, and local investment.” (*North American Eco-Industrial Development Council, 2003*)

Eco-Industrial development provides a pragmatic application of industrial ecology concepts. It involves a network of businesses that cooperate and view the community as a partner to improve resource productivity, restore the local environment, and eliminate pollution and associated costs. The networks of relationships are between core businesses within a given development or industrial park, those core businesses and the community or region, the core eco-industries and other regional businesses like materials, energy or component suppliers that may result in facilities “collocated” in an industrial park or an “industrial cluster” in a defined geographic area.

Eco-Industrial Park is “a community or network of companies and other organizations in [a physical park] who choose to interact by exchanging and making use of byproducts and/or energy in a way that provides one or more... benefits over traditional, non-linked operations” These benefits include: reduction in natural resources use for inputs, reduction in pollution, reduction in energy use, reduction in disposal of wastes, and increase in value of non-product outputs. (Gertler 1995, 16).

Eco-Industry is a business that produces goods or services that result in an environmental performance advantage over equivalent goods and services within that specific industry. Core business activities of an eco-industry should result in quantifiable advantages to measure, prevent, limit, correct, restore, or enhance water, air, land, and ecosystem problems and improve environmental quality. Also included under the rubric of eco-industries are cleaner technologies, sustainable production systems, and products and services that reduce environmental risks and minimize pollution and resource use.

High Performance Industries are distinguished by their systemic approach to resource utilization an effective integration of economic, environmental and social considerations. The economic costs of environmental degradation are internalized and avoided by shifting away from polluting processes, technologies and products. The results are less generation of wastes, air and water pollution, land degradation and release of toxic materials to the environment.

A high performance industrial system occurs when existing and new industrial facilities, production processes and supply chains are designed to and operate as networks and in ways that achieve high levels of material, energy and water efficiencies with optimal use of resource inputs and minimal discharges of emissions and waste outputs.

Industrial Ecology involves designing businesses and groups of businesses as if they were a series of interlocking ecosystems, which interface benignly with the environment. Industrial ecology takes the pattern of the natural environment as a model for solving environmental problems and creating the most efficient industrial processes. "Industrial ecology is the study of the flows of materials and energy in industrial and consumer activities, of the effects of these flows on the environment, and of the influences of economic, political, regulatory, and social factors on the flow, use, and transformation of resources." (*Robert White, President National Academy of Engineering, 1994*)

Industrial Symbiosis is a way of achieving industrial ecology, when the supply chain components within an industrial system are integrated to be symbiotic, rather than independent, each contributing to an efficient system that generates minimal byproducts and pollutants. Materials, energy, and water resource inputs are optimized, emissions and wastes are minimized. Wastes that remain are recovered for use as feedstocks by other businesses within the system.

Industrial symbiosis engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and/or by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity. (*M. Chertow 2000 Annual Review of Energy and Environment*)

Linear (Open) Versus Cyclical (Closed) Loop Systems Applied industrial ecology involves the evolution of industrial systems from linear systems, where resources are consumed and damaging wastes are dissipated into the environment to a more closed systems like that of ecological systems. In a linear process, materials and energy enter one part of the system and then leave either as products or by-products/wastes. Unless the supply of materials and energy is infinite and the carrying capacity of the natural systems can assimilate the wastes and emissions, this system is unsustainable. In most of our current industrial systems, some wastes are recycled or reused within the system while others leave it. In a more evolved and integrated industrial system, there is a dynamic equilibrium with ecological systems, where energy and wastes are constantly recycled and reused in closed loops by other processes within the system.

Material and Energy Flows and Transformations as a primary part of industrial ecology requires an analysis of material and energy flows and their transformation into products, byproducts, and wastes throughout industrial systems. The consumption of resources is inventoried along with environmental releases to air, water, land and biota. One strategy of industrial ecology is to reduce the amount of waste material and waste energy that is produced and that leaves the industrial system, subsequently impacting ecological systems adversely. Instead, the system is designed to utilize waste as a material input or energy source in another process within the industrial system and thus improve the overall efficiency of the industrial system while reducing negative environmental impacts.

Pollution Prevention involves changing the existing or planned operations so that the volume and/or toxicity of wastes are minimized, so that waste generation is prevented all together. Pollution Prevention (P2) is the reduction or elimination of pollution at the source (source reduction) instead of at the end-of-the-pipe or stack. Pollution prevention occurs when raw materials, water, energy and other resources are utilized more efficiently, when less harmful substances are substituted for hazardous ones, and when toxic substances are eliminated from the production process. By reducing the use and production of hazardous substances, and by operating more efficiently we protect human health, strengthen our economic well-being, and preserve the environment.

Renewable Energy, Renewable energy (sources), or RES capture their energy from existing flows of energy, from *on-going natural processes*, such as sunshine, wind, wave power, flowing water (hydropower), biological processes such as anaerobic digestion, and geothermal heat flow.

The most common definition is that renewable energy is from an energy resource that is replaced by a natural process at a rate that is equal to or faster than the rate at which that resource is being consumed. Renewable energy is a subset of sustainable energy.

Most renewable forms of energy, other than geothermal and tidal power, ultimately derive from solar energy. Energy from biomass derives from plant material produced by photosynthesis using the power of the sun. Wind energy derives from winds, which are generated by the sun's uneven heating of the atmosphere. Hydropower depends on rain which again depends on sunlight's power to evaporate water.

Even fossil fuels derive from solar energy, as fossil fuel originates from plant material. However, while theoretically renewable on a very long time-scale, fossil fuels are exploited at rates that may deplete these resources in the near future, and are therefore not considered renewable.

Renewable energy resources may be used directly, or used to create other more convenient forms of energy. Examples of direct use are solar ovens, geothermal heating, and water- and windmills. Examples of indirect use which require energy harvesting are electricity generation through wind turbines or photovoltaic cells (PV cells), or production of fuels such as biogas from anaerobic digestion or ethanol from biomass (see alcohol as a fuel). (*From Wikipedia, the free encyclopedia http://en.wikipedia.org/wiki/Renewable_energy*)

Supply Chain The all inclusive set of links from raw materials to customer, including extraction, transportation, fuels, manufacturing, and use, i.e., the network of retailers, distributors, transporters, storage facilities and suppliers that participate in the sale, delivery and production of a particular product (*Investorwords.com* 2003).

Sustainable Community A community that uses its resources to meet current needs while ensuring that adequate resources are available for future generations. A sustainable community seeks a better quality of life for all its residents while maintaining nature's ability to function over time by limiting waste, preventing pollution, practicing conservation, promoting efficiency, and developing local resources to revitalize the local economy. Decision-making in a sustainable community stems from a rich civic life and shared information among community members. In the broadest sense, a sustainable community resembles a living system in which all resources—human, natural, and economic—are interdependent and draw strength from each other.

Sustainable Design The concept of sustainable design has a long-term focus and considers the life cycle of a building or larger development from the planning stage to demolition. The key is understanding before we build how things are interrelated while striving to integrate the building with the surrounding natural environment resulting in low and perhaps enhancing environmental impacts. We think whole systems and the process of building becomes integrated throughout the planning, pre-design, design, construction and occupancy phases. The building itself is designed and built not as many separate parts but rather as a system that must be balanced to achieve the highest level of resource efficiency and a healthy productive indoor environment.

Sustainable Development “Development that maintains or enhances economic opportunity and community well-being while protecting and restoring the natural environment upon which people and economies depend. Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.” (MN Statute 4A.08)

Sustainable Industrial Development requires that industries and communities support the **economic, social, and environmental** quality in a community or region. In business terms this is often referred to as the “**triple bottom line**”. Industrial development should be cleanly integrated into the community to efficiently use local resources, work synergistically within the industrial and commercial economy, and enhance community prosperity

Sustainable industrial development is a subset of sustainable development that occurs when existing and new industrial facilities and processes are designed to operate in ways that achieve not only economic performance but simultaneous higher performance in environmental and social considerations.

Such development addresses the full economic costs of associated environmental impacts by achieving higher levels of environmental performance as a fundamental way of doing business. The inherent benefits resulting from this higher level of performance results in competitive advantages for the enterprises and communities involved.

Systems Analysis is integral to industrial ecology, which requires a systems view of the relationship between human activities and environmental problems. Central to the systems approach is an inherent recognition of the interrelationships between industrial and natural systems. In an industrial production system, applying a systems view enables manufacturers to develop products in a sustainable fashion by understanding the life cycle impacts throughout each stage of production. Applying industrial ecology requires that the industrial system be viewed not in isolation from surrounding ecological systems but in concert with them. As a result, a manufacturer throughout their supply chain will seek to optimize the total materials cycle from virgin material, to finished material, to component, to product, to waste product, and to ultimate disposal. Factors to be optimized include resources, energy, and capital.

Triple Bottom Line The triple bottom line captures an expanded spectrum of values and criteria for measuring organizational (and societal) success—economic, environmental and social. For some a commitment to corporate social responsibility brings with it a need to institute triple bottom line reporting. The triple bottom line is rapidly gaining recognition as a framework for measuring business performance.

In practical terms, triple bottom line accounting usually means expanding the traditional company reporting framework to take into account not just financial outcomes but also environmental and social performance. The phrase was coined by John Elkington, co-founder of the business consultancy SustainAbility, in his 1998 book, *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*.

Corporate social responsibility (CSR) is an expression used to describe what some see as a company's obligation to be sensitive to the needs of all of the stakeholders in its business operations. A company's stakeholders are all those who are influenced by, or can influence, a company's decisions and actions. These can include (but are not limited to): employees, customers, suppliers, community organizations, subsidiaries and affiliates, joint venture partners, local neighborhoods, investors, and shareholders (or a sole owner).

CSR is closely linked with the principles of sustainable development in proposing that enterprises should be obliged to make decisions based not only on the financial/economic factors but also on the social and environmental consequences of their activities (from Wikipedia). See also "Business and Sustainable Development a Global Guide" www.bsdglob.com)

Appendix B: Final Budget and Narrative

The original Knight Foundation grant proposal was submitted in summer 2004. By then, an EID committee representing the mayors of Duluth and Superior had been meeting for over six months to develop a draft *Strategy Framework for EID*. This involved a diverse list of representatives from various local organizations grappling with understanding EID concepts and methods while trying to determine how to pursue EID in the area. This was not a structured planning process, and participants had varying degrees of commitment and time to invest in strategic planning. It became evident that there would be a need for coordination of leadership and more financing. Therefore, through the College of St. Scholastica, the committee made a proposal to the John S. and James L. Knight Foundation.

The original project as proposed was for three years with a total budget of \$443,173 with \$215,130 requested Knight Funds. In the end, the Knight Foundation agreed to award a \$50,000 grant for a one-year project. The final project ended up extending to nearly two years with a leveraged investment of \$312,864 from project partners matching Knight Funds at a ratio of over six to one. Although less than what was originally proposed this \$50,000 grant has proven to be vital in establishing a vision for EID in the region, a foundation for a strong network and local “know-how” capacity, and the collective will to tenaciously apply an eco-industrial development approach for the next five years.

The single most important contribution was made by the Minnesota Office of Environmental Assistance (now part of the Minnesota Pollution Control Agency). This state agency assigned Tim Nolan to work on this project as its director for more than twice the originally agreed to time frame. The agency also gave additional financial aid far beyond what was originally anticipated. Tim was able to stretch dollars by getting much more than market value for different contracted services. For example, Tim was able to attract unique EID expertise and apply it directly in an eco-industrial development design workshop at Elkhorn Industries using only \$4,000 of Knight Funds, combined with an extensive investment of his time organizing, conducting, and formulating the results of this workshop into critically useful information for Elkhorn. This amounts to pro bono work. Similarly, other services were provided at lower than the going rate. And as the de facto project director, Tim was quite frugal regarding his travel and other expenses. Furthermore, many hours have been volunteered by members of the planning group, and others, people who stand to gain nothing financially. These people have had an idealistic motivation to transform the economy of the region.

For the two years (Phase One) of this EID Initiative, the Knight Foundation and the state of Minnesota have been the only direct financial supporters. However, the additional local in-kind and other more pro bono support this leveraged was significant. As a result, recently the four most important local governments, the cities of Duluth and Superior, and St. Louis and Douglas Counties, have made financial and other kinds of commitments to support the Coalition for Eco-Industrial Development for up to five years to implement Phase Two. There was no financial support from governmental entities until recently for two basic reasons. First, each of these governments is extremely pressed financially, and second, an ongoing educational process has been necessary due to the complex nature and multi-faceted concepts associated with EID.

The amount of financial support from these governmental entities is not as important as the fact that such support indicates their commitment to the “vision” and endorsement of the CEID, along with their willingness to collaborate to create new EID opportunities. This endorsement will help us leverage financial support from the public, private, and nonprofit sources. We anticipate that through fees for various kinds of services the CEID will become self sustaining.

Final budget reporting is based on a two-year period. Although we received a one-year grant of \$50,000, we were able to make that money last two years. (Originally we applied for a three-year grant totaling \$443,173: Year1 \$156,915; Year 2 \$150,315; Year 3 \$135,943.)

Revenues Allocated**Actual 1/05 – 12/31****a) Individual contributions**

Ralph Loomis CSS	\$37,500
CSS administrative costs	\$15,414
Corporate contributions	\$0
Foundation grants (except Knight Foundation)	\$0
<u>Government support a) federal</u>	<u>\$0</u>
Total	\$52,914

b) State of Minnesota (MPCA)

Project coordinator salary & benefits (Tim Nolan)	\$123,000
MPCA mgmt staff support	\$15,000
Technical administrative support	\$10,000
State contract professional services	\$5,000
State grant for eco-home project	\$8,000
State contract for eco-home technology transfer (in-process as of 12/29/06)	\$15,000
<u>Project final report (editing, graphics, printing)</u>	<u>\$1,000</u>
Total	\$177,000

c) Local

Northern Center for Community and Economic Development – Outreach Support	\$5,000
City of Duluth staff services	\$5,750
City of Duluth printing	\$500
Special events	\$0
EID committee members	\$29,700
<u>Planning group</u>	<u>\$27,000</u>
Total	\$67,950

d) Other – Estimated professional pro bono **\$15,000****Total matching contributions** **\$312,864**Knight Foundation grant award \$50,000**Total project contributions** **\$362,864**

Expenses

CSS student interns (\$7.50/hr) \$4,544

Contract services

Professional Services EID Trillium Planning, Inc.
Baseline analyses – planning and coordinating
Industrial real estate analysis
Strategic planning for EID initiative (Trillium) \$8,000
Architectural (LHB) \$4,000

Professional services – CEID set-up costs (Bruce Lindgren) \$3,000

Total contract services \$15,000

Other expenses

Coordinator—Remote travel, office space \$24,383
Industrial Profiling—Harris Directory \$776
Environmental Business Market Research \$600
Benefits \$83
CEID administrative \$1,200

Total other expenses \$27,042

Total expenses \$46,586

The balance of the \$50,000 will be paid out shortly for set-up costs and other related services.

For more information about this project go to

www.eidnetwork.com

**Working Together.
Making a Good Thing Happen.**

