

# COMPETING TO WIN:

*Spurring Industrial Energy Efficiency  
in Minnesota*



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A L L I A N C E

## **Competing to Win: Spurring Industrial Energy Efficiency in Minnesota**

Minnesota is uniquely positioned to take advantage of the many benefits of industrial energy efficiency, which range from cost and energy savings to increased international competitiveness, job creation and pollution reduction. Companies throughout Minnesota have made investments in improving the energy efficiency of their industrial operations, but there are still significant opportunities to capture its benefits to companies, communities and workers.

A diverse group of Minnesota business, environmental, labor and government stakeholders gathered recently to answer the following questions: 1) what are the largest barriers preventing further investment in industrial energy efficiency in Minnesota, and 2) what tools and resources are available, or what policy changes are needed, to reduce those barriers?

To identify the barriers preventing industrial energy efficiency improvements specifically in Minnesota, the BlueGreen Alliance joined with the St. Paul Port Authority and the United Steelworkers to convene stakeholders from taconite companies, pulp and paper mills, and other stakeholders from around the state. Their input was used to develop recommendations for policy makers to address the barriers identified and to make new and significant energy efficiency projects possible. The results were clear. While stakeholder companies have increased energy efficiency—given the energy-intensity of these industries—participants supported opportunities that could remove internal hurdles and other barriers to new and significant energy efficiency and related projects.

*Competing to Win: Spurring Industrial Energy Efficiency in Minnesota* summarizes the benefits of increasing industrial energy efficiency, quantifies the opportunity for the state of Minnesota, identifies the barriers preventing projects from being installed, and issues a series of recommendations to address these barriers.

Clearly, the largest barrier identified was financing of the large upfront costs associated with industrial energy efficiency projects. This is an especially important finding for Minnesota's energy-intensive, trade-exposed industries in taconite and pulp and paper, which are under constant pressure from global competition and face high internal hurdle rates when seeking capital investments.

### **Introduction**

For energy-intensive industries, energy efficiency improvements have the potential to save companies energy and money while modernizing production and increasing long-term competitiveness. For communities, industrial efficiency investments can reduce pollution, contribute to energy security and economic recovery, and create jobs. The changing economic, energy, and regulatory landscape is creating new opportunities for state level policies and programs to help companies and communities make investments and realize these benefits.

Minnesota is uniquely positioned to take advantage of the enormous potential of industrial efficiency, particularly in manufacturing applications. In 2006, 32 percent of the total energy used in Minnesota

was used by industry—more than any other sector (Bradbury et al. 2012, p. 33). Nationally, more than 80 percent of total industry-sector energy use is in manufacturing, while the rest occurs in construction, mining, utilities, and agriculture (Brown et al. 2011). At the same time, energy intensity—the amount of energy required for a fixed amount of manufacturing output—in the Midwest is higher than the national average, which has been attributed to lower costs of energy (Glatt 2009, p. 5). Energy-intensive manufacturing subsectors also spend more on energy. Nationally, manufacturers spend an average 2 percent of total expenditures on energy, while the iron and steel subsector spends 6 percent, cement 15 percent, and paperboard manufacturing 16 percent (Bradbury et al. 2012, p. 3). Volatile energy costs affect these subsectors disproportionately, so when energy costs rose almost 60 percent between 2000 and 2008, these companies were likely hit harder than those in other sectors of the economy (Bradbury et al. 2012, p. 3).

The Minnesota Technical Assistance Program (MnTAP), an outreach and assistance program at the University of Minnesota, conducted an *Energy Conservation Market Analysis* in 2010 to determine the ability of Minnesota utilities to reach the 1.5 percent energy savings goal legislated by the Next Generation Act of 2007. The study identified 8 percent of potential natural gas savings and 7 percent potential electricity savings achievable with available technologies across eight utility service areas. Included in the analysis were manufacturers in energy-intensive sectors and subsectors and individual large energy users that could be considered for energy conservation strategies (DeWahl et al. 2010, executive summary). Their findings are summarized in the table below:

*Table 1. MnTAP reported energy savings and technology opportunities for manufacturing sub-sectors.*

Sector	Sub-Sector	Estimated Thermal Savings	Estimated Electrical Savings	Energy Efficient Technologies Identified for the Sub-Sector
Chemical Manufacturing	Ethanol Production	20%	11%	Boiler best practices, corn fractionation, motor and pump improvements, anaerobic digestion of thin stillage
	Pharmaceutical Manufacturing	18%	16%	Heat recovery opportunities, equipment and piping insulation, process controls, adding adjustable speed drives
Fabricated Metals	Machine Shops	15%	9%	Compressed air system improvements, boiler tuning and best practices, fan and paint ventilation optimization
	Sheetmetal Fabrication	24%	15%	Process heat system optimization, reduction in cure time and overheating, compressor control and intake modification
Food Processing	Poultry Processing	11%	15%	Steam, boiler, and equipment best practices; heat recovery; refrigeration improvements; motor opportunities
	Commercial Bakeries	10%	16%	Direct fired best practices, boiler blowdown heat recovery, thermal oxidizer improvements, cooling improvements
Primary Metals	Steel Products	20%	15%	Flue gas optimization, furnace optimization, process control improvements, waste heat recovery
	Aluminum Operations	14%	19%	Iso thermal melting technologies, reverberatory furnace improvements, insulation installation and improvements

*Source: DeWahl et al. 2010, executive summary.*

Several types of investments can improve industrial efficiency. Replacing general manufacturing equipment with newer, more efficient equipment can reduce energy use and waste. Similarly, modernizing lighting, heating, cooling, and insulation in buildings can reduce energy use. Adding advanced system-control technology or changing the facility layout can also add up. Process improvement and behavioral changes, like special manufacturing processes and plant-wide energy management efforts or improved operational practices, can lead to savings. For industrial applications that require heat energy and electricity, cogeneration or combined heat and power that generates both

heat and electricity on-site can increase efficiency from near 45 percent to upwards of 75 percent (U.S. DOE EPA 2012, p. 7).

Energy efficiency investments have many benefits. Efficiency improvements lead to energy savings, and once the initial investment is paid off, the improvements lead to cost savings from reduced energy or fuel use. These improvements can insulate companies from volatile fuel and energy costs, increasing energy security (Bradbury et al. 2012, p. 3). Investments in efficiency can modernize production, leading to increased long-term competitiveness of companies in a global market (Bradbury et al. 2012 p. 3). Efficiency investments in manufacturing in particular can benefit the economy. According to the Bureau of Economic Analysis (BEA), manufacturing has been a leading contributor to economic recovery in the U.S. over the past two years (Bradbury et al. 2012, p. 3). In the Midwest, manufacturing has a higher share of total employment than any other region (p. 4).

Energy efficiency also creates jobs. Direct spending for the design and installation of equipment creates direct jobs, and this spending leads to indirect jobs to manufacture materials and equipment, as well as induced jobs created by the increase in economic activity. Reinvestment of money saved from efficiency improvements over time results in creation of, “second order jobs” as spending shifts from the energy sector to sectors of the economy with higher labor intensity.

However, there are several barriers preventing industrial energy efficiency investments. The largest barriers to industrial efficiency are the capital-intensive upfront investments required—along with long depreciation periods (Bradbury et al. 2012, p. 10). As noted before, with relatively low energy costs, there may be less incentive for Midwest companies to invest in efficiency improvements. However, with increased international market competition, the older and less efficient facilities are finding it harder to compete with newer, more efficient facilities being built all over the world (Bradbury et al. 2012, p. 10). There are other barriers as well, including informational barriers that may prevent companies from being aware of technologies, practices, and support available. Similar challenges exist with a lack of employee training. Technical barriers include challenges with older equipment or facilities, grid interconnection for CHP, and interoperability. Regulatory barriers may prevent certain types of efficiency projects from being possible, such as anti-cogeneration clauses in a company’s contract with a power utility. Further, uncertainty about long-term fuel prices and availability in a changing energy landscape make investment decisions difficult.

There are a variety of policies being used to implement more industrial efficiency at national, state, and local levels across the country. Coordinated government action at the federal level brings resources, technical assistance, and connections that help companies access the tools they need to make decisions, as well as plan and implement efficiency improvements. Similarly, the voluntary ISO 50001 energy management standard recently published by the International Organization for Standardization offers a way that companies can be recognized for energy productivity gains (Bradbury et al. 2012, p. 12). Nationally the energy landscape is undergoing big changes. New environmental regulations and a shift toward cheap and abundant natural gas supplies are altering economics and regulation of energy use, which also creates opportunities for alternative compliance that could include efficiency measures (Bradbury et al. 2012, p. 14). Similarly, state or local efficiency goals created through legislation or utility

commission orders may offer opportunities for efficiency measures to meet state and utility efficiency targets (Bradbury et al. 2012, p. 12).

To determine what is preventing industry in Minnesota from further investing in efficiency projects, the BlueGreen Alliance joined with the St. Paul Port Authority and the United Steelworkers to convene stakeholders from taconite companies, pulp and paper mills, and other industrial companies in Minnesota. Meetings were held at the St. Paul Port Authority, Minnesota Department of Commerce, and the City of Cloquet. Multiple individual and small group meetings and conversations took place with participants, advocates, additional businesses and others, including the Division of Energy Resources' energy efficiency and combined heat and power/waste heat recovery meetings, in the process of determining these recommendations.

The stakeholder companies have made and are making efforts to increase energy efficiency—some have reduced their energy use 30 percent in the last decade. All of the participants of these meetings are interested in identifying additional opportunities to assist them with removing internal hurdles and other barriers to larger energy efficiency initiatives. Using the input from the companies that participated in the meetings, the BlueGreen Alliance developed the following recommendations for policy makers to address the barriers identified with a goal of making new and significant energy efficiency projects possible.

#### **Stakeholders**

- US Steel
- Rock-Tenn
- Sappi
- International Paper
- United Steelworkers
- Minnesota Department of Commerce
- Saint Paul Port Authority
- Clean Energy Manufacturing Center, BlueGreen Alliance
- Ever-Green Energy
- Natural Resources Defense Council (NRDC)

Other involvement, engagement or consultation included: HealthEast, Boise Paper, 3M, Jarden Home Brands, and the Sheet Metal Workers Local 10.

#### **Recommendations**

**Promote Industrial Energy Efficiency through a Revolving Loan Fund Financed by State Revenue Bonds.** Right now, low interest rates combined with the potential of larger scale energy efficiency projects makes authorizing revenue bonds for a state revolving loan fund a good economic investment. Access to upfront capital will accelerate the development and size of energy efficiency initiatives and increase large industrial and commercial users' return on investments, assisting them in overcoming



internal barriers. The first recommendation was to provide the Minnesota Department of Commerce with a \$100 million state revenue bond authorization to work with manufacturers, hospitals and other businesses statewide to identify potential efficiency projects and provide access to low-interest financing. The St. Paul Port Authority (SPPA) Trillion BTU program has demonstrated the viability of such a fund.

SPPA has estimated that \$20 million in funding would generate over \$100 million in renewable energy projects with a five-year payback from food manufacturing projects in Minnesota. The BlueGreen Alliance believes that a \$100 million revenue bond authorization to the Department of Commerce would also allow entities across the state—like hospitals and other commercial and public entities—to significantly increase their energy efficiency initiatives.

*Recommendation: In 2014, the Minnesota State Legislature enacted legislation to provide the Department of Commerce \$100 million revenue bond authorization for an industrial, commercial and community energy efficiency revolving loan fund.*

**Creation of a Statewide Energy Efficiency Initiative.** The establishment of a dedicated initiative to finance industrial improvements statewide would help to remove a significant barrier to further investments in industrial energy efficiency projects. Employing energy conservation as an economic development tool, such an initiative could provide eligible companies with technical assistance to identify potential efficiency improvements and access to a revolving loan program to finance those improvements. In particular, such an initiative would provide assistance to industries and companies across the state, including but not limited to taconite mines, pulp and paper mills and food manufacturers in northeast and southern Minnesota.

*Recommendation: Establishment of a statewide energy efficiency initiative aimed at providing resources and access to financing for industrial projects.*

**Provide For On-Bill Financing and/or Repayment Or Assessment.** One barrier to larger or significant expansion in energy efficiency initiatives is the impact on credit rating of carrying the cost of the initiative on the balance sheet. One solution is to establish a mechanism in which a third party, such as a utility, is the initial owner of the equipment, and once the payments or assessments are complete, ownership switches to the company. Such on-bill financing allows projects to be funded through ratepayer charges on electricity or gas bills, and in some cases, resulting efficiency gains can make the project bill-neutral because savings are larger than the cost to the ratepayer. This also frees up capital for other investments while allowing the company to avoid the credit rating impact of the debt from the project. Three industrial users in northeastern Minnesota currently have such arrangements with Minnesota Power and other industrial users are interested in similar opportunities.

*Recommendation: Support Legislative and Administrative efforts to broaden on-bill financing and repayment for industrial utility users.*

**Support Opportunities such as Energy Efficiency Power Purchase Agreements (PPAs).** Another method of third-party financing for efficiency projects is the Energy Efficiency PPA, also referred to as efficiency services agreements (ESAs). In this mechanism, the utility would determine a price for purchasing energy efficiency and enter into an agreement for what the company could do, and for as much as the company does, paying for the efficiency through a lower rate. While it does not overcome the initial need for capital, combined with upfront financing, an EE PPA is another potential solution to overcoming some of the balance sheet challenges and capital competition faced by companies interested in efficiency improvements beyond current capital constraints.

*Recommendation: Support Department of Commerce research, development and implementation of an EE PPA approach in or before 2015 consistent with Minnesota's regulatory framework.*

**Support Combined Heat and Power (CHP), Waste Heat Reduction (WHR) and Waste Heat to Power (WHP) Initiatives.** Some industries already have significant efforts in place and as a result, are spending less money on energy and wasting fewer BTU's. Many opportunities remain, if additional tools were in place and barriers removed. Many of the recommendations already identified, particularly third-party financing mechanism and revenue bonds, could apply to CHP, WHR, and WHP projects as they tend to have substantial upfront costs. Expanding the use of anaerobic digesters could also create economic development opportunities in the state.

*Legislative Recommendation: Fit Combined Heat and Power (CHP), Waste Heat Reduction, and Waste Heat to Power into Minnesota's regulatory framework explicitly, potentially as a part of the Energy Savings Goal.*

*Administrative recommendations: The Public Utilities Commission should clarify current law for regulated utilities regarding just and fair rates as prohibiting anti-cogeneration clauses. The Department of Commerce should work with utilities to implement the phase-out of anti-cogeneration utility practices.*

**Support Broader Use of Financing and New and Existing Tools for Energy Efficiency.** In addition to financing assistance, companies continue to look for better ways to utilize resources and reduce water use, energy use, and waste. Not all are explicitly considered energy efficiency under some measures. For example, some industries and companies use considerable energy in vehicles in addition to buildings, but those efforts are not traditionally considered as part of energy reduction. Considering all reduction and efficiency efforts as part of energy reduction would assist both companies and the state in meeting energy and savings goals.

*Recommendations: Identify and include energy reduction activities by companies currently excluded from energy efficiency definitions.*

**Increase Access To and Sharing Of Information Regarding Energy Efficiency Opportunities.**

Informational barriers exist that may prevent companies from being aware of technologies, practices,

and support available regarding energy efficiency of operations. Greater sharing of information through existing federal and state resources would help to break down these barriers.

*Recommendation: Increase company access to relevant technological information and promote the utilization of existing resources such as those available from federal programs and initiatives through centralized collection and dissemination of information. Offer feedback to these programs and initiatives on what additional information is needed or useful for industry in Minnesota.*

**Support Broader Use of Energy Management Tools.** Additional tools to increase internal energy management would also allow companies to improve their energy efficiency. One specific example is sub metering. In this scenario, a company would monitor equipment individually for electricity usage in a facility. This would allow better visibility of energy use and performance of equipment, which makes inefficiencies easier to detect and respond to. While companies are unlikely to take measures that will upset operations, they do make changes when installing updates, building new additions, or doing maintenance. Facilitating or encouraging energy management practices at this time could be beneficial. Voluntary energy management standards were mentioned previously. Most of the participants in the stakeholder group practice some level of energy management and are tailoring ISO 50001 to their facility's needs.

*Administrative recommendation: Facilitate and encourage industrial energy management practices, including setting best practice standards.*

**Promoting Past and Current Energy Efficiency Related Work and Projects.** There is little knowledge of the energy efficiency related work that companies have done or are doing, or related goals and/or actions around sustainability. Among the stakeholders, there is interest in promoting such activities. Stakeholders identified an industrial energy efficiency education program to promote these activities as a next step.

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