

Energy Efficiency

Recommendations for Industrial Energy Efficiency

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Industrial End Use Energy Efficiency – Recommendations for State Policy Changes

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Abstract

The industrial sector in Alaska consumes 51 trillion Btu of a total net domestic consumption of 444 trillion Btu, or about 12% of the total. There is significant potential to increase energy efficiency in this sector. Reducing energy usage in industries in the state will increase productivity and enhance competitiveness, leading to a strengthened state economy. There are existing state programs that Alaska could emulate in Colorado, Wyoming, Utah, Illinois, Washington, and New York. These programs can complement existing utility programs, and most commonly offer a public recognition program, technical assistance, networking opportunities and, in some cases, low-interest loans. There are also regional and federal programs in which Alaska could participate. A reasonable energy efficiency goal would be about a 2.5% per year reduction in industrial energy use; this could meet about 20% of our overall statewide goal to improve energy efficiency by 15% by 2020. Four recommendations are offered to improve end-use energy efficiency in the Alaska industrial sector:

Recommendation One: Set a goal of about a 2.5% per year reduction in industrial energy use.

Recommendation Two: Create an *Alaska Industry Challenge and Recognition Program*.

Recommendation Three: Create a partnership with an existing Industrial energy efficiency program in order to share resources.

Recommendation Four: Research in greater depth the energy consumption of existing industries in Alaska.

Background

Alaska's industrial sector is important in terms of energy use and economic impact to the state. As of 2008, Alaska's net domestic consumption amounted to 444 trillion Btu. Net domestic consumption is comprised of five components: residential, commercial, industrial, transportation and electric sector consumption. Alaska's net domestic consumption of 444 trillion Btu does not include energy used by utilities for electric power generation or energy used during petroleum product processing. Industrial consumption (including military bases) totaled 51 trillion Btu or 12% of overall consumption. Transportation consumption was the largest component of Alaska's net domestic consumption accounting for 215 trillion Btu followed by , followed by the electric sector which used 67 trillion Btu as inputs to produce electricity. Residential sector consumption was 33 trillion Btu and finally, commercial consumption was about 38 trillion Btu. Alaska industries (other than oil and gas extraction or

processing) used the 51 trillion Btu for a variety of industrial uses, including heat, generating power and processing material. More detailed information on energy use by sectors within the industrial is not currently available. ¹

There is significant potential to increase energy efficiencies in the industrial sector. Reducing energy usage in industries in the state will lead to increased productivity and enhanced competitiveness, leading to a strengthened economy in the state. The Western Governor's Association, *Industrial Energy Efficiency Programs and Supporting Policies* (March 2011)) suggests realistic goals for reducing baseline energy consumption are from 2.0 – 3.0% annually. EPA's Energy Star for Industry and DOE's Save Energy Now Leaders programs have developed standard goals of 2.0-2.5% annually. ² If we could obtain a 2.5% annual improvement in industrial end-use energy efficiency based on the 2008 level of 51 trillion Btu, we could achieve 20% of our state goal of a 15% overall improvement in energy efficiency by 2020 (assuming that we had started in 2008).

Existing State Industrial Energy Efficiency Programs

Multiple examples of effective state and utility industrial energy efficiency programs exist across the country. Many more are in the development phase as more and more states identify energy efficiency as a priority. Many state industrial energy efficiency programs have as one of its component a Demand Side Management program, where utilities offer incentives, goods or services that achieve energy related cost savings. State industrial programs can complement existing utility programs most commonly by offering a public recognition program, offering technical assistance, networking opportunities and in some cases, low-interest loans. ³

Colorado

The Colorado Industrial Energy Challenge program recognizes that industrial facilities have many opportunities to significantly improve energy efficiency and that publicly stating goals and public recognition of meeting goals is an important component of the program. The Colorado Industrial Energy Challenge (CIEC) is a voluntary program open to industrial facilities with more than \$200,000 in annual energy costs. The program defines Industrial as all types of manufacturing, oil, gas and mining operations, ski resorts, research and development facilities and municipal water utilities. The program

¹ Fay, Finny, Alejandra Villalobos Melendez, Ben Saylor and Sarah Gerd, 2011, *Alaska Energy Statistics*, prepared for Alaska Energy Authority, May 2011, 184 pages

² www.energystar.gov and www.eere.energy.gov

³ Industrial Energy Efficiency: Improving Competitiveness, Reducing Emissions, State Policy Recommendations, June 2011 Western Governors' Association

encourages program participants to set five-year energy efficiency goal and to track and report progress towards those publically stated goals. In return, the state offers public recognition from the governor, free technical assistance, access to networking events, training opportunities and access to low-interest loans.

The CIEC program is sponsored by the Colorado Governor’s Energy Office and the US Department of Energy. The team is comprised of the Southwest Energy Efficiency Project (SWEET), the Colorado State University’s Industrial Assessment Center and the ETC Group, an energy and environmental engineering firm that provides technical support. In addition to its participation in CIEC, SWEET also takes an active role in promoting utility industrial Demand Side Management (DSM) programs in the region, by facilitating the sharing of best practices between utilities and by discussing possible program enhancements directly with the utility industrial DSM program managers. SWEET estimates that electricity utility spending on DSM programs in the Southwest (Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming) between 2002-2009 increased from 29 million per year to 250 per year. The resulting electricity savings, net economic benefits and avoided CO2 emissions are indicated below.⁴

Year	First-year Energy Savings (GWh/yr)	Energy Savings from Cumulative Programs (GWh/yr)	Net Economic Benefits from Annual Programs (million \$)	Avoided CO2 Emissions (1000 metric tons)
2003	175	175	113	122
2004	239	414	146	290
2005	280	694	189	486
2006	476	1170	256	819
2007	743	1913	332	1339
2008	1046	2959	459	2071
2009 (est.)	1540	4499	686	3149
Total	4499		2181	8276

Utah

The Utah Industrial Energy Efficiency Program is similar to the Colorado program, without any on-site technical assistance. In Utah the program focuses on training events and networking opportunities as well as public recognition for meeting stated goals.

Illinois

⁴ Southwest Energy Efficiency Project www.swenergy.org/programs/utilities

The Illinois Department of Commerce and Economic Opportunity administers the Large-Customer Energy Analysis Program (LEAP). The program was created in order to reduce energy costs for large energy users, defined as having annual energy expenditures of \$500,000 or greater. The focus of the program is not specifically industrial in nature; the program focuses on large energy users such as manufacturers, hospitals, large commercial buildings, universities and local governments. The program's stated goals are to reduce the cost of doing business in the state, thereby demonstrating the cost-effectiveness of energy efficiency strategies, protecting jobs and reducing pollution from wasted energy. LEAP provides organizations assistance in developing an energy management plan that identifies and prioritizes energy reduction measures and capital projects that provide the greatest return on investment. The program also identifies incentive opportunities organizations can utilize from the energy efficiency programs offered by the Department of Commerce and Economic Opportunity and Illinois utilities. The department estimates participants in the program typically reduce energy costs 10-30% if they implement the plans that are developed. The program has three components, beginning with a workshop to teach large energy users how to develop a plan that will assist organizations to reduce energy usage and achieve results that will improve the overall business performance. The second step of the program is to provide up to 25 hours of consulting and technical assistance in developing a strategic plan that identifies energy savings measures. The third step of the program is to participate in a "lessons Learned" workshop that is typically held six months after the initial workshop. The workshop provides participants an opportunity to discuss successes, lessons learned and strategies for implementing energy efficiency measures. ⁵

Washington

Washington State University (WSU) Extension Energy Program's mission statement is to advance environmental and economic well-being by providing unmatched energy services, products, education and information based on world-cross research. The WSU program was recognized as an "exemplary state energy efficiency program" by the American Council for an Energy-Efficient Economy in September 2010. Funding for the WSU Extension Energy Program Industrial Services is provided by the US Department of Energy's Industrial Technologies Program, federal power marketing agencies, private corporations, state and federal agencies, the nonprofit Northwest Energy Efficiency Alliance and fees for services. The WSU Industrial program has six components and is staffed by professional energy engineers and energy specialist's experiences in industrial process systems. ⁶ THE WSU Industrial program six components are:

Industrial Engineering/Plant Assessments

⁵ www.commerce.state.dceo

⁶ Industrial Energy Efficiency Programs and Supporting Policies: A White Paper, prepared for the Western Governor's Association by Southwest Energy Efficiency Project (SWEET) and the American Council for an Energy-Efficient Economy (ACEEE)

The program offers Industrial engineering and plant assessments ranging from an informal walk-through to in-depth plant assessments focusing on energy intensive systems.

Industrial Newsbriefs

The program provides a free electronic newsletter summarizing recent updates in energy technology, program news for industries and a schedule of events relevant to the field.

(www.energy.wsu.edu/EnergyLibrary/Newsbriefs)

Industrial Trainings

The program team coordinates training for plant operators and industrial equipment specialists. WSU works with regional and national training providers to deliver training that result in energy and process efficiencies. The program's close association with the US DOE Qualified Specialists allows expertise to be shared in compressed air, fans, process heating, pumping, steam and motors.

Northwest Clean Energy Application Center

The five-state center (Alaska, Idaho, Montana, Oregon and Washington), is headquartered at the WSU Extension Energy program and promotes combined heat and power, waste heat recovery and other clean energy technologies applicable to industrial and commercial facilities. The website contains case studies and other resources. (www.chpcenternw.org)

Software Development

The WSU Extension Energy program Industrial Efficiency develops software products to aid in analyzing industrial energy projects, including the US DOE sponsored Airmaster and MotorMaster programs. Other free software programs include RELCOST Financial, an excel spreadsheet template used to evaluate the financial viability of energy projects and HEATMAP, a software tool that performs a comprehensive simulation of existing heat and proposed district heating and cooling systems.

Technical Assistance

Industries in the Northwest can utilize the industrial team to receive timely and objective information about energy efficiency or heat recovery projects. The program also provides engineering assistance for several information centers that support industrial energy efficiency, among them DATA Center Energy Efficiency Resource List and the Energy Efficiency Resources for Northwest Industries. Of particular note is the Energy Solutions Database (www.energyexperts.org/EnergySolutionsDatabase.aspx) that contains thousands of links to energy resources and allows searches by keyword, topic, sector and content type.

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation created in 1975 and is currently funded by state rate payers through the System Benefits Charge (SBC) which was established in 1996. The SBC funds were allocated towards energy efficiency programs, research and development initiatives, low-income energy programs and environmental disclosure activities. NYSEDA 's Commercial/Industrial programs provide energy efficiency services for existing buildings, new construction, industrial facilities and vehicle fleets. Participants in the program can participate in the FlexTech Program that provides eligible facilities with objective, customized information on a cost-shared basis to help organizations manage energy costs. In order to participate, facilities must pay into the System Benefits Charge as electricity distribution customers of one of the participating utilities. FlexTEch's goal is to increase productivity and economic competitiveness by identifying and encouraging the implementation of cost-effective energy efficiency, carbon reduction measures, peak-load curtailment, and combined heat and power and renewable generation projects. The program offers cost-sharing incentives for various types of studies, including general energy feasibility studies and technical support, peak-load reduction and load management, industrial and process efficiency analysis, energy procurement strategies, energy efficiency retro-commission and combined heat and power and renewable generation project classifications. (www.nyserda.org/programs/flextech.)

In addition, industrial and commercial facilities can participate in the New Construction Program that provides assistance incorporating energy efficiency strategies during the design phase of a project. The goal of the New Construction program is to save energy through reduced electric demand, thereby lowering operating costs during the life of the facility. Technical assistance is available during design; funding is available to help offset the added costs of energy efficiency measures. (www.nyserda.org/programs/New_Construction)

NYSERDA's Existing Facilities Program offers incentives for energy projects including Pre-Qualified Measures and Performance-Based Incentives. Pre-Qualified Incentives are described as encouraging applicants to purchase and install energy-efficient equipment for small-sized energy projects and equipment replacement projects; incentives are limited to \$60,000. The Performance-Based incentives portion of the Existing Facilities program offers incentives to customers who are working on large-scale energy efficiency projects. The incentives offered are to offset capital costs of effective efficiency projects that reduce electric and natural gas consumption, to offset the installation costs of commercially available CHP systems, to offset a portion of the technology costs that enable facilities to participate in Demand Response Programs and to offset the costs of projects focused on increasing productivity, increasing process efficiency, reducing waste and reducing electricity consumption on a per unit of production basis. AS of August 2011, the Existing Facilities and Industrial and Process Efficiency Programs received applications for projects that committed budgeted funds. The program stopped accepting applications with the exception of National Fuel Gas customers using less than 12,000 Mcf annually.

Federal Industrial Energy Efficiency Programs

The Industrial Technologies Program (ITP) is part of the US Department of Energy, Energy Efficiency & Renewable Energy. The ITSP stated goal is to strengthen America's energy security, environmental quality and economic vitality through public-private partnerships. ITP provides industrial manufacturers across the country with a variety of energy efficiency tools, resources and incentives. ITP conducts activities to further these goals in two areas – research and development and technical assistance. Under the research and development component of the program, ITP provides cost-shared funding to develop transformational technologies for industry, targeting energy intensive industries and crosscutting technologies that benefit multiple industries. While partnering with academia, industry and DOE's laboratories, the program focuses on next-generation processes that eliminate or reinvent manufacturing steps and reduce material requirements, advanced materials with improved properties that increase productivity and lower costs and high-efficiency combined heat and power technologies.

The Technical Assistance portion of the program offers help to manufacturers to become more energy efficient through proven tools, training, assessments and other resources to assist facilities identify the most cost-effective measures for reducing energy consumption. The program shares lessons learned from other companies/facilities through case studies, data bases and success stories. And finally the technical assistance program offers recognition for setting ambitious and measurable goals and for adopting energy management values.

The Save Energy Now program is an initiative of the ITP that asks companies to voluntarily pledge to reduce their energy intensity by 25% in ten years. Those companies that make the commitment to achieve the 25 in 10 goal (LEADERS) are given priority access to energy assessments and other resources of the department. Companies typically develop energy intensity baselines, energy management plans and report on progress after implementing the energy plans.

The ITP (www.eere.energy.gov/industry/states) tracks and reports industrial energy efficiency resources by state. The Electronic Handbook of industrial Resources, Alaska (November 2010) lists information available through the Alaska Housing Finance Corporation Research Information Center and the Alaska Building Science Network. Programs listed include the AEA Renewable Energy Grant Program, GVEA's Sustainable Natural Alternative Power (SNAP) program, the Denali Commission Training fund and Green Star's site assessment program. Also mentioned are AEA's Power Plant Electrical Distribution Upgrade program, GVEA's BusinessSense program and Green Star's Lighting Energy Efficiency Pledge (LEEP) program.

Other federal agencies offer energy industrial energy efficiency resources in addition to those provided by DOE. According to DOE, the Internal Revenue Service provides tax incentives to industrial manufacturers that implement energy efficiency projects. The US Environmental Protection Agency provides loans on new energy efficient construction and incentives for combined heat and power

projects. The US Department of Agriculture also provides incentives to rural and small industrial facilities that become more energy efficient.⁷

Regional Programs

The Northwest Energy Efficiency Alliance Industrial program serves industrial facilities in Washington, Oregon, Idaho and Montana. NEEA's program focuses on achieving a projected regional savings of 900 aMW by 2029. To help the region realize this energy savings, NEEA "is executing an industrial and agricultural strategy in 2010-2014 that will increase demand for strategic energy management solutions by targeting industry cluster groups to set industry-wide energy intensity reduction goals. NEEA will also increase the market's ability to meet this increased demand by working strategic energy management strategies." NEEA currently has three initiatives in its industrial program – developing and configuring whole product strategic energy management solutions for the Northwest food processing industry and the small-to-medium-sized manufacturing businesses. The third initiative is focuses on agriculture in the region: NEEA is conducting a market characterization study to determine the barriers and opportunities within the industry.

Another NEEA initiative is the Continuous Energy Improvement (CEI) program. It provides a framework for strategic energy management in energy-intensive industrial and business operations. NEEA pioneered the program in 2008 in conjunction with the Northwest Food Processors Association (NWFPA), the US DOE, and Northwest Utilities. An industry-wide energy reduction goal was set and called for an energy intensity reduction of 25% in 10 years and 50% in 20 years (25 in10sity Challenge). NEEA worked with the industry and utility partners to reduce energy consumption and costs and to increase profitability. An independent evaluation of the program indicates the food processors participating in CEI achieved an average annual electric savings of three percent of their electric energy consumption. After the success of the program with the food processors, NEEA is working to engage other industrial and commercial sectors to develop similar industry- wide goals and savings.

Recommendations

One: Set a goal of a 2.5% average annual reduction in industrial energy use in Alaska. See recommendations below for programs to achieve this goal and for the need to improve data collection to evaluate where to target the programs and to measure progress in meeting the goal.

⁷ US DOE Energy Efficiency & Renewable Energy Industrial Technologies Program, Electronic Handbook of Industrial Resources, New Mexico, November 2010

Two: Create an Alaska Industry Challenge and Recognition Program. The proposed program would be voluntary, so in order to achieve a significant impact with the program, it would be necessary to consult with industry on program specifics. The program could have the following components:

- Challenge industrial firms or sectors to voluntarily establish energy intensity reduction goals and commit to implementing cost-effective energy efficiency projects. The Challenge Program could establish energy intensity reduction goals, and include an audit of facilities that do not have a current energy audit. Progress should be tracked and reporting annually. The program could maintain a database on energy savings, benefit-cost ratios and simple payback periods.
- Implement an annual awards program to recognize and honor industrial firms that are participating in the Challenge program and have made progress in reducing their energy intensity. The governor could give the annual awards at an annual event.
- Expand industrial energy efficiency training and technical assistance activities such as those provided by regional programs or the Washington State University Extension Energy Program Industrial Services or the Industrial Assessment Centers (IACS) funded by the US DOE.
- Increase the scope and impact of utility financial and technical assistance programs for the industrial sector. Electric and gas utilities could establish demand side management programs for industrial customers. The programs could be modeled on other successful programs for industrial users in other states such as Washington and New York.

Three: Create a partnership with an existing Industrial Energy Efficiency program in order to share resources. Providing technical assistance to industries for strategic energy management is a relatively process specific endeavor. By partnering with a program that serves a larger industrial and population base, Alaska's program could avail itself of qualified resources on an as needed basis. The Washington State University Extension Energy Program, Industrial Services currently has an in-depth program that could meet some of Alaska's needs. A partnership could be developed that resembles the WWAMI School of Medical Education at the University of Alaska Anchorage. The program is a collaborative medical school among universities in the five northwestern states of Washington, Wyoming, Alaska, Montana and Idaho and the University Of Washington School Of Medicine. Prospective students apply to the University Of Washington School Of Medicine and upon admission, Alaska students complete their first year of medical school at UAA, their second year at UW and the subsequent years related to specialties can be taken in any of the WWAMI states.

Four: Research in greater depth the energy consumption of existing industries in Alaska. Prior to creating an industrial energy efficiency program, research should be conducted to better evaluate the energy intensity of various Alaska industries. Alaska Energy Statistics, 1960-2008 prepared by the Institute of Social and Economic Research, UAA contains limited data on industrial energy use. Industrial

and military producers of electricity with installed capacity greater than one megawatt are required by law to report their operations to the federal government; however ISER found that the reporting was not complete. There is some data on installed capacity for the petroleum and seafood industries. Once better data is collected, the Alaska program can be tailored to provide the greatest impact towards the State's goal of increasing energy efficiency. Data can be filtered to determine a particular industry's susceptibility to state policy, the potential benefit to the state and the potential for the greatest energy efficiencies.