



INDUSTRIAL TECHNOLOGIES PROGRAM

Save (More) Energy Now with Intelligent Industrial Buildings

High-Performance Stewardship of Buildings

Energy Use by the Industrial Building Sector

Industrial sites employ energy-intensive systems to heat, ventilate, air condition, light, and otherwise support processes and personnel. These support functions consume up to 33% of all energy used in manufacturing sub-sectors. In 2002, U.S. manufacturing buildings used an estimated 2 quadrillion Btu (including electricity-related losses) — more than the entire U.S. food processing industry and more than 4.4% of U.S. manufacturing energy consumption overall.¹ The energy used annually by manufacturing buildings costs industry about \$12 billion and is equivalent to the energy used in 34 million passenger cars or in 11 million homes.

The Opportunity

Industrial facilities present a unique opportunity to save energy by recovering energy and/or water from industrial processes. Waste heat from processing and/or combined heat and power systems may be used to power, cool, heat, and dehumidify the facilities. Improvements in the design and operation of industrial facilities can yield energy savings of a quarter quadrillion Btu per year by 2017. This savings would reduce the peak load on natural gas, electric, and water systems—thus increasing energy security and improving the reliability of manufacturing systems.

As part of the Save Energy Now initiative, the U.S. Department of Energy's (DOE's) Industrial Technologies Program (ITP) works with industry to foster the use of advanced technologies and best practices in energy management to capture these savings. Relevant technologies include low-cost wireless sensors, demand-based controls, intelligent metering, building envelope upgrades, and high-efficiency steam/water heating. These energy opportunities also represent thousands of manufacturing and installation job opportunities.²

Challenges

Challenges to identifying and implementing energy-saving strategies in industrial buildings include the following:

- Evolving technologies for lighting; heating, ventilating, and air conditioning (HVAC); sensing; control; water management and metering
- Access to useful analytic tools
- Under-recognized value of onsite generation in reducing emissions
- Limited understanding of demand-response technologies
- Limited scenarios of energy transport to nearby users
- Lack of corporate-wide energy management standards
- Limited availability of training

"If you can't measure it, you can't improve it." - Lord Kelvin

Benefits to Facilities

- Reduce energy use and costs
- Lower carbon emissions
- Increase energy security and resiliency to energy disruptions³
- Boost productivity, performance, and power quality
- Potentially garner traded credits

Sample Technologies

DOE works with industry to develop and deploy energy-efficient technologies:

- Wireless sensor networks to reliably monitor systems
- High-efficiency water heaters and boilers (>94%)
- Daylighting, lighting and controls
- Demand-based water controls
- Demand-responsive HVAC
- Preventative Maintenance Diagnostic Tools

Links to Help Find Opportunities

- [Quick Start](#) your facility energy management program
- Archived webcasts on [Efficient Building Management](#)
- Best Management Practices:
 - [Metering](#)
 - [Water](#)
 - [Federal industrial facilities](#)
 - [Laboratories](#)
 - [Commercial buildings](#)
- [Design Guide ASHRAE 30% Goal](#)
- [Automated Demand Response](#)

¹ U.S. DOE, Energy Information Administration (2002), [Manufacturing Energy Consumption Survey](#)

² American Solar Energy Society (2009), [Green Collar Jobs in the U.S. and Colorado](#)

³ A. Carlson, B. Hedman, Energy and Environmental Analysis, Inc. for ORNL, [Assessing the Benefits of On-Site Combined Heat and Power during the August 14, 2003 Blackout](#)



Goodyear Facility

Tools to Reduce Energy Use in Industrial Facilities

DOE provides facility owners and managers with the tools to evaluate and deploy more energy-efficient technologies, design high-performance facilities, and select energy-management best practices. Building upon the success of DOE's Save Energy Now program and associated assessment process, DOE resources can help your company accomplish the following:

- Receive recognition for protecting our nation's resources.
- Reduce facility energy consumption 25% and total plant energy consumption 1 to 5% by adopting cleaner energy sources; energy-efficient, facilities-related best practices; and improved technologies.
- Assess facility systems as part of an industrial plant assessment.
- Use tools to set an energy baseline and profile, analyze energy use, and find savings opportunities:
 - [Quick Plant Energy Profiler](#) to benchmark your facilities
 - [Industrial Facilities Score Card](#) to quickly identify opportunities.
 - [Buildings Cooling, Heating, and Power Systems Screening Tool](#) to assess the economic potential of these systems in commercial buildings
 - [Industrial Facilities System Assessment Tool](#) (Beta version) to analyze building energy use scenarios
 - [Data Center Tool DC Pro](#) helps identify data center opportunities.
 - [Steam, Compressed Air, Motor, Pump and Fan](#) opportunities.
- Train staff to identify additional opportunities, use analysis software, and/or become Certified Practitioner or Qualified Specialists.
- Train industrial facility designers, operators, and managers to use the latest facility energy-management best practices and tools.
- Employ design guidelines; identify and install applicable technologies.
- Use Cool Roof technology to design and maintain efficient roofing.
- Use wireless sensors and meters with energy management visualization tools to help maintenance staff quickly recognize and respond to energy management opportunities (e.g., steam trap failure, steam/water use in unoccupied space, filter near-full, motor pre-failure indicator, inappropriate system operation for time of day, or the approach of an electrical demand charge). See UC Davis' Utility [Dashboard](#) for a public example of an energy awareness tool.
- Use commissioning to verify energy savings from changes.
- Use adjustable speed drives for dramatic energy reductions and improved performance.

Diversify for Energy Security:

- [Combined Heat and Power](#)
- [Wind Power](#)
- [Solar Power](#)
- [Ground Source Heat Pumps](#)
- [Bio-diesel](#)
- [Alternative Fuels](#)

Financial Opportunities:

- [Energy Efficiency Incentives](#)
- [Renewable Energy Incentives](#)
- [Energy Cost Management Opportunities](#)
- [National Association of Energy Service Companies \(NAESCO\)](#)
- [Guide for Hiring an Energy Services Company](#)

Assessments:

www.eere.energy.gov/industry/saveenergynow

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www.eere.energy.gov/industry

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Energy Efficiency &
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