

General Best Practices Checklist for Industrial Facilities

The following are key Energy Best Practices within common systems in industrial facilities. For more information on these Best Practices, free technical support to estimate the Best Practice energy savings for your systems, and possible project incentives call the Focus on Energy - Industrial Program at 800-762-7077.

Best Practices for Common Systems

System	Best Practices	System	Best Practices
Compressed Air			Use VSD instead of bypass control
	Reduce system pressure	Area Comfort Heating	
	Repair leaks		Reduce waste heat
	Single versus two stage		De-stratify heated air in plant
	Variable inlet volume		Control heating to desired temperature
	Variable speed control		Use infrared heating
Energy efficient motor	Optimize CFM air exhausted		
Lighting			Automatic temperature control
	Light meter used to verify levels		Minimize heat to storage areas
	T-8 or pulse start MH lighting are considered	Comfort Cooling	
	Occupancy sensors		Install removable insulation
	Lights off during process shutdown		Minimize unnecessary ventilation
	Task lighting is maximized		Minimize moisture released
Night lighting is turned off	Higher efficiency AC		
L.E.D. lamps in exit signs	Optimize room air temperature		
Motors		Dehumidification	
	Premium efficiency motor vs. repair		Reduce humidity load
	Cogged belts vs. V-belts		Accurately controlling humidity
	Premium efficiency motors specified		Optimize ventilation
Pumps			Desiccant dehumidification
	Trim impeller to meet maximum Load		Minimize reheat energy
	Use VSD instead of throttled control		

Best Practices for Common Systems

Refrigeration		Fan Systems	
	Thermosiphon		Reduce excess flow
	Evaporator fan control		Eliminate flow restrictions
	Floating head pressure		Correct poor system effects
	Scheduled maintenance		Optimize efficiency of components
	- Clean filters		Correct leaks in system
	- Low refrigerant charge		Optimize fan output control
	Automatic air purge	Process Cooling	
Steam Systems			Use variable frequency drives
	Reduce steam pressure		Float head pressure
	Steam trap maintenance		Use of free cooling - fluid cooler
	Minimize blowdown		Use of free cooling - cooling tower
	Insulate pipes		Match chilled water pumps
	Improve boiler efficiency		Insulate pipes and vessels
	Heat recovery for boiler blowdown		Process to process heat recovery
	Increase condensate return	Process Heating	
	Stack economizer		Optimize combustion air fuel ratios
	Recover flash steam		Preheat combustion air
Ventilation			Insulate pipes and vessels
	Direct fired make-up units		Schedule cleaning of heat exchangers
	Better ventilation management		Condensing heat recovery
	De-stratified air		Process to process heat recovery
Wastewater			Ultra filtration for condensation
	Fine bubble diffusers	Vacuum	
	Automatic controlled DO sensors/VSDs		Optimize total cost for conveying
	Heat recovery on anaerobic digester		Choose appropriate vacuum pump
	Unneeded aeration basins are shut off		Optimize vacuum pressure
			Eliminate vacuum leaks

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CENTER FOR TECHNOLOGY TRANSFER, INC.: www.cttinc.org - MISSION: The mission of the Center for Technology Transfer, Inc. (CTT) is to help companies overcome barriers that restrict the commercialization of energy efficient technologies in Wisconsin.

CTT is unique due to its ability to assist in the commercialization of energy efficient technologies by providing capital in the form of loans or equity to companies not typically served by traditional financial resources. This capital, coupled with CTT's technical, business and financial expertise can help bridge the gaps preventing the adoption and commercialization of new technology.

CTT's technology investment funds are aimed at companies with technologies specific to the forest products (paper), metal casting, food processing, printing and plastics industries. CTT will also consider investment in other areas that will have a significant impact on energy use in Wisconsin. Businesses that have technology ready for commercialization in the near term, as well as business with commercialized technology that is not currently offered in Wisconsin, are especially encouraged to contact CTT. Examples of specific CTT programs include:

- **Funding for New Energy Technologies:** To reduce energy usage on a long term basis, CTT can provide up to \$250,000 to fund demonstrations of new emerging technologies and to commercialize new energy efficiency technologies. The funds can be provided to the company developing the technology either in the form of equity or loans. The funds can be leveraged with other financing and a variety of payback models are available, including shared savings.
- **Provide Energy Education and Training:** CTT, with financial support from Focus, The Wisconsin Division of Energy and the US Department of Energy is conducting a project to deliver \$170,000 in energy efficiency training with industry associations and other non-profits. The funds are available through a Requests for Proposals available on the CTT website www.cttinc.org. Projects in the \$5,000 to \$25,000 range will be considered, with an anticipated average award size of approximately \$10,000.
- **Green Tier Assistance:** Green Tier is an innovative, voluntary program that allows the Wisconsin DNR to create incentives for companies to "go beyond" standard environmental compliance. Through a grant from the US Department of Energy, and in cooperation with the DNR, CTT provides free assistance to companies negotiating Green Tier contracts that will deliver superior energy and environmental results.

US – DEPARTMENT OF ENERGY – ENERGY EFFICIENCY AND RENEWABLE ENERGY (EERE) - EERE offers valuable tools and publications to help industrial companies improve productivity and energy efficiency. These resources are listed below, you can learn more by visiting the Best Practices website at www.eere.energy.gov/industry/bestpractices or by calling the EERE Information Center at 877-337-3463.

Publications : www.oit.doe.gov/bestspractices/library.shtml

Whether you're looking for information on how to recover waste heat from your steam system or wondering about the market potential of efficient motors, the Best Practices library has the publication for you:

- DOE G 414.1-2, Quality Assurance Management System Guide – systems for conducting best practices. <http://www.directives.doe.gov/pdfs/doe/doetext/neword/414/g4141-2.pdf>
- Corporate Energy Management Case Studies - These case studies can help decision makers examine the bottom line benefits that result from successful applications of energy efficient practices and technologies. www.oit.doe.gov/bestpractices/case_studies_corp.shtml, www.ase.org/section/topic/industry/corporate/cemcases/
- Case Studies – Profiles of companies and organizations that have made energy savings improvements and how they did it. www.oit.doe.gov/bestpractices/case_studies.shtml
- Technical Publications – Materials on buying, maintaining, and assessing industrial systems and components; overviews of the energy-efficient motor and compressed air markets; and specific information on Best Practices tools. www.oit.doe.gov/bestpractices/technical_publications.shtml#source
 - Technical Fact Sheets and Handbooks provide “how-to” technical detail on increasing system efficiencies.
 - Tip Sheets provide quick advice on how to keep your systems running at their maximum efficiency.
 - Best Practices Resources provide information on the tools available from the Best Practices portfolio.
 - Market Assessments provide a look at the market for energy efficient industrial systems and components, and offer strategies to influence that market.
 - Sourcebooks provide information on activities, resources, applications, standards and guidelines for increasing industrial energy efficiency.
 - Repair Documents for motors.
- Energy Matters – Best Practices’ award-winning quarterly newsletter carries articles from industry experts, tips for performance optimization, case studies and news on current program activities. www.oit.doe.gov/bestpractices/energymatters/energy_matters.shtml
- ITP E-Bulletin – Monthly online connection to news and resources from ITP—including announcements about new tools and resources. Subscribe by sending an e-mail to itpebulletin@ee.doe.gov
- Training Materials – A range of materials—notebooks, CDs, viewgraphs—designed to spread the word about the benefits of industrial energy efficiency and how to achieve it. www.oit.doe.gov/bestpractices/training/training_materials.shtml
- Library Links – Links to ITP Allied Partners and industry association colleagues, many have very complete energy efficiency library collections. www.oit.doe.gov/bestpractices/library_links.shtml

Training: www.oit.doe.gov/bestpractices/training/

Best Practices offers system-wide and component-specific training programs to help you run your plant more efficiently. The training is offered throughout the year and around the country.

- End-User Training for compressed air, motor, process heating, pump and steam systems.
- Specialist Qualification Training offers additional training in the use of specific assessment and analysis software tools developed by DOE.

Plant Assessments: www.oit.doe.gov/bestpractices/assessments.shtml

Plant assessment assistance is available to help you and your customers identify opportunities to improve the bottom line by reducing energy use and enhancing productivity.

- Plant-Wide Assessments investigate overall energy use in industrial facilities and highlight opportunities for best energy management practices. Approximately once per year, plants are selected through a competitive solicitation process and agree to a minimum 50% cost-share for implementing the assessment.
- Industrial Assessment Centers (IAC) are aimed at small- to medium-sized manufacturers and provide a comprehensive industrial assessment at no cost. Engineering faculty and students

conduct energy audits or industrial assessments to identify opportunities to improve productivity, reduce waste and save energy.

Software: www.oit.doe.gov/bestpractices/software_tools.shtml

ITP's comprehensive suite of software tools can help your organization identify energy savings opportunities. Visit the Web site to learn more and download these tools, free of charge, to improve industrial compressed air, motor, fan, pump, process heating and steam systems:

- ASDMaster evaluates adjustable speed drives and their application
- AirMaster+ assesses compressed air systems
- MotorMaster+ and MotorMaster+ International assists in selecting and managing energy-efficient motors
- Process Heating Assessment and Survey Tool (PHAST) assesses process heating systems
- Pumping System Assessment Tool (PSAT) assesses the efficiency of pumping systems
- NOx and Energy Assessment Tool (NxEAT) assesses and analyzes NOx emissions and applications of energy-efficient improvements
- Steam System Scoping Tool (SSST) profiles and grades steam system operations and management
- Steam System Assessment Tool (SSAT) assesses steam systems
- 3E Plus determines whether boiler systems can be optimized through the insulation of steam lines

Databases: www.oit.doe.gov/bestpractices/databases.shtml

ITP's on-line databases can help you make contact with best practices service providers, review results of plant assessments, and find a variety of additional tools.

- Allied Partners Database contains information on private companies, organizations, and government agencies that provide equipment, assistance, or services to manufacturers. www.oit.doe.gov/bestpractices/cfm/database_allied.cfm
- The Industrial Assessment Center (IAC) Database contains the actual results of approximately 7,000 assessments conducted by the IACs. The database includes details including fuel type, base plant energy consumption, and recommended energy efficiency improvements, in addition to projected energy savings, cost savings, implementation cost, and simple payback. <http://iac.rutgers.edu/database/>
- The National Inventory of Manufacturing Assistance Programs (NIMAP) database provides an extensive listing of organizations that offer assistance to industrial firms. NIMAP links industrial customers to potential resources to help them address energy management responsibilities, including operations, maintenance, and training issues, as well as equipment sourcing and financing. www.oit.doe.gov/bestpractices/nimap/

OTHER

Energy Center of Wisconsin. See <http://www.ecw.org>

Energy Consumption by Manufacturer-MECS data for 1998. See <http://www.eia.doe.gov/emeu/mecs98/datatables/contents.html>