



# The Industrial Technologies Program and the Federal Energy Management Program:

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*Working Together to Help the  
Federal Complex Save Energy  
and Money*

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Industrial Technologies Program



**GovEnergy**  
[www.govenergy.gov](http://www.govenergy.gov)



# Industrial Technologies Program Delivers Solutions

## Technology Delivery

Help plants and data centers save energy today by assessing opportunities and facilitating adoption of best energy management practices and efficient new technologies



**Save**  
**ENERGY**  
**Now**

## Energy Efficiency R&D

Develop technologies addressing the top energy savings opportunities across industry



### **Goal:**

Drive a 30% reduction in federal industrial facilities by 2013



# Industrial Facilities Initiative

- Partnership between FEMP and DOE's Industrial Technologies Program (ITP) started in 2000
- Started through agreement between FEMP and ITP in 2000
- Serving federal industrial customers with technical expertise from:
  - Oak Ridge National Laboratory
  - Industrial Assessment Centers
  - ITP BestPractices Qualified Specialists

“Industrial” applies to industrial processes including steam, process heat, compressed air, productivity improvements (labor, materials, wastes), and laboratories and data centers



# Energy Savings Assessments

ITP offers Save Energy Now energy assessments to industrial and federal facilities to identify key opportunities for energy savings and productivity improvements.

- Entire industrial process assessments
- Targeted system assessments:
  - steam
  - process heating
  - compressed air
  - motors
  - chilled water

Produces a final report that identifies:

- potential energy and cost-saving measures
- potential productivity improvements
- cost estimates for implementation

# ITP Industrial Energy Savings Assessments: Achieved Results

As of July 1, 2008, ITP has completed 570 Save Energy Now assessments. 468 plants are reporting:

- **\$807 million** in identified energy cost savings
- **\$117 million** in implemented energy savings
- **\$312 million** in energy savings measures underway or scheduled
- **77.1 trillion Btu** of identified natural gas savings
- **6.8 million metric tons** potential reduction of carbon dioxide emissions

**Save Energy Now**  
Industrial Technology Program  
www.saveenergy.gov/industry/energyprogram

**Reduce your company's energy costs and carbon emissions with DOE tools and resources**

Thousands of companies have used the U.S. Department of Energy's (DOE) resources to uncover cost-effective opportunities to save energy. Your plant can benefit from assessments, software tools, training, and technical information.

**Save Energy Now Delivers Results**  
Through Save Energy Now, DOE helps U.S. industrial companies prosper in the face of energy challenges. In the past two years, assessments led by DOE Energy Experts have helped plants find ways to meet these challenges and achieve impressive results.\*

**Potential energy cost savings more than:** **\$807 million**

**Avoided carbon dioxide emissions more than:** **6.8 million metric tons**

**Actual cost savings from implemented measures more than:** **\$117 million**

**Estimated cost savings from activities underway or planned more than:** **\$312 million**

\* Numbers based on DOE publications.

**Consider an Energy Assessment**  
Expert-led energy assessments can identify ways for manufacturing plants to shave an average of 3% off their annual energy bills. By specifically focusing on energy use in process heating, steam, compressed air, fan, or pumping systems, the DOE approach often helps plants find opportunities missed in other assessments. DOE's Industrial Technology Program (ITP) offers assessments to facilities of all sizes.

- Large, energy-intensive plants may be eligible for an assessment led by a DOE Energy Expert
- Small and medium size plants may qualify for an assessment by a university-based team from a DOE Industrial Assessment Center

Visit the Save Energy Now Web site to apply for an expert-led assessment and to learn how these assessments help plant personnel find energy savings.

**"The Save Energy Now Assessment was a great way to help us quantify the opportunities we knew were out there and discover additional opportunities we hadn't seen before."**

Robert Hart, Engineering Manager,  
West Line Paper Company

U.S. Department of Energy  
Energy Efficiency and Renewable Energy  
Helping you to prosper from clean energy & smart decisions, today and tomorrow.

**Save ENERGY Now**



# ITP Industrial Energy Savings Assessments

## *Top 10 Cost-Saving Recommendations for Steam Systems*

1. Reduce steam demand = \$89 million/year
2. Use alternate fuel = \$77.9
3. Improve boiler efficiency = \$42.9
4. Add/modify backpressure steam turbine = \$33.9
5. Improve condensate recovery = \$23.6
6. Add/modify condensing steam turbine = \$22.9
7. Implement steam trap maintenance program = \$15.1
8. Improve insulation = \$10.5
9. Improve boiler blowdown rate = \$9
10. Improve blowdown feedwater heat recovery = \$8.9



# ITP Industrial Energy Savings Assessments

## *Top 10 Cost-Saving Recommendations for Process Heating Systems*

1. Furnace heat recovery = \$19.6 million/year
2. Heat cascading = \$16.2
3. Use of proper heating methods = \$12.8
4. Proper furnace insulation/maintenance = \$11.7
5. Reduce flue gas oxygen content = \$8.7
6. Use oxygen for combustion = \$7
7. Use process or exhaust air for combustion = \$7
8. Improve load charge preheating = \$6.9
9. Reduce/eliminate furnace openings & leakage = \$5.2
10. Improve furnace scheduling, loading, shutdown= \$4.7



# Federal Industrial Energy Savings Assessments

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- Using the same Save Energy Now assessment methodology, federal facilities can receive an industrial energy assessment from Oak Ridge National Laboratory (ORNL)
- ORNL supports FEMP's IFI program and can do energy assessments in-house, use IACs, and/or ITP BestPractices Qualified Specialists
- IFI has performed 24 industrial energy assessments since 2001
- Contact Melissa Madgett  
at *madgettmg@ornl.gov* or  
(865) 576-3373



# Federal Industrial Energy Savings Assessments

## Highlight: **Philadelphia Mint**

Manufactures coins for general circulation as well as produces uncirculated coins, commemorative coins, national medals, and gold bullion coins.

- Recommended Savings

- 64,300 MMBtu source
- \$934,500 /yr
- 19 recommendations

- Implemented Savings

- 13,300 MMBtu source
- \$201,600 /yr
- Eliminated one furnace
- Furnace temperature setback
  - Reduced compressed air pressure and leaks
  - Scrap recovery





# Federal Industrial Energy Savings Assessments

## Highlight: Radford Army Ammunitions Plant

6,900 acre manufacturing and storage space facility. Chemical processing, laboratory, hazards testing, ballistic testing, maintenance, process development and explosives storage.

- Recommended Savings

- 223,600 MMBtu/yr source
- \$377,500/yr

- Implemented Savings

- 194,600 MMBtu/yr source
- \$290,000/yr
  - Boiler combustion control
  - Flue gas temperature improvements





# Technology Delivery Resources

## Technology Delivery

Self-assessment Software Tools

Technical Resources & Expertise

Save Energy Now CD

Training

End-user

Specialist

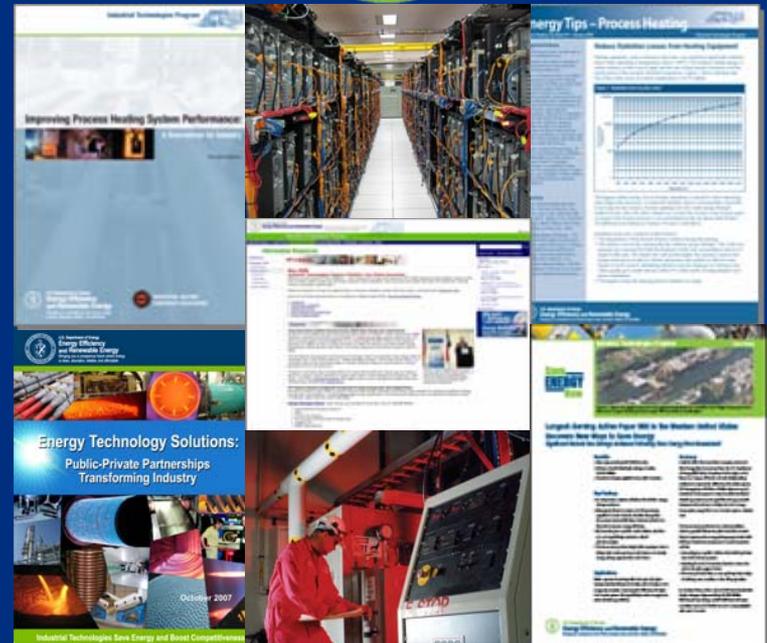
Energy Savings Assessments

## Data Centers

Save Energy Now Data Center Program

Workshops

DC Pro online software tool





# Self-Assessment Software Tools

ITP's suite of analysis software tools identify energy savings opportunities and supply in-depth system-specific instruction.

## First Step

*Quick PEP – diagnose overall energy use and identify savings opportunities*

- provides an overview of amount of energy purchased and generated
- identifies major industrial systems that consume the most energy
- describes savings potential
- points out specific resources and tools to realize savings



# Self-Assessment Software Tools

## Next Steps

- *AIRMaster+*
- *Chilled Water System Analysis Tool*
- *Combined Heat & Power Application Tool*
- *Fan System Assessment Tool*
- *MotorMaster+*
- *MotorMaster+ International*
- *Process Heating Assessment & Survey Tool*
- *Pumping System Assessment Tool*
- *Steam System Tool Suite*
  - *Steam System Scoping Tool*
  - *Steam System Assessment Tool*
  - *3E Plus®*

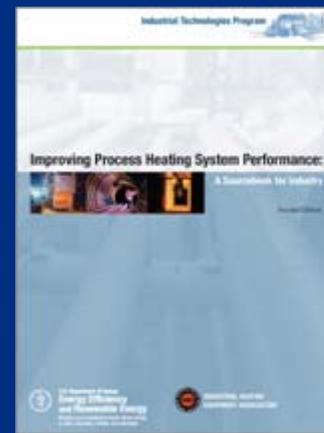
These tools allow you to self-assess each system, model recommendations, and calculate impacts and cost savings



# Technical Resources

ITP's portfolio of technical information helps plant managers, engineers, and operators increase their knowledge on managing specific energy systems:

- **Sourcebooks** – essential references for analyzing and implementing energy efficiency and productivity improvements
- **Tip Sheets & Fact Sheets** – targeted, low-cost improvement recommendations
- **Market Assessments** – big picture energy efficiency opportunities





# Technical Resources

## Outreach

- **Case Studies** – highlight examples of successful energy savings projects that can be implemented in other facilities
- **Qualified Specialists** – identify system efficiency opportunities in your facility.

## News

- **Energy Matters** – quarterly e-magazine that features expert technical articles, tips, and technology highlights
- **E-Bulletin** – monthly online connection ITP activities, new products, technology developments, and events.





# Technical Resources

## Save Energy Now CD

- Over 20,000 distributed
- More than 100 downloadable publications
- Complete suite of software tools for assessment and later use by plants
- Interactive quiz helps plants evaluate their energy management know-how
- Portable resource: a Web connection not required for tools, quiz, or PDFS





# Training

Federal personnel such as plant managers and engineers can utilize ITP's system- and component-specific training sessions that focus on Improving energy management and the use of the software tools.

## End-User Training

- Hands-on, one- and two-day **trainings** at different locations around the country are taught by expert instructors
- **Webcasts** provide an introduction to energy management and other special topics
- **Federal Data Center Workshops** provide information on state-of-the-art strategies to improve data center energy intensity

## Specialist Training

- Interested Federal personnel can take training to become a **Qualified Specialist.**



# Training

## Webcasts

- **Introduction to Compressed Air**  
Aug. 11
- **Introduction to Process Heating Assessment Tool**  
Aug. 12  
Sept. 9  
Oct. 14
- **Introduction to Pumping System Assessment Tool**  
Aug. 25  
Sept. 15

## Hands-on, instructor led trainings

- **Motor Systems Management**  
Aug. 12. Sacramento, CA  
Sept. 18. Tempe, AZ  
Oct. 7. Downey, CA
- **Fans Systems Assessment**  
Aug. 20. Vancouver, WA  
Sept. 15. Green Bay, WI
- **Steam Systems Assessment**  
Sept. 25. Sacramento, CA  
Oct. 9. Medford, OR
- **Fundamentals of Compressed Air (Level 1)**  
Sept. 30. Longview, WA  
Oct. 1. Scottsdale, AZ
- **Advanced Management of Compressed Air (Level 2)**  
Oct. 1-2. Longview, WA
- **Pumping Systems Assessment**  
Oct. 8. Downey, CA
- **Process Heating System Assessment**  
Oct. 28. Sacramento, CA



# Data Centers

The Save Energy Now Data Center Program helps identify and implement solutions for data center efficiency.

- **DOE Green Grid Goal** for Energy Savings
  - 2011 goal: 10% energy savings overall in U.S data centers, equivalent to 10.7 billion kWh or the electricity consumed by 1 million typical U.S. households
- **Data Center Workshops** address new opportunities and challenges facing data center operators.
- The **Data Center Energy Profiler (DC Pro)** online software tool identifies how energy is being purchased and consumed.



# Data Centers

## DC Pro Details

### Inputs

- Description
- Utility bill data
- System information
  - IT
  - Cooling
  - Power
  - On-site gen

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Industrial Technologies Program

### DC Pro

[Open](#) | [Save](#) | [FAQ](#) | [Tutorial](#) | [Feedback](#)

#### Data Center Energy Profiler

**Get Started Now!** Username  [Forgotten password](#)

Returning User Password   [Register](#)

Data Center Energy Profiler, or DC Pro, is an online software tool provided by the U.S. Department of Energy to help industries worldwide identify how energy is being purchased and billed by their data center(s) and also identify potential energy and cost savings. DC Pro is designed so that the user can complete a data center profile in about an hour. The [online tutorial](#) will explain what data center information you need to complete a DC Pro case. When you complete a DC Pro case you are provided with a customized, printable report that shows the details of energy purchases for your data center, how energy is being used by your data center, potential cost and energy savings, comparison of your data center energy utilization versus other data centers, and a list of next steps that you can take to get you started saving energy.

The current version of DC Pro is 1.1.1.1, released 12/12/2006.

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### Outputs

- Overall picture of energy use and efficiency
- End-use breakout
- Potential areas for energy efficiency improvement
- Overall energy use reduction potential



# Data Centers

## Example DC Pro Recommendations

### List of actions (for electric distribution system)

- Avoid lightly loaded UPS systems
- Use high-efficiency MV and LV transformers
- Reduce the number of transformers upstream and downstream of the UPS
- Locate transformers outside the data center
- Use 480 V instead of 208 V static switches (STS)
- Specify high-efficiency power supplies
- Eliminate redundant power supplies
- Supply DC voltage to IT rack

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EEERE Home

### Industrial Technologies Program

## DC Pro

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#### Potential Annual CO<sub>2</sub> Savings

Based on the potential energy savings identified above, your data center may be able to reduce emissions of CO<sub>2</sub>. The following potential annual CO<sub>2</sub> emission savings numbers are broad estimates based on the estimated costs associated with the data center suggested improved and are not meant to reflect actual realized savings at your data center.

Potential Annual CO<sub>2</sub> Savings From Electricity 0 lbs.  
Potential Annual CO<sub>2</sub> Savings From Fuel/Steam 61,256,000 - 118,976,000 lbs.

#### Suggested Next Steps

Energy Management	IT Equipments	Environmental Conditions	Air Management	Cooling Plant	IT Equipment Power Chain	Lighting
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Create an energy management plan
Assign staff with energy management
Sub-meter end-use loads and track over time

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# ITP researches and develops technologies addressing the top energy savings opportunities across industry

## Select Technologies of Interest

### Commercial

- **Combustion**
  - Combined Heat and Power
  - Radiation-Stabilized Burner
  - Forced Internal Recirculation Burner
- **Metal Fabrication and Finishing**
  - Vanadium Carbide Coating Process to Enhance Metal Wear-Resistance
  - Intensive Quenching
- **Industrial Buildings and Auxiliary Equipment**
  - Trane CDQ Desiccant Dehumidification System
  - RR-1 Insulating Screw Cap
  - Adaptive Climate Controller for Single-Phase AC Induction Motors in HVAC Systems

### Emerging

- **Combustion**
  - Super Boiler
- **Metal Fabrication and Finishing**
  - Gas Metal Arc Welding Optimization
  - Advanced Weld Overlays
- **Industrial Buildings and Auxiliary Equipment**
  - Wireless Sensors for Motor Management
  - Membranes for Retaining Volatile Organic Compounds



# R&D Technologies

## Highlight: **Super Boiler**

*First-generation package boiler that can offer up to 25% increases in steam generation efficiency and occupy substantially less floor space*

### Benefits

- Maintains fuel-to-steam efficiency of 93%-94%
- Currently undergoing 3 demonstrations at plants around the U.S.
  - Specification Rubber Products: 12.2 million Btus/hr, 13% gas savings, 2-years operational
  - Clement Pappis, under development
  - ORNL, under consideration



DOE predicts industry savings of more than 185 trillion Btu of natural gas by 2020; about \$10 billion in annual energy costs



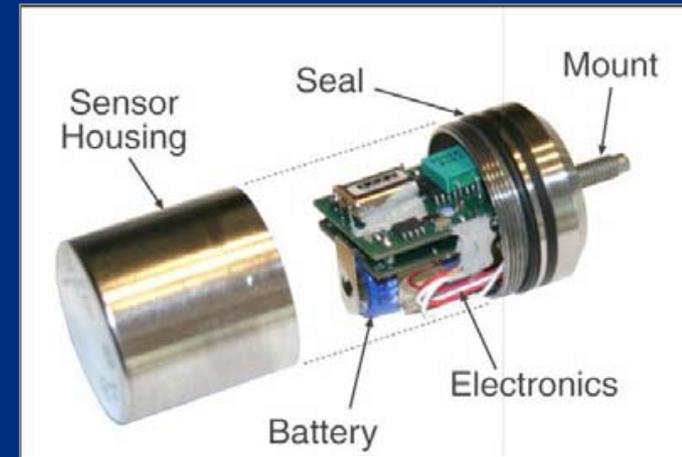
# R&D Technologies

## Highlight: Wireless Technology

*Sensors and monitors that can record the slightest system changes in facility and process equipment*

### Benefits

- Reduced installation and maintenance costs
- Improved safety, reliability, and control
- Easily replaced and upgraded
- Greater mobility
- Data security and invulnerability to interference
- Could reduce energy-use in process areas by 5% - 18%



Applications, case studies, and Webinars are under development



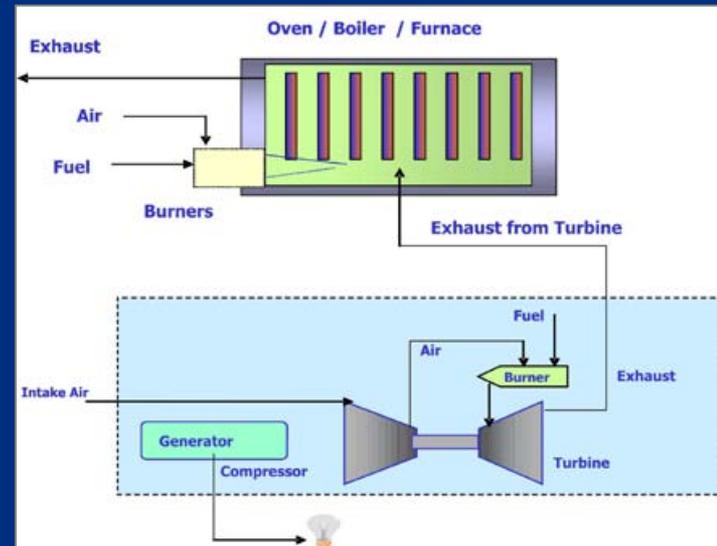
# R&D Technologies

## Highlight: Combined Heat and Power (CHP) Technologies

*Utilizes energy normally lost in the production of electricity to provide cooling, heating, humidity control, energy storage, and other process functions.*

### Benefits

- Helps meet increased energy needs; reduces transmission costs; and cuts emissions
- Increases power reliability, quality, and overall energy security
- Federal facilities mandated by 1999 *Greening the Government Through Efficient Energy Management* executive order to consider CHP when upgrading and assessing needs
- Energy savings of 30% have been documented



For technical assistance contact the CHP Regional Application Center near you



# R&D Technologies

## CHP Highlight:

DOE/Honeywell/ORNL Team  
Improved Energy Security at Ft.  
Bragg with CHP System

- 5 MW turbine integrated with 1,000 RT waste-heat driven chiller and HRSG
- Provides 1/4 of mission-critical power
- Development of supervisory control systems with on-line optimization using real-time pricing
- Provision of reliable power to strategic command center & hospital

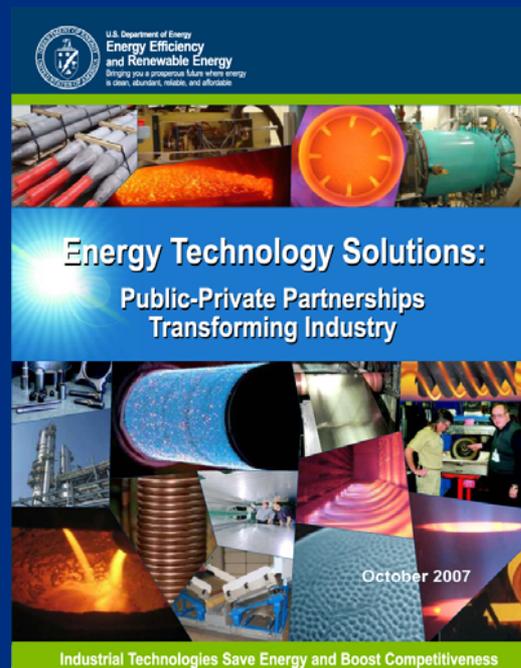




# R&D Technologies

For more on ITP's technologies, download *Energy Technology Solutions: Public-Private Partnerships Transforming Industry*.

[www.eere.energy.gov/industry/bestpractices/pdfs/itp\\_successes.pdf](http://www.eere.energy.gov/industry/bestpractices/pdfs/itp_successes.pdf)



*ITP can also provide referrals to experts in these technologies.*



ITP's resources are easily accessible,  
most are **free** and available online

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**Industrial Facilities Initiative**

[www.eere.energy.gov/femp/industrial/index.html](http://www.eere.energy.gov/femp/industrial/index.html)

**Technology Delivery Resources**

*Software tools, publications, qualified specialists, and more*

[www.eere.energy.gov/industry/bestpractices](http://www.eere.energy.gov/industry/bestpractices)

*Training Calendar*

[www.eere.energy.gov/industry/bestpractices/events\\_calendar.asp](http://www.eere.energy.gov/industry/bestpractices/events_calendar.asp)

*Save Energy Now CD*

[www.eere.energy.gov/industry/saveenergynow/cd\\_rom.html](http://www.eere.energy.gov/industry/saveenergynow/cd_rom.html)

**Data Centers**

*Workshops, DC Pro software tool*

[www.eere.energy.gov/industry/saveenergynow/partnering\\_data\\_centers.html](http://www.eere.energy.gov/industry/saveenergynow/partnering_data_centers.html)

**Technology Development**

*Super Boiler, Wireless technologies, and more*

[www.eere.energy.gov/industry/bestpractices/latest\\_advancements.html](http://www.eere.energy.gov/industry/bestpractices/latest_advancements.html)

*CHP*

[www.eere.energy.gov/de/chp/chp\\_applications](http://www.eere.energy.gov/de/chp/chp_applications)



# Would you like to know more about the Industrial Technologies Program?

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Renewable  
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**Don't forget to fill out and drop off your session evaluations!**