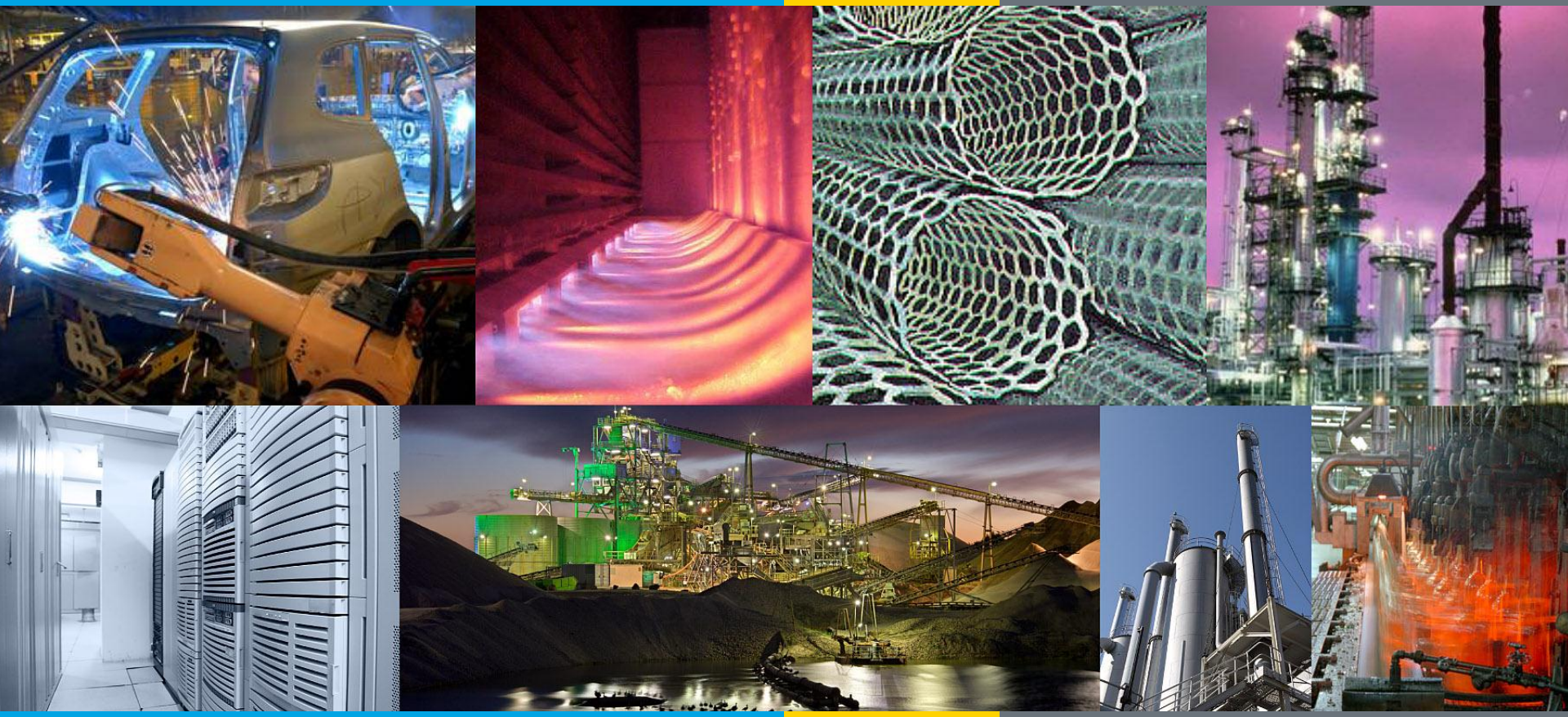
ADVANCED MANUFACTURING OFFICE

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy



Tuesday Webcasts for Industry: Key Energy-Saving Projects for Smaller Facilities

January 10, 2012

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

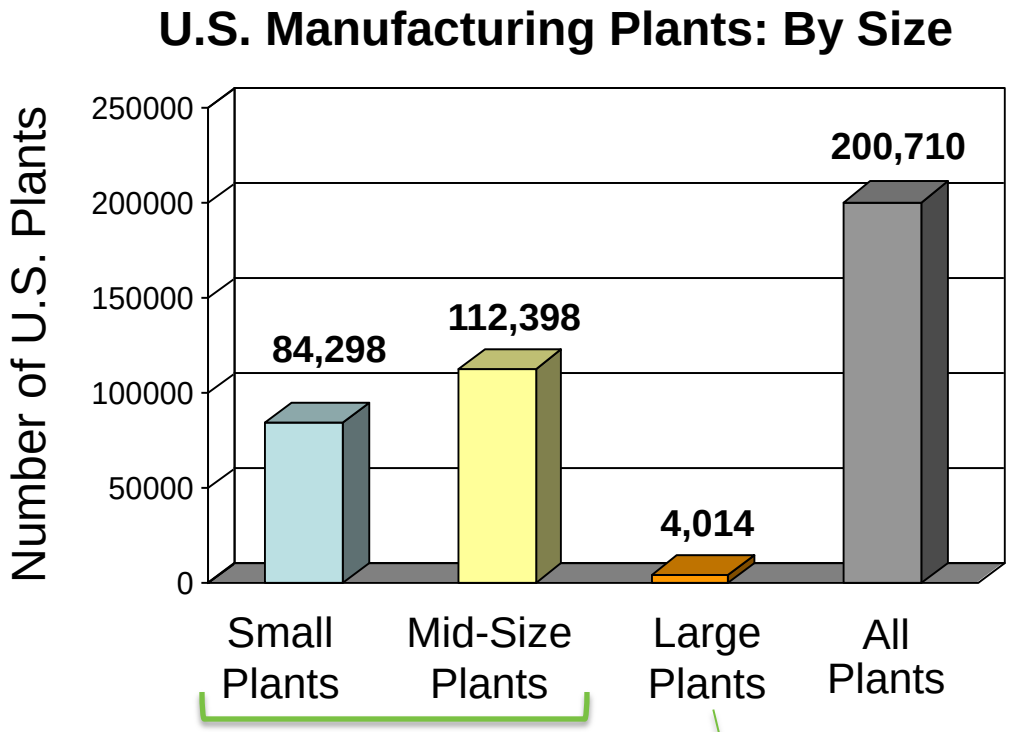
OAK RIDGE National Laboratory

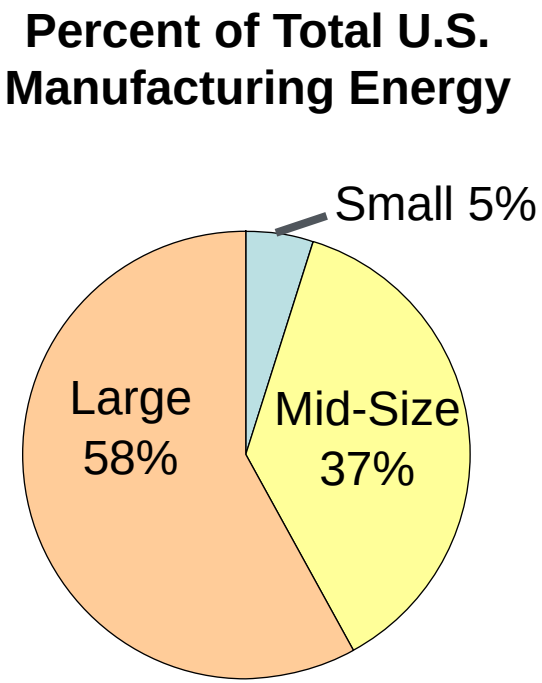
Key Energy-Saving Activities for Small and Medium Sized Facilities

Thomas Wenning
Oak Ridge National Laboratory

Tuesday Webcast for Industry
January 10, 2012

Industry Breakdown





Crosscutting Assessments

System-Specific Assessments

Plant Energy (Size) based Approach

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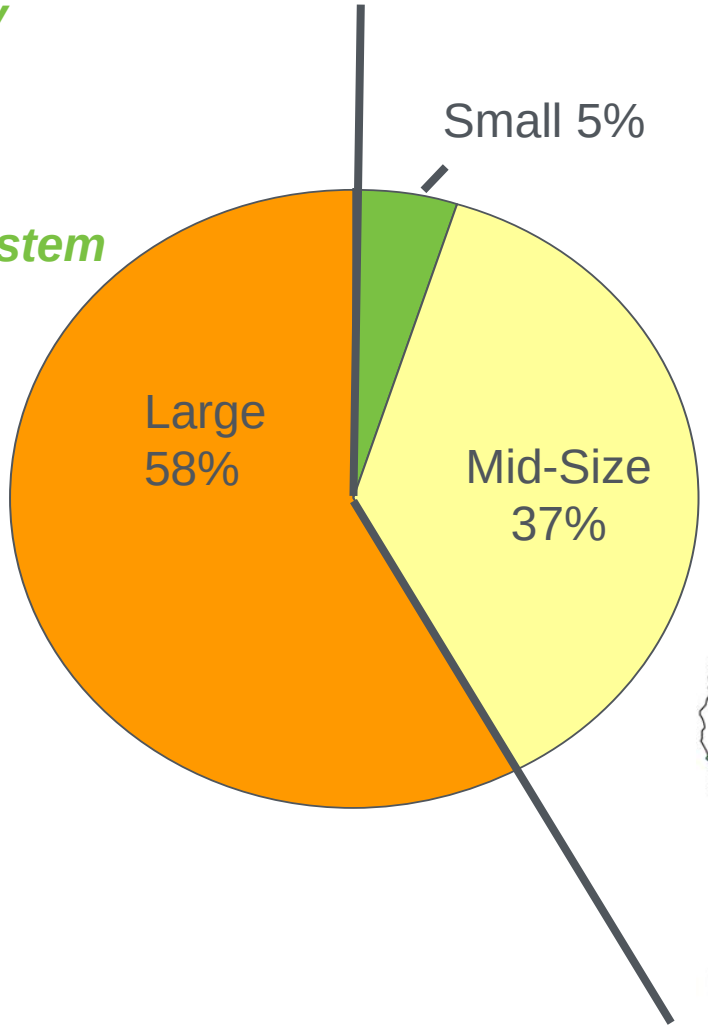
4,014 large plants use 58% of the energy

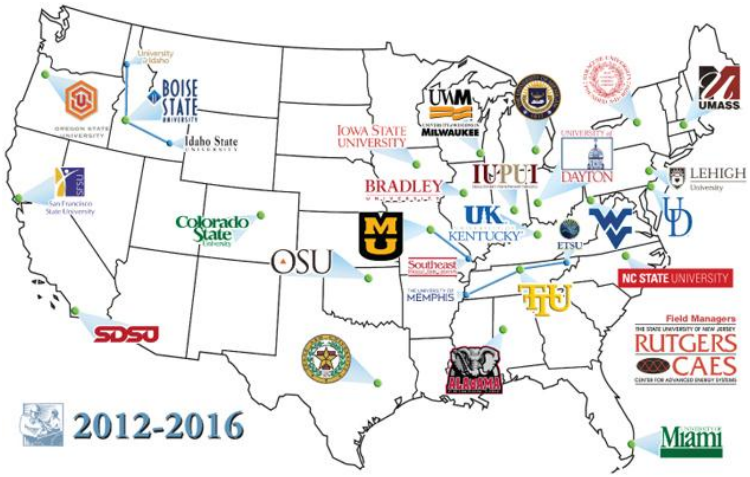
196,696 small and mid-sized plants use 42%



Energy Saving Assessments (System focused)

Industrial Assessment Centers (IAC)

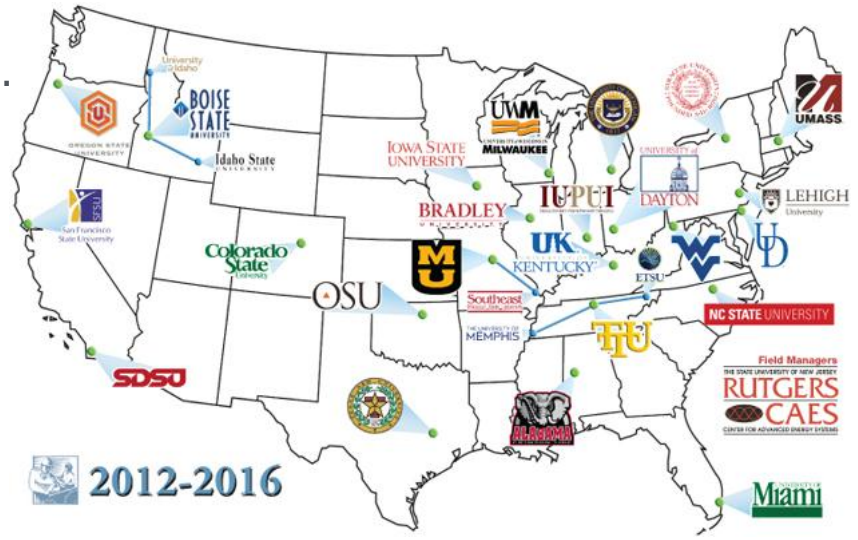
Cross-Cutting Energy Assessments



Industrial Assessment Centers

DOE's 24 University-based Industrial Assessment Centers (IACs)

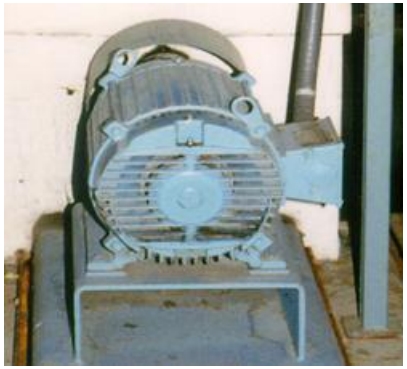
- Provides 1-day no-cost assessments to small and medium-size plants (energy costs below $3 million per year)
  - Identifies $175,000 to $200,000 in potential annual energy savings per plant, with an average implementation rate of 35 to 45%
- Trains engineering students for careers in industrial energy efficiency
- Helps university professors stay connected to the technical needs in manufacturing
- Maintains database of recommendations to help other facilities identify opportunities.



The Systems Approach

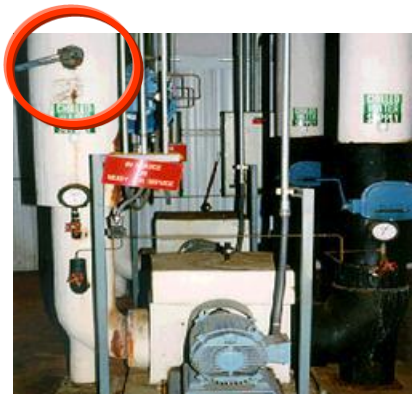
Key to cost-effective plant utility system operations and maintenance

- Pay attention to the system as a whole, not just to individual pieces of equipment
- Analyze both the supply and demand sides of systems and how they interact



15 kW motor efficiency = 91%

Combined motor & pump efficiency = 59%

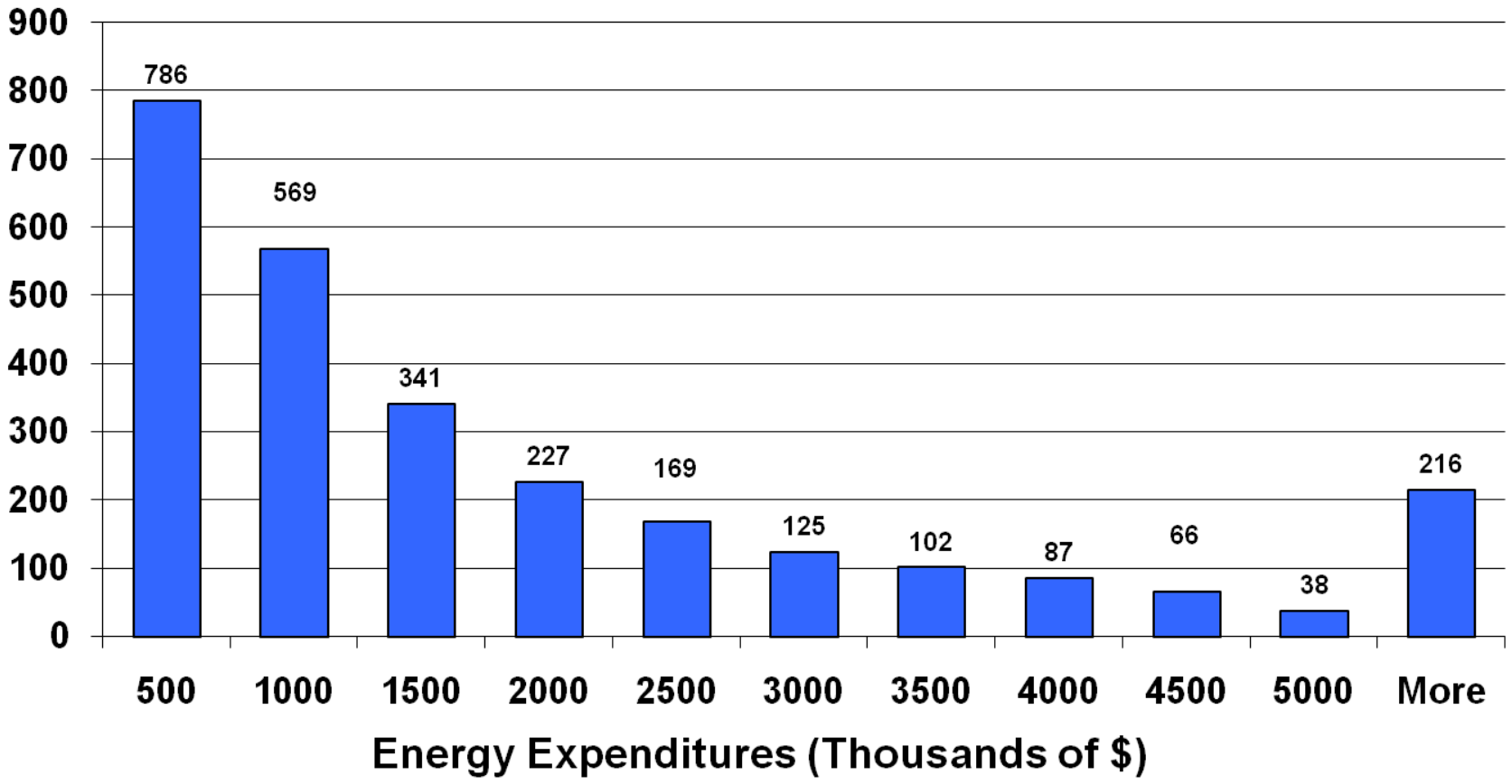


System efficiency = 13%

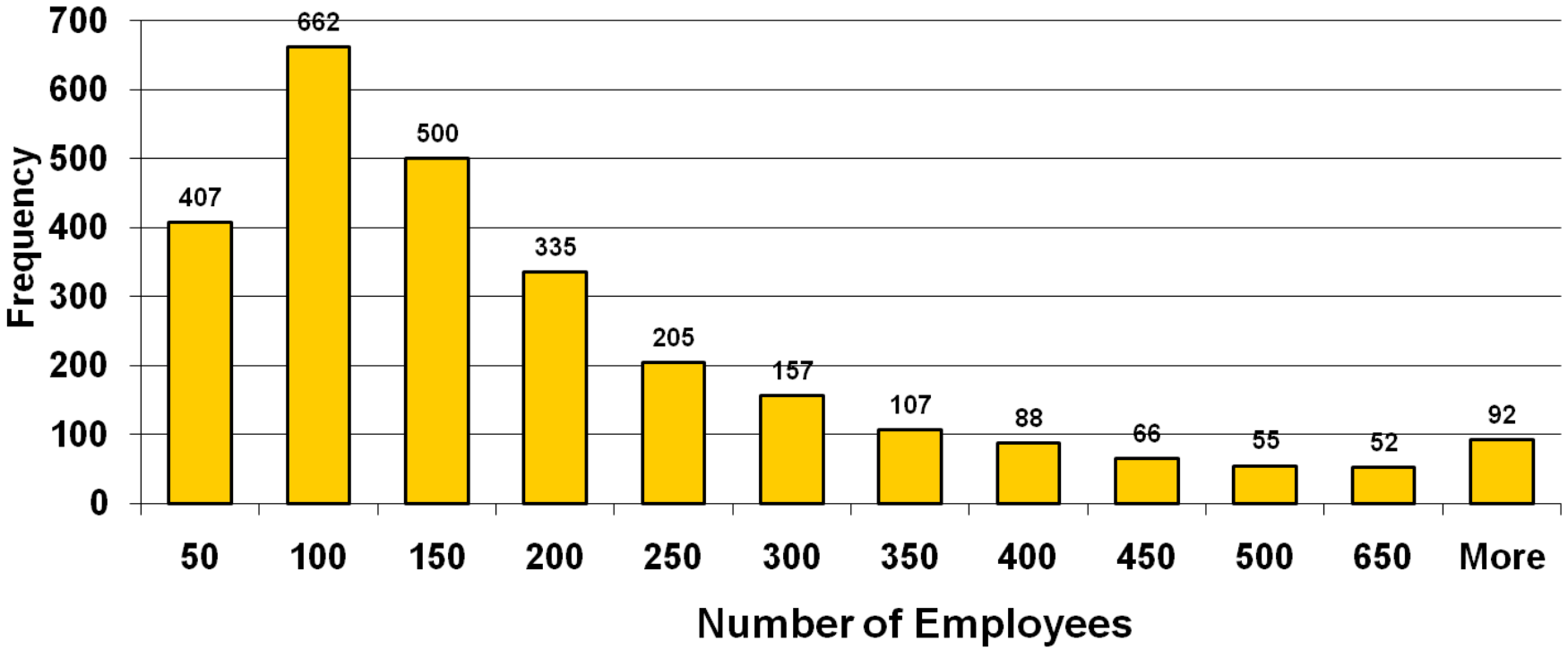
Assessment Components

- Client Solicitation
- Pre-visit preparation
  - Pre-assessment data collection
- Intake interview
- Plant Tour
- Recommendation brainstorming
- Onsite Data Collection
- Exit Interview
- Post Assessment Report Workup
- Review of assessment impact
  - Implementation callback (about 1 year after plant visit)

Client Profile Last Five Years: Annual Energy Expenditures



Client Profile Last Five Years: Number of Employees



IAC Online Assessment Database

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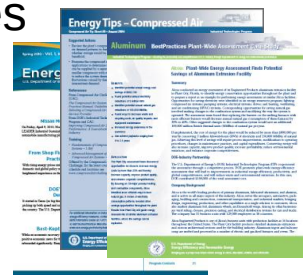
Industrial Assessmer Center Knowledge Base Website

IAC

IAC Results Databases

Energy Manuals

Best Practices & Success Stories

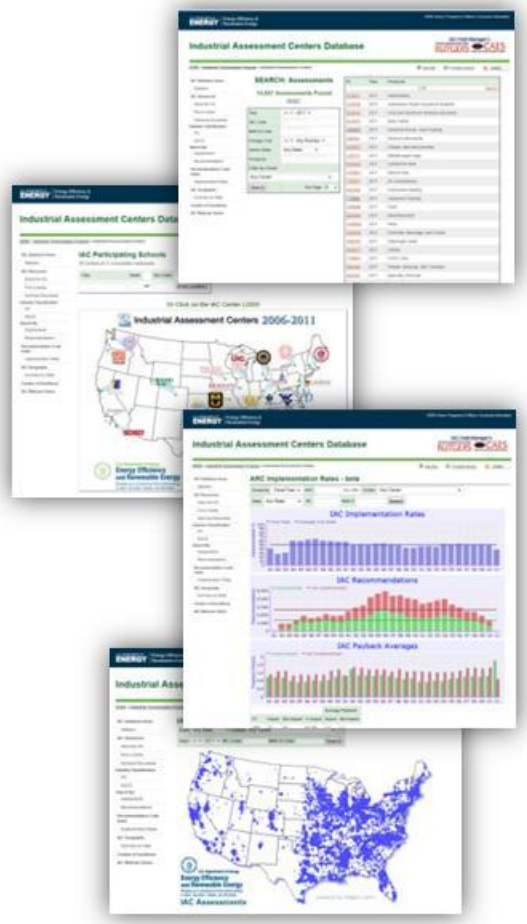


Software Tools & Templates

Training Modules & Curricula

IAC Online Database System

- Collection of publicly available assessment and recommendation data
- Contains ~15,000 Assessments
- Access to:
  - Assessments results
  - Energy and cost savings by recommendation
  - Recommendation statistics
  - Case studies
  - Technical documents



http://iac.rutgers.edu/database/

Industrial Assessment Center (IAC) Results

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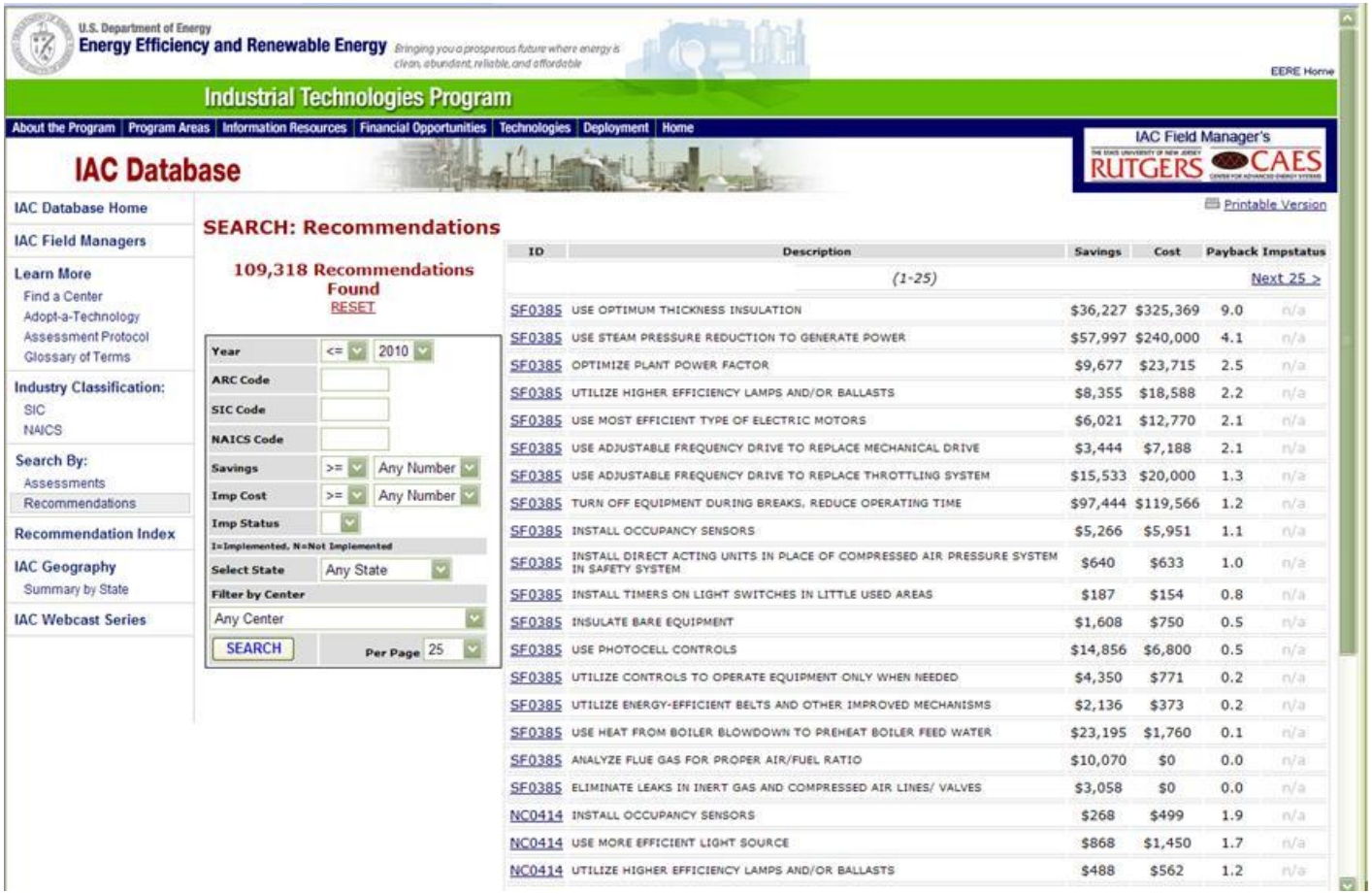
The complete results – recommendations and implementations are maintained in an online database at Rutgers University

http://iac.rutgers.edu/database/recommendations/



Top 10 IAC Recommendations

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	Description	Times Received	Average Savings	Average Cost	Average Payback	Implementation Rate
1.	Apply a Protective Coating to Racks and Tanks	5	$2,660	$24	0.0	100.00%
2.	Establish a Predictive Maintenance Program	99	$8,383	$1,426	0.4	95.51%
3.	Use Counter-current Rinsing to Reduce Rinse Water Volume (Gravure)	7	$6,859	$13,203	3.5	85.71%
4.	Keep Equipment Clean	28	$18,932	$11,920	0.4	82.61%
5.	Repair and Eliminate Steam Leaks	294	$103,031	$8,729	0.4	82.25%
6.	Eliminate Leaks in Inert Gas and Compressed Air Lines/ Valves	6,930	$5,889	$1,411	0.4	81.65%
7.	Repair Leaks in Lines and Valves	416	$11,709	$1,928	0.3	81.59%
8.	Repair or Replace Steam Traps	280	$39,212	$7,471	0.4	78.49%
9.	Maintain Machines with to Reduce Leaks	38	$10,950	$2,809	0.3	77.14%
10.	Eliminate Leaks in Water Lines and Valves	154	$5,375	$4,103	1.8	76.03%

http://iac.rutgers.edu/database/topten/

ARC Implementation Rates

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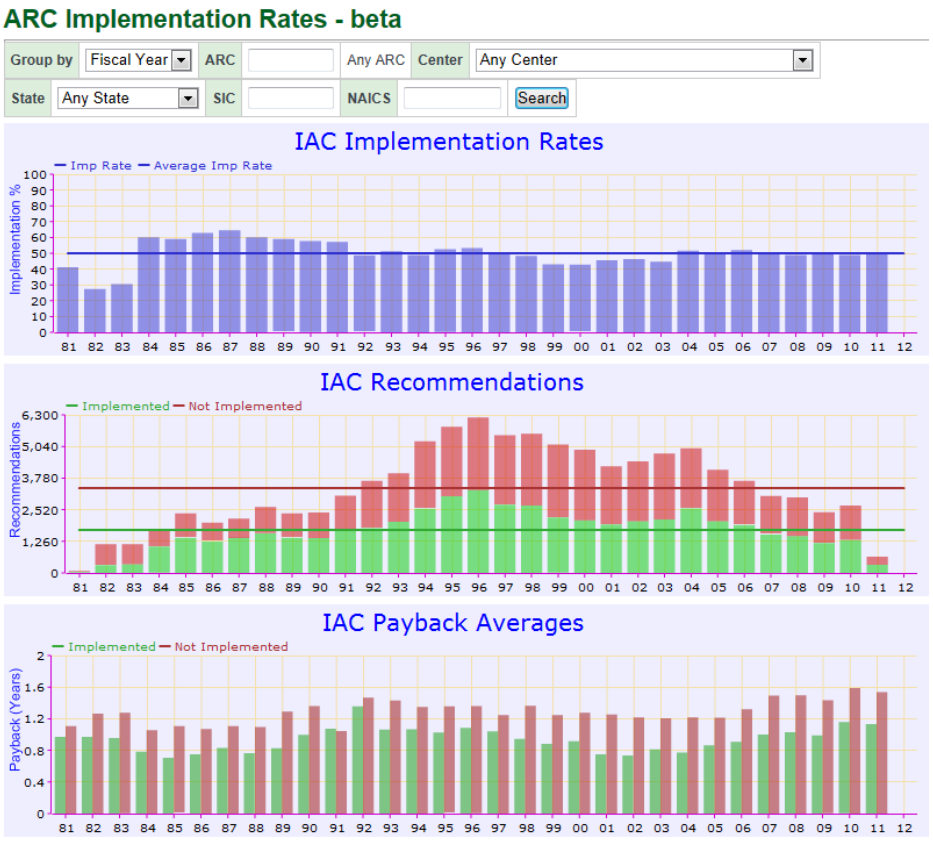

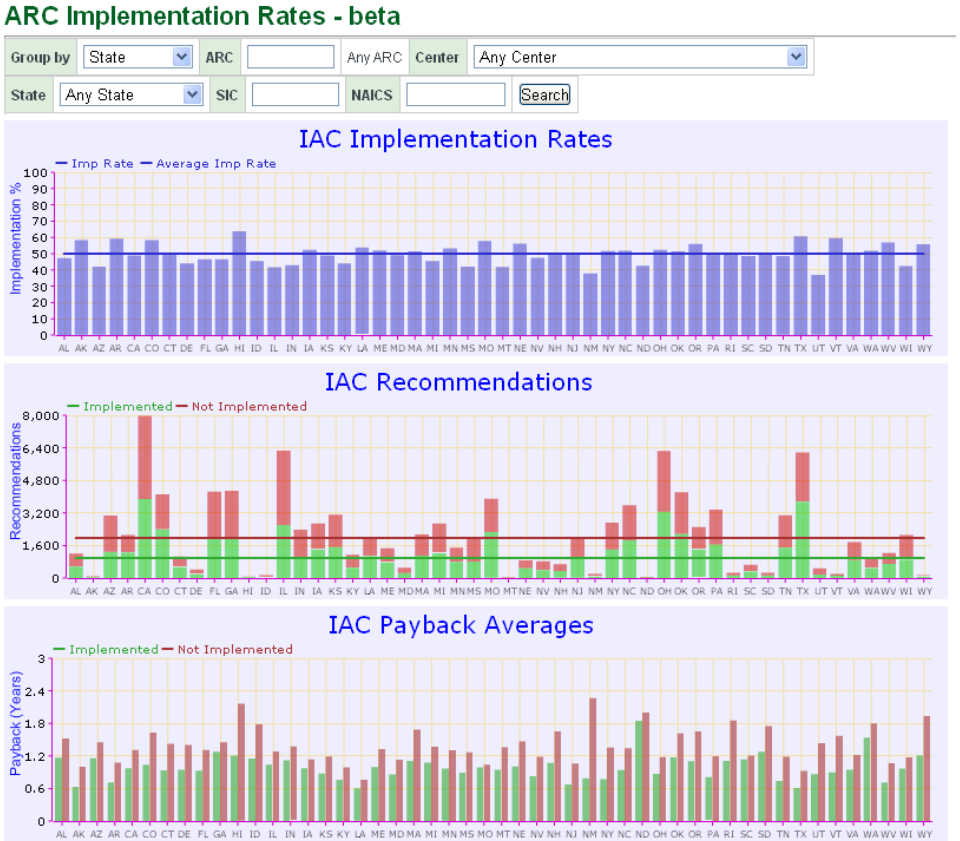

http://iac.rutgers.edu/database/arcImpRate/

Low-hanging Fruit Opportunities

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In addition to the Top 10 IAC recommendations, plant personnel can take several steps to reduce their industrial energy intensity and save money. System-specific tips include:

Combustion	Steam	Process Heating
1. Operate furnaces and boilers at or close to design capacity 2. Reduce excess air used for combustion 3. Clean heat transfer surfaces 4. Reduce radiation losses from openings 5. Use proper furnace or boiler insulation to reduce wall heat losses 6. Adequately insulate air or water-cooled surfaces exposed to the furnace environment and steam lines leaving the boiler	1. Improve water treatment to minimize boiler blow down 2. Optimize de-aerator vent rate 3. Repair steam leaks 4. Implement effective steam trap maintenance program 5. Use high-pressure condensate to make low pressure steam 6. Utilize backpressure turbine instead of pressure-reducing or release valves 7. Optimize condensate recovery	1. Minimize air leakage into the furnace by sealing openings 2. Maintain proper, slightly positive furnace pressure 3. Reduce weight of or eliminate material handling fixtures 4. Modify the furnace system or use a separate heating system to recover furnace exhaust gas heat 5. Recover part of the furnace exhaust heat for use in lower-temperature processes

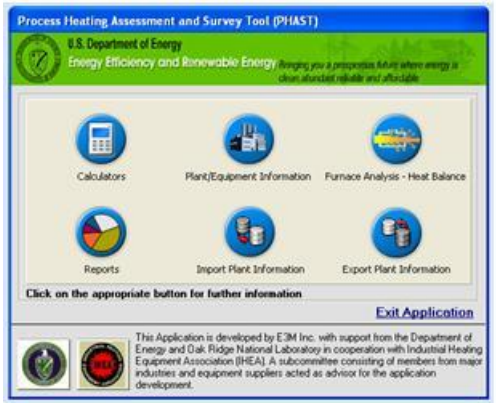
Additional Energy-Saving Opportunities

Lighting	HVAC	Water
1. Upgrade exit signs to LED 2. Replace older T12 fluorescent lamps with “super” T8 lamps and high efficiency electronic ballasts 3. Consider using daylighting sensors	1. Inspect ducts and pipe insulation for damage and repair/replace as needed 2. Clean heat transfer coils on chillers, heat pumps, and air conditioners 3. Replace air filters and dampers 4. Repair boiler steam traps and clean boiler tubs	1. Install insulation around domestic hot water tanks and pipes 2. Consider using heat exchangers to capture heat from hot wastewater

Tools for Any Approach

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Scope	Tools
Plant-wide	Industrial Facilities Scorecard Quick Plant Energy Profiler/Integrated Tool Suite (QuickPEP) IAC Database
Steam	Steam System Scoping Tool Steam System Assessment Tool 3E Plus
Process-heating	Combined Heat and Power Application Tool NOx and Energy Assessment Tool Process Heating and Survey Assessment Tool (PHAST)
Motor-Driven	AirMaster+ Fan System Assessment Tool MotorMaster+ Chilled Water System Analysis Tool Pumping System Assessment Tool
Data Centers	DC Pro Software Tool Suite



http://www1.eere.energy.gov/industry/bestpractices/software.html

Additional Resources

— Cross-cutting
- Steam systems
- Process heating systems
- Compressed air systems
- Electric motor systems
- Fan and pumping systems
- Lighting systems

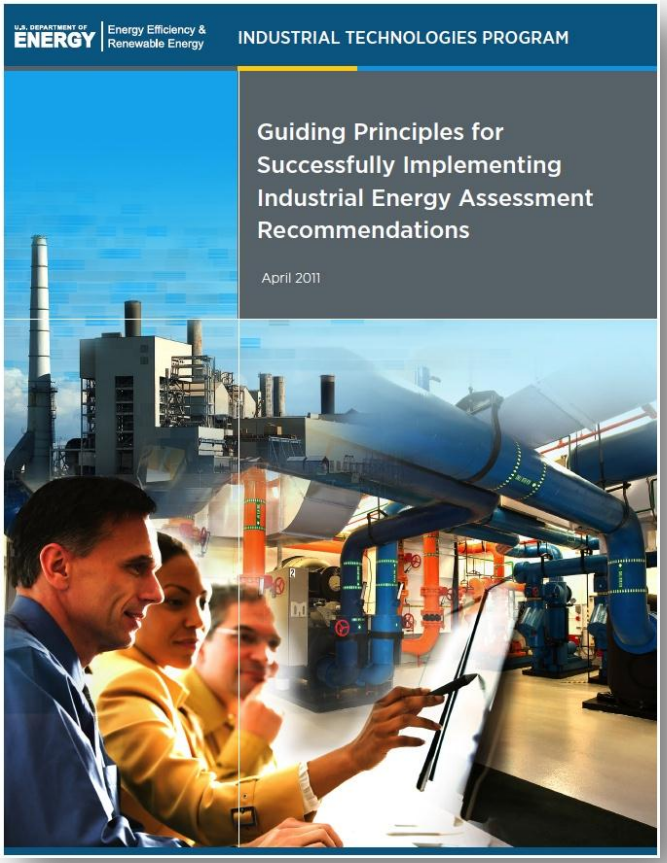
— Sector-specific
- US DOE Advanced Manufacturing Office resources
- US EPA ENERGY STAR energy efficiency guidebooks
- EU Best Available Technology reference documents

Implementation Guide Overview

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Guiding Principles for Successfully Implementing Industrial Energy Assessment Recommendations

- Recent resource for industry
- Identifies key principles and actions that lead to successful implementation of energy assessment recommendations
- Connects readers with a variety of trusted resources
- Simple tools for supporting energy management programs and continuous energy performance improvement efforts



Utilizing the Guidebook

Value-Added Content

- Not a how-to guidebook, but a clear, simple, and concise description of the key principles
- Based on actions that have achieved satisfactory implementation results in real applications
- Identifies actions for each stage of the assessment process

Benefits

- Save money and reduce energy consumption
- Increase your company's bottom line
- Promote culture change to make energy efficiency an ongoing priority in the plant

The guide is available for download from AMO's Website:
http://www.eere.energy.gov/industry/pdfs/implementation_guidebook.pdf

Thank You!

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wenningtj@ornl.gov
Ph: 865 - 241- 8676

Briggs & Stratton

Sustainable Energy Efficiency

Richard Feustel

Corporate Energy Manager

Briggs & Stratton

- World's largest producer of gasoline engines for outdoor power equipment.
- North America's number one manufacturer of portable generators and pressure washers.
- Leading designer, manufacturer and marketer of lawn and garden and turf care through our Simplicity®, Snapper®, Ferris® and Murray® brands.
- Briggs & Stratton products are designed, manufactured, marketed and serviced in over 100 countries on six continents.
- We employ 6,700 employees worldwide, 5,718 US employees
- **90% of the products** we manufacture are **Made in the USA** of US and global parts
- In Fiscal 2011, the Company reported sales of $2.1 billion (NYSE: BGG)

Manufacturing Facilities

Auburn, AL
Statesboro, GA
McDonough, GA
Murray, KY
Poplar Bluff, MO
Milwaukee, WI
Munnsville, NY
Newbern, TN
Ostrova, Czech Republic
Chongqing, China
Sydney, Australia

Customers

THE HOME DEPOT

LOWE'S Home Improvement Warehouse

SEARS

WAL★MART

TSC TRACTOR SUPPLY CO

ACE Hardware

TRU★SERV™

MENARDS®

MTD For A Growing World.™

Blain's FARM & FLEET

More than 15,000 Authorized B&S Dealers

Products

Engine Power Products

Power Products

Brands

ENGINES MATTER

That's why 8 out of 10 leading brands choose ours.

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Why Energy Matters?

- Responding to our customers
- We spend $20,000,000 a year on energy.
- Energy prices have been and will continue to go up.
- Most importantly, Efficiency and Value Creation are core strategies at B&S.

B&S Energy Intensive Processes

- Aluminum Melting / Heat Treat
- HVAC (A/C in southern plants)
- Paint Ovens

Key Energy Saving Activities at Briggs & Stratton

1. **Energy Teams**
2. **Goals**
3. **Project Approval Process**
4. **Energy Projects**
   - Renewable and Capital Projects
   - Low-Hanging Fruit
5. **Sustainability**

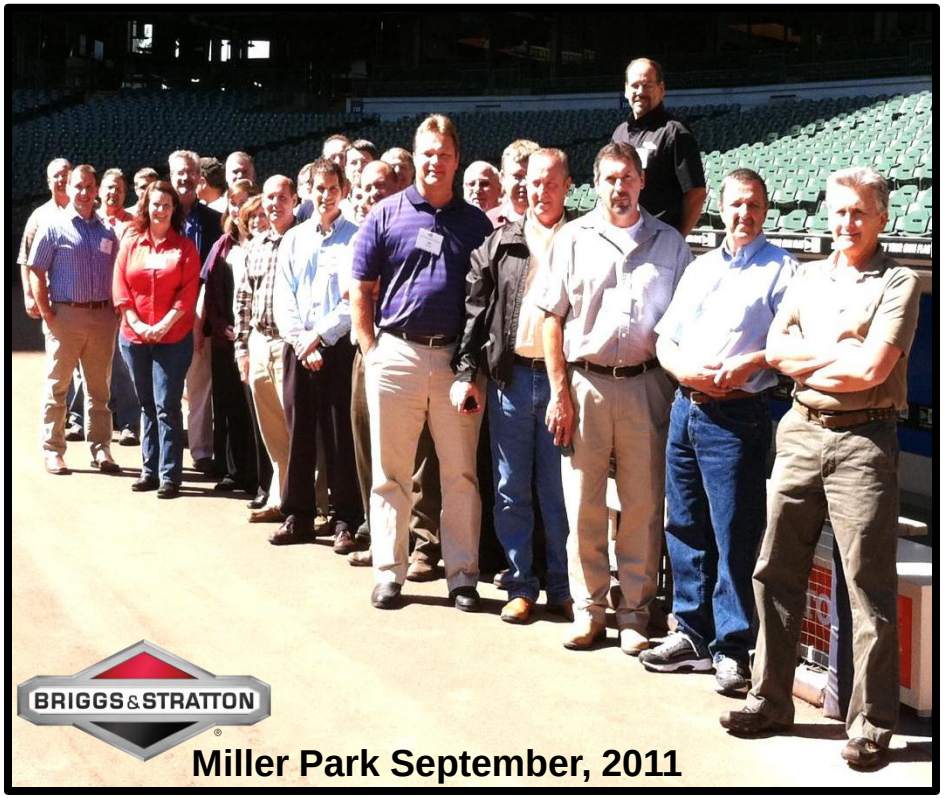
Energy Teams

- Corporate Energy Manager
- Corporate Environmental Department
- Facilities
  - Plant Manager
  - Designated Facility Energy Leader
  - Various team members
- Corporate-wide Monthly Meetings
- Annual report out to Sr. Executive Management

B&S Energy Team

- **Corporate-wide Monthly Meetings**
  - Facility Updates
  - Best Practices
  - New Ideas
  - Training

- **Benchmarked – Top 4%**
  - 2008 ★★
  - 2009 ★★★
  - 2011 ★★★★



Energy Policy and Goal

- Signed Energy Policy in 2009, incorporated into Employee Business Integrity Program
- First Sustainability Report published July 2009
- Tracking and publishing energy related metrics according to the Global Reporting Initiative
- Save Energy Now LEADERS Pledge helped define our goal
- Projects and Opportunities define our savings

How to Achieve 25/10

ENERGY MANAGEMENT

- Inherent process efficiency
- Energy Management System
  - Sub-metering
  - Proactive Internet monitoring
- Re-commissioning

RENEWABLE SOURCES

- Rooftop solar electric systems
- Geothermal system
- Power Regeneration

PROJECTS

- Boilers, HVAC
- Aluminum Melting
- Power Regeneration
- Heat Recovery
- Lighting
- Compressed Air
  - Controls
  - System/Components

Energy Project Decision Making

- Facility Energy Teams develop and discuss efficiency projects throughout the year at monthly meetings.
- Energy Projects are viewed as any other cost reductions (lean manufacturing) and support our commitment to Sustainability.

Barriers to Efficiency Projects

- Global Economic Conditions
- Energy projects must compete with future product line enhancements including marketplace demands and environmental regulations
- Challenge to obtain internal budget commitment for large scale capital projects (> $500k) and a payback of > 24 months
- Advanced technology has unknown costs

The Best Renewable Energy

--- ENERGY EFFICIENCY ---

- Briggs & Stratton has saved
  $2,735,511 through energy efficiency

- *Upgrade to en*
- *Fix compresse*
- *Use LEDs for*
- *Upgrade furna*
- *oile*
- *ffic*
- *ble*
- *nufacturing process efficiency*
- *chronous belts*
- *ty air filters*
- *orrect wasteful operations*

Projects

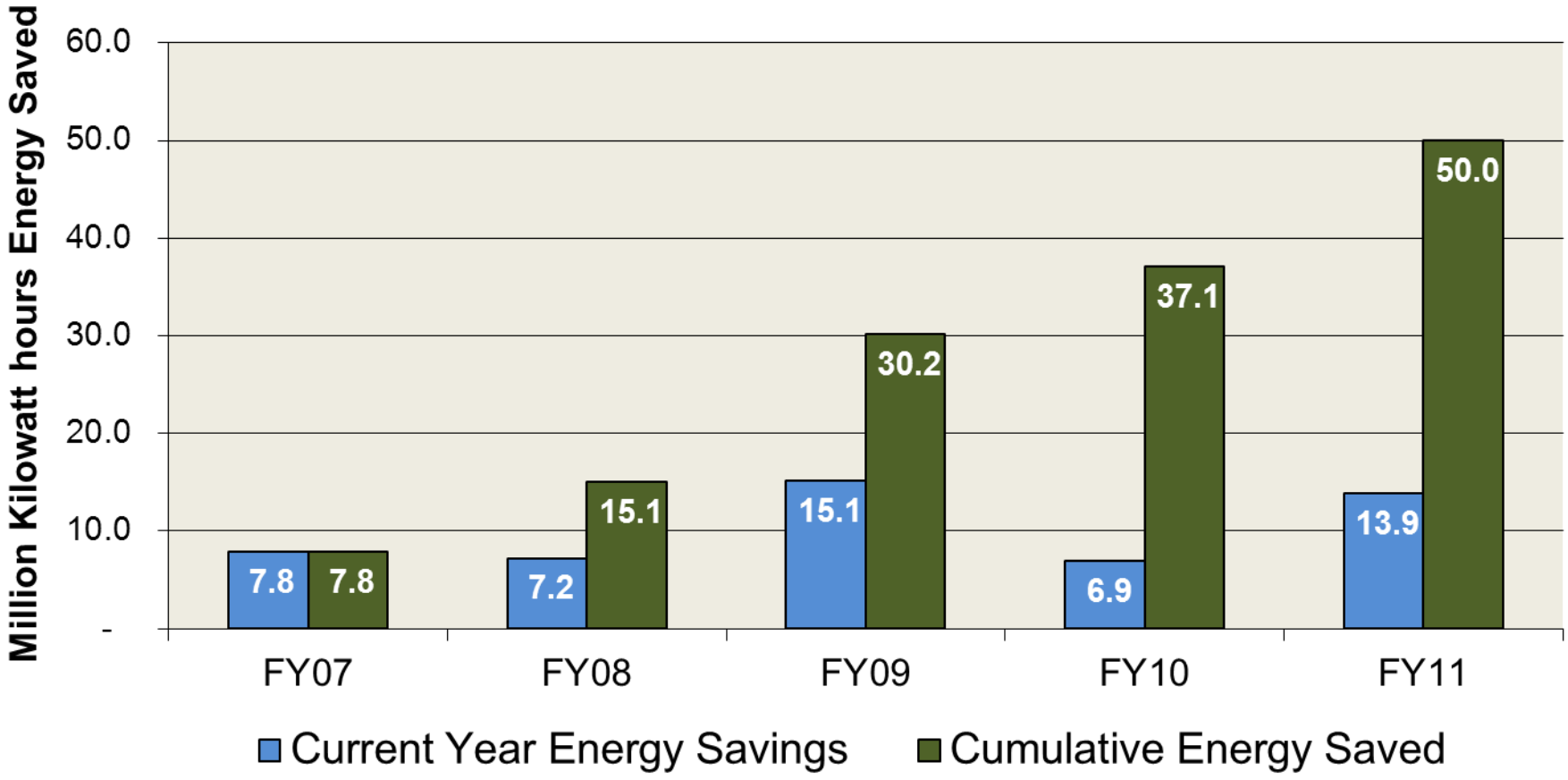
- Lighting Retrofits 16 facilities
  [$1,324,744 Savings] *($537,856 Grant)*
- R&D Engine Power Regeneration
  [$66,000 Savings] *($118,000 State Grant)*
- IT PC Power Management
  [$52,000 Savings]
- Compressor Exhaust Heat Recovery
  [$10,500 Savings]

FY11 Projects with DOE Support

- Milwaukee Steam and Heating System
  ($1,259,585 DOE Grant
  In progress - $910,000 savings)
- Compressed Air System Controls
  SENL Study generated saving ideas
  (In progress - $412,000 savings)
- Poplar Bluff, MO Furnace Damper Control *SENL Study generated saving ideas*
  (In progress - $386,000 savings)

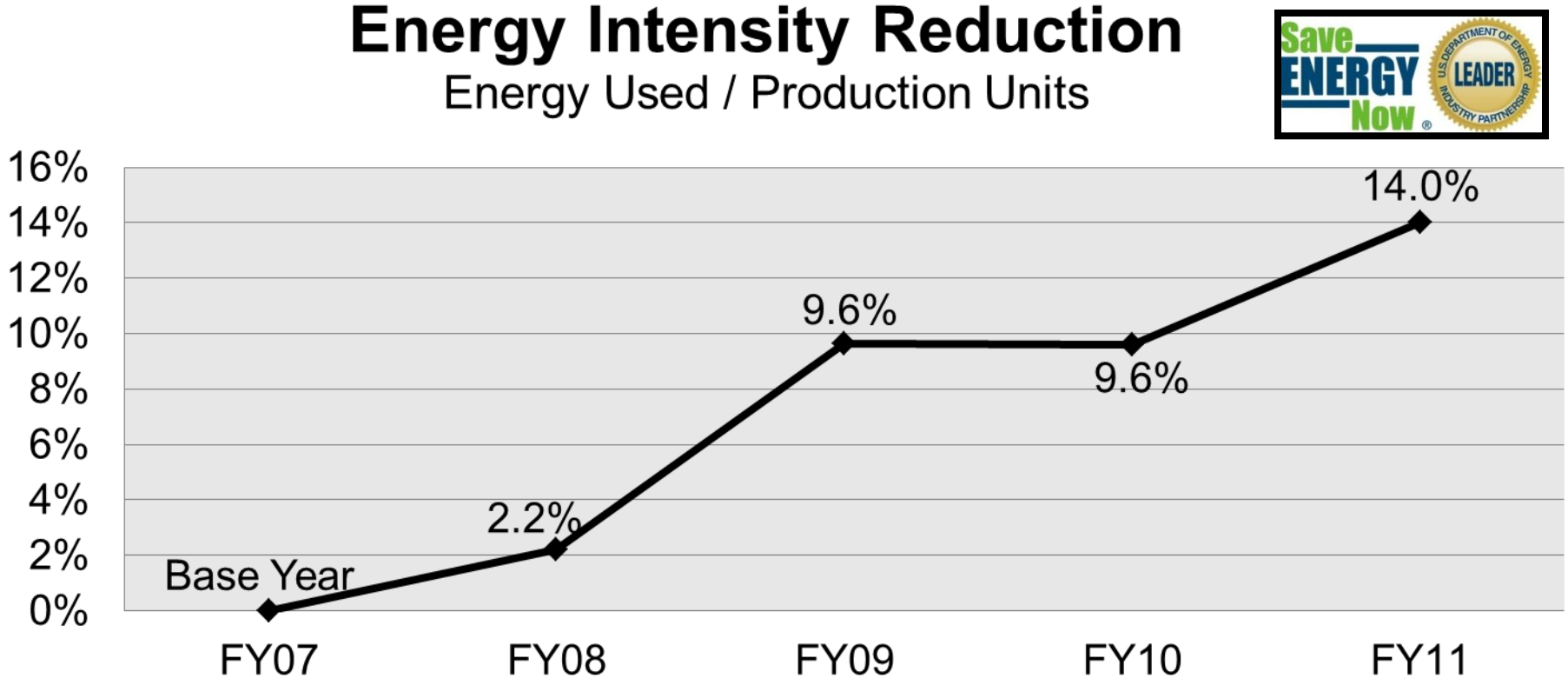
Murray

Energy Saved through B&S Energy Efficiency Measures



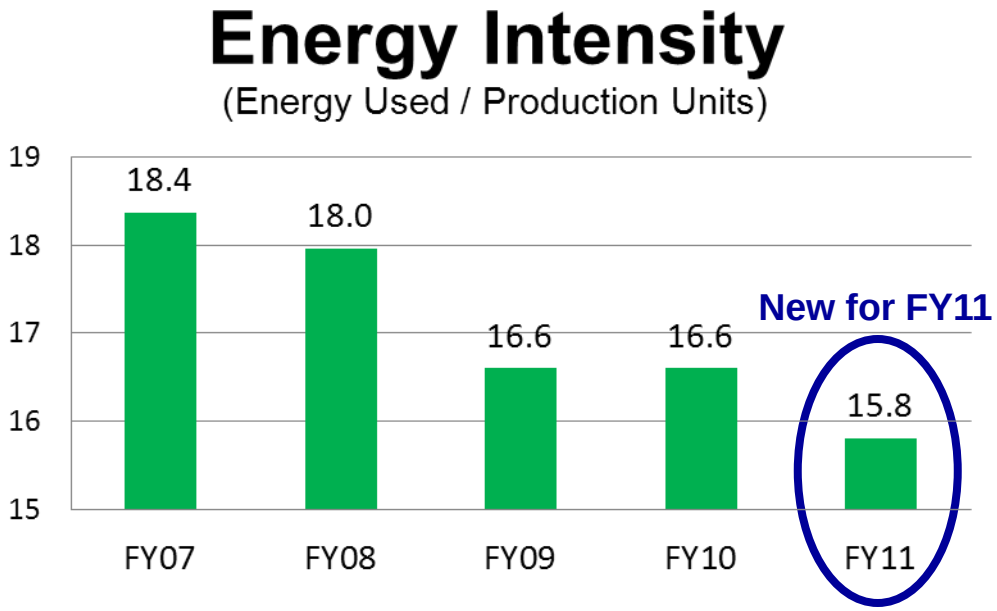
Energy Goal Progress

- **Goal:** 25% reduction in 10 years
- 14% energy intensity reduction since 2007



Sustainability

- 2nd Sustainability Report
  - http://www.basco.com/Sustainability/



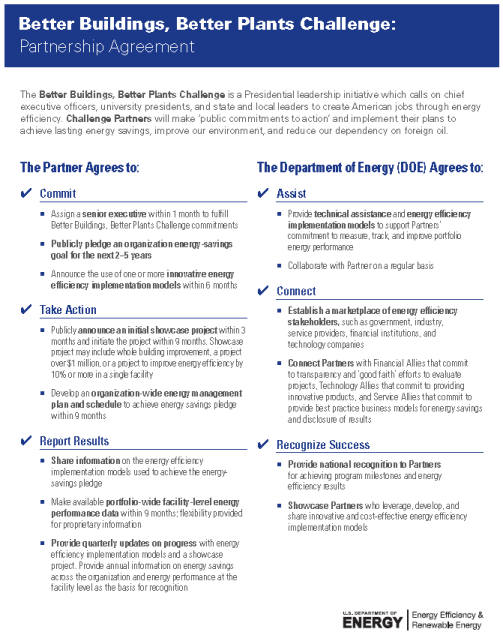
Implementing Lessons Learned at DOE INPLT Training Event

1. Asked for a voice at the Weekly Production Meeting.
2. Discussed the cost of compressed air.
3. Detailed our initial plan (leak detection, non-intrusive, required repair efforts from them).
4. These supervisors found two major improper uses that resulted in a savings of $23,500 with a payback of 7 months.

Neenah Foundry: June 28, 2011

Better Buildings - Better Plants

- President Obama/Clinton initiative - 9Dec11
- Resembles Save Energy Now LEADERS
- Do not be afraid of the “Challenge Requirements”
- BB Benefits
  1. Ongoing Technical Support
  2. Recognition
  3. Project Funding (Possibly)



Better Buildings, Better Plants Challenge:
Partnership Agreement

The **Better Buildings, Better Plants Challenge** is a Presidential leadership initiative which calls on chief executive officers, university presidents, and state and local leaders to create American jobs through energy efficiency. **Challenge Partners** will make 'public commitments to action' and implement their plans to achieve lasting energy savings, improve our environment, and reduce our dependency on foreign oil.

The Partner Agrees to:

✔ **Commit**
- Assign a **senior executive** within 1 month to fulfill Better Buildings, Better Plants Challenge commitments
- **Publicly pledge an organization energy-savings goal for the next 2–5 years**
- Announce the use of one or more **innovative energy efficiency implementation models** within 6 months

✔ **Take Action**
- Publicly **announce an initial showcase project** within 3 months and initiate the project within 9 months. Showcase project may include whole building improvement, a project over $1 million, or a project to improve energy efficiency by 10% or more in a single facility
- Develop an **organization-wide energy management plan and schedule** to achieve energy savings pledge within 9 months

✔ **Report Results**
- **Share information** on the energy efficiency implementation models used to achieve the energy-savings pledge
- Make available **portfolio-wide facility-level energy performance data** within 9 months; flexibility provided for proprietary information
- **Provide quarterly updates on progress** with energy efficiency implementation models and a showcase project. Provide annual information on energy savings across the organization and energy performance at the facility level as the basis for recognition

The Department of Energy (DOE) Agrees to:

✔ **Assist**
- Provide **technical assistance** and **energy efficiency implementation models** to support Partners' commitment to measure, track, and improve portfolio energy performance
- Collaborate with Partner on a regular basis

✔ **Connect**
- **Establish a marketplace of energy efficiency stakeholders,** such as government, industry, service providers, financial institutions, and technology companies
- **Connect Partners** with Financial Allies that commit to transparency and 'good faith' efforts to evaluate projects, Technology Allies that commit to providing innovative products, and Service Allies that commit to provide best practice business models for energy savings and disclosure of results

✔ **Recognize Success**
- **Provide national recognition to Partners** for achieving program milestones and energy efficiency results
- **Showcase Partners** who leverage, develop, and share innovative and cost-effective energy efficiency implementation models

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Recognized as an Energy Leader

- Awards, Organizations, Case Studies, Newspaper and Magazine Articles
- Provides Credibility = Trust for future projects
- Employees notice and make recommendations

Star of Energy Efficiency Award Recipient

Save ENERGY Now®

U.S. DEPARTMENT OF ENERGY INDUSTRY PARTNERSHIP LEADER

energy

ENERGY STAR PARTNER

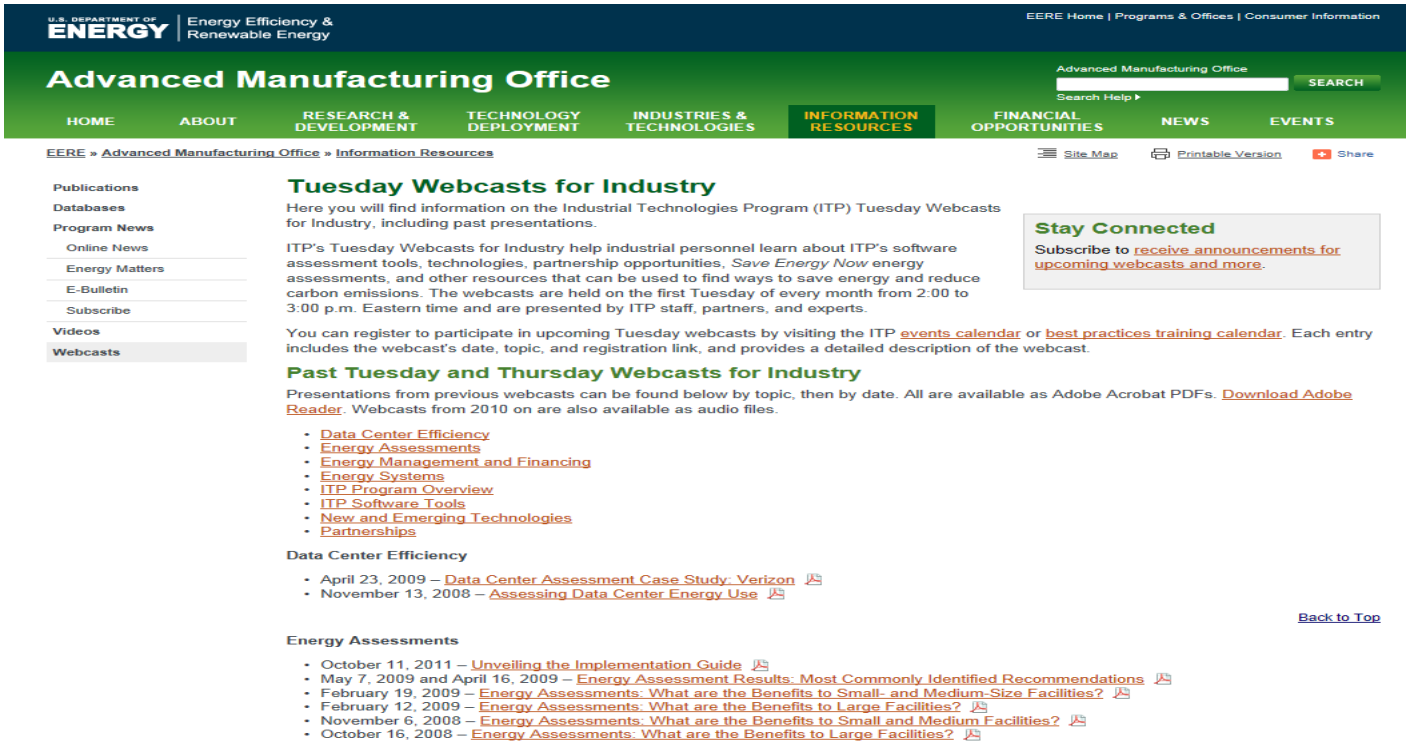
ALLIANCE TO SAVE ENERGY

Creating an Energy-Efficient World

THE POWER WITHIN™

Richard Feustel
Feustel.Richard@basco.com
414-259-5881

Slides from Previous Webcasts



To access the slides from this and previous Webcasts, please visit:
http://www1.eere.energy.gov/industry/resources/tuesday_webcasts.html

Next Month's Webcast

Please join us for our next Webcast.

Topic: Advanced Manufacturing Partnership

Date and Time: Tuesday, February 14 at 11:00 a.m. PST/2:00 p.m. EST

To Register: https://www1.gotomeeting.com/register/560613344