

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

January 10, 2012

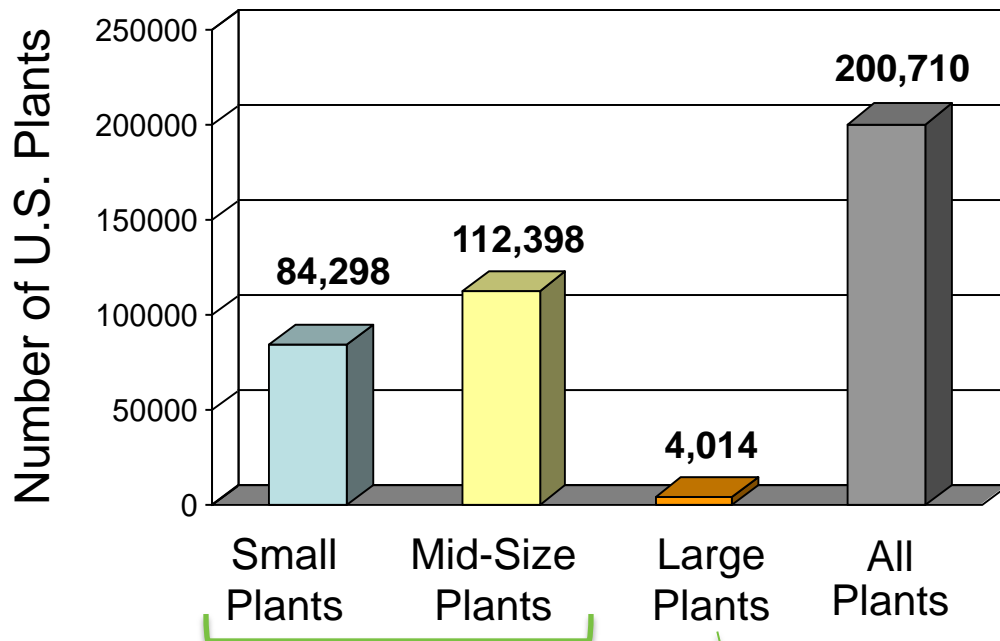
Key Energy-Saving Activities for Small and Medium Sized Facilities



Thomas Wenning
Oak Ridge National Laboratory

Tuesday Webcast for
Industry
January 10, 2012

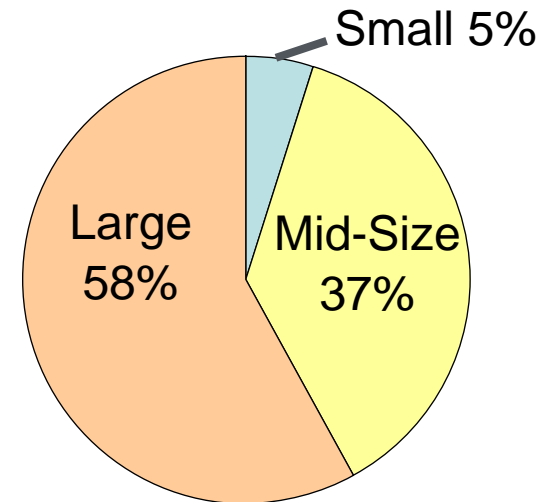
U.S. Manufacturing Plants: By Size



Crosscutting Assessments

System-Specific Assessments

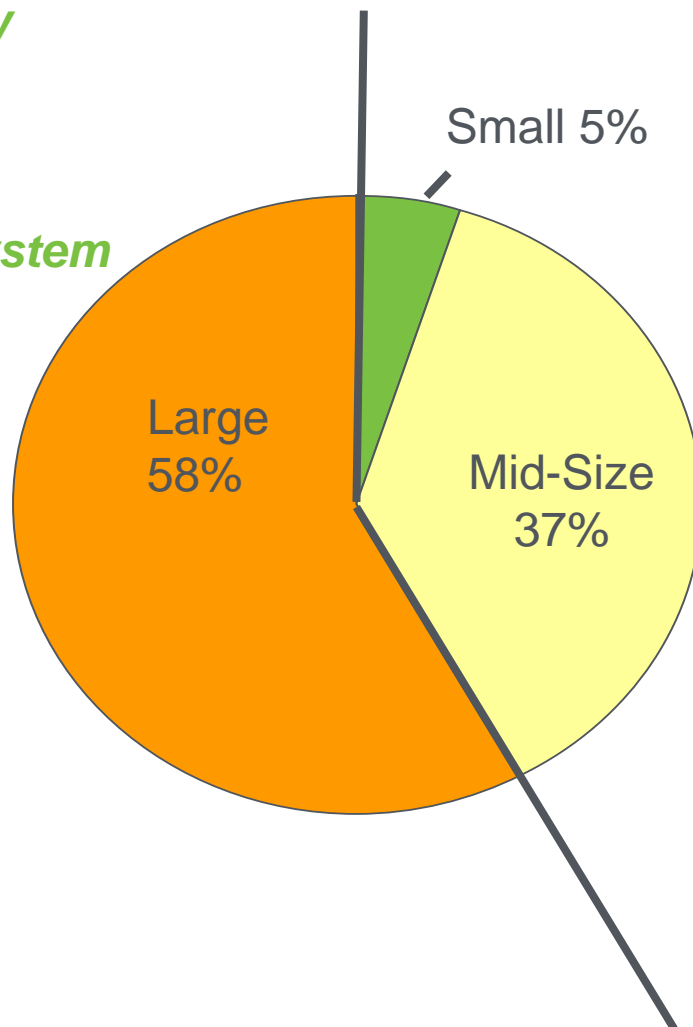
Percent of Total U.S. Manufacturing Energy



Plant Energy (Size) based Approach

*4,014 large plants use
58% of the energy*

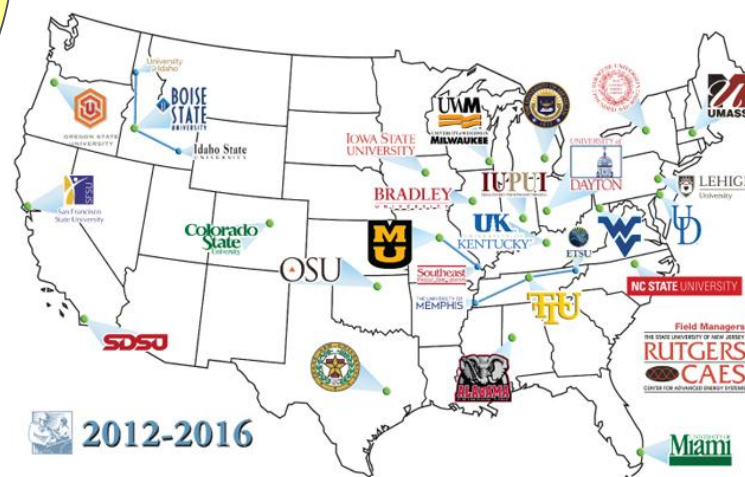
*Energy Saving
Assessments (System
focused)*



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

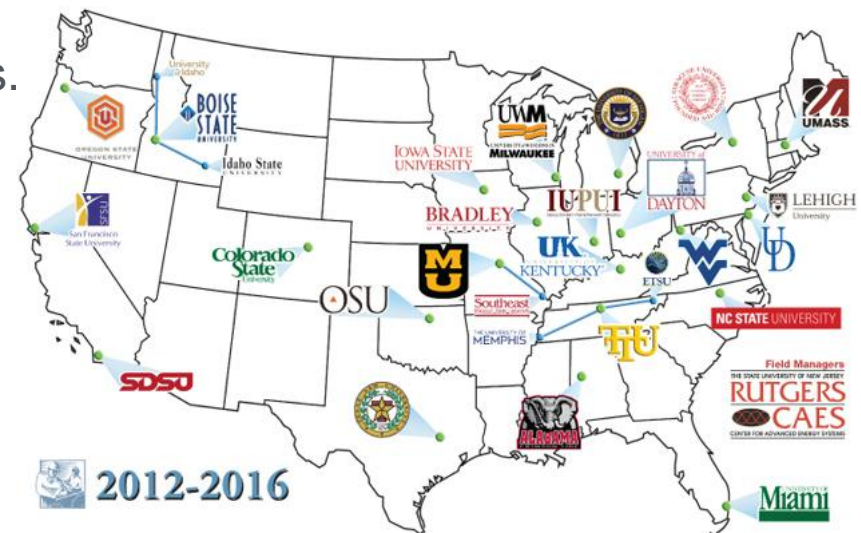
*Industrial Assessment
Centers (IAC)*

*Cross-Cutting Energy
Assessments*



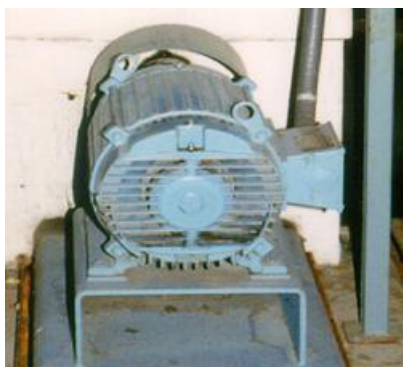
DOE's 24 University-based Industrial Assessment Centers (IACs)

- 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.



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%**

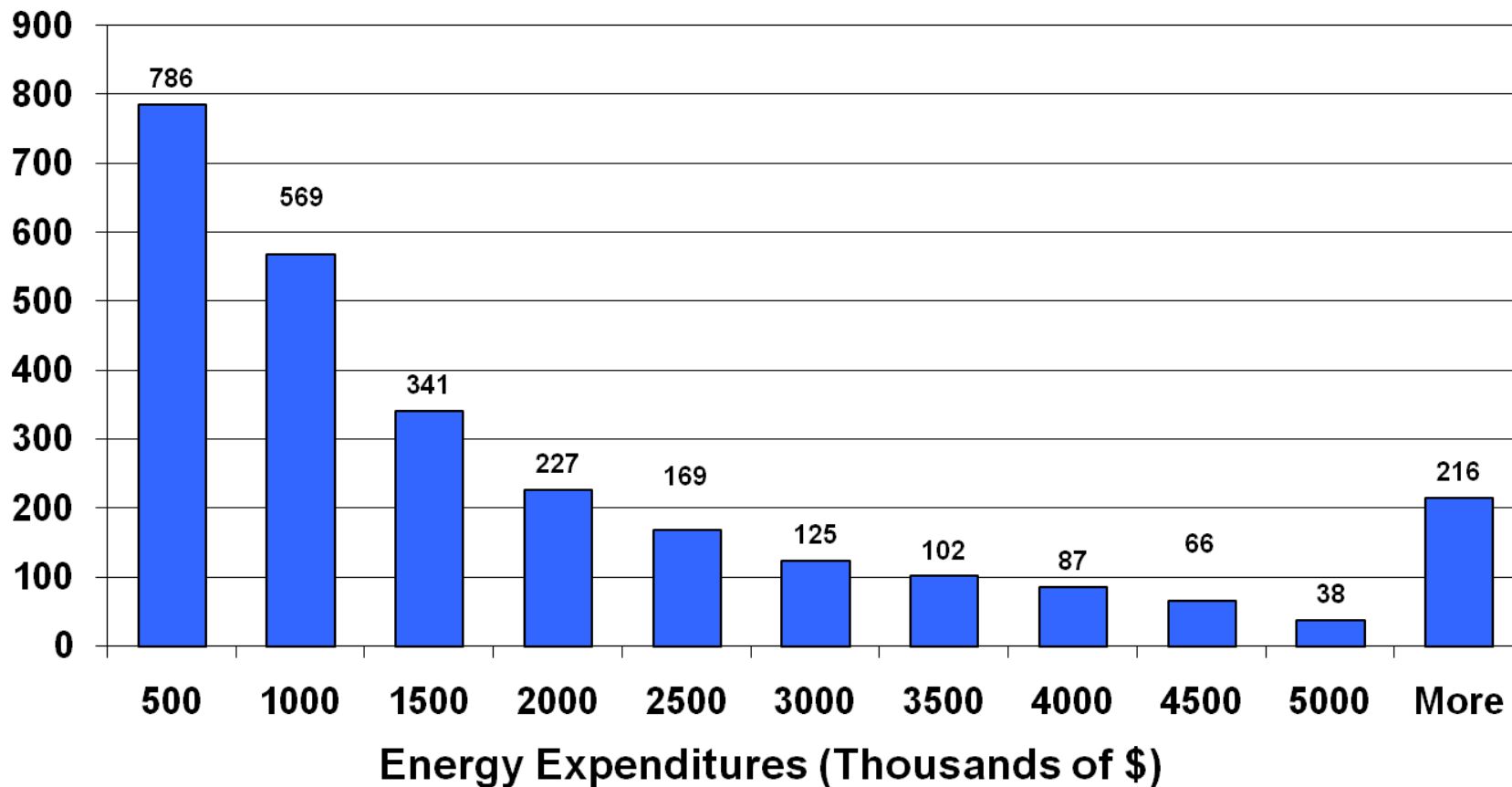


System efficiency = 13%

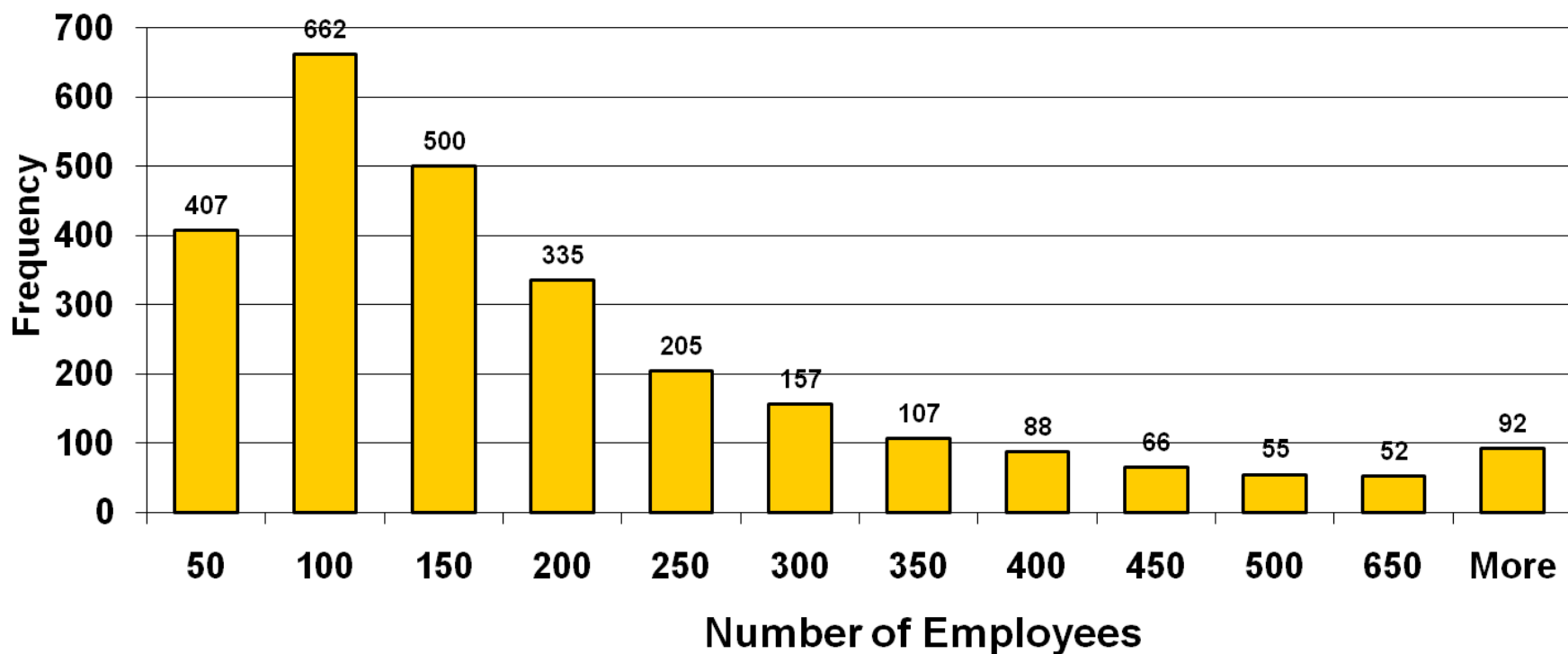
- Client Solicitation
- Pre-visit preparation
 - Pre-assessment data collection
- Intake interview
- Plant Tour
- Recommendation brainstorming
- Onsite Data Collection
- Exit Interview
- Post Assessment Report Workup
- Review of assessment impact
 - Implementation callback (about 1 year after plant visit)



Client Profile Last Five Years: Annual Energy Expenditures



Client Profile Last Five Years: Number of Employees



Industrial Assessment
Center Knowledge
Base Website



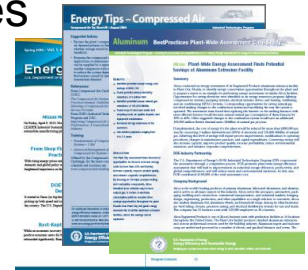
IAC Results Databases

Assessment Recommendation Code (2012)	Description	Hours Recommended	Average Savings	Payback Period (Years)	Implementation Rate	Help
2.2000 - 0000	Combustion Systems	6,420	\$21,431	1.2	45.40%	1000.000
2.2000 - 0000	Thermal Systems	15,113	\$18,090	1.3	40.66%	1000.000
2.2000 - 0000	Electrical Power	6,633	\$42,813	1.5	30.24%	1000.000
2.2000 - 0000	Motor Systems	20,927	\$5,686	1.1	53.96%	1000.000
2.2000 - 0000	Industrial Design	827	\$42,148	1.6	34.63%	1000.000
2.2000 - 0000	Operations	4,800	\$6,783	0.8	52.78%	1000.000
2.2000 - 0000	Building and Grounds	11,027	\$5,987	1.8	46.50%	1000.000
2.2000 - 0000	Inventory Costs	2,220	\$21,770	1.4	47.71%	1000.000
2.2000 - 0000	Alternative Energy Usage	161	\$128,628	0.6	5.00%	1000.000

Energy Manuals



Best Practices &
Success Stories



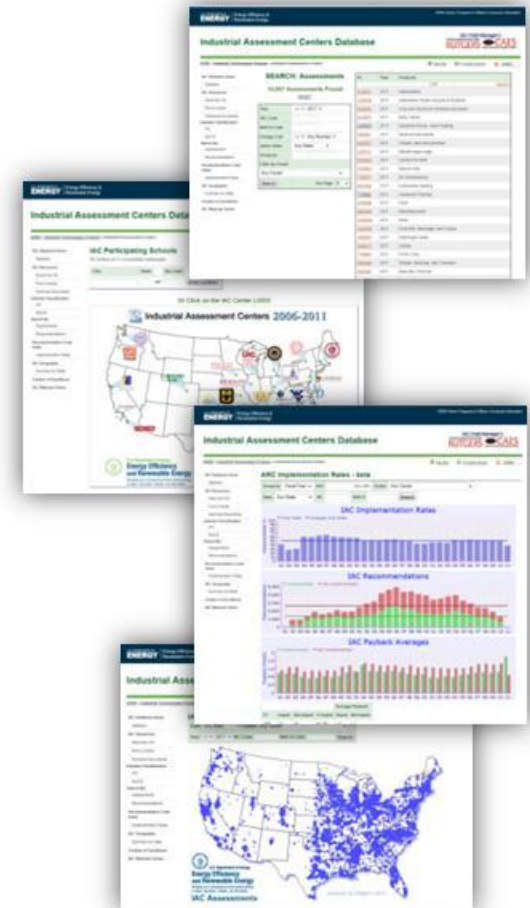
Software Tools
& Templates



Training Modules & Curricula



- 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

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

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

The screenshot displays the 'IAC Database' search interface. The page title is 'SEARCH: Recommendations' and it shows '109,318 Recommendations Found'. The search filters are set to Year: 2010, ARCC Code: (empty), SIC Code: (empty), NAICS Code: (empty), Savings: >= Any Number, Imp Cost: >= Any Number, and Imp Status: (empty). The results table lists various energy efficiency measures with columns for ID, Description, Savings, Cost, Payback, and Imp Status.

ID	Description	Savings	Cost	Payback	Imp Status
SF0385	USE OPTIMUM THICKNESS INSULATION	\$36,227	\$325,369	9.0	n/a
SF0385	USE STEAM PRESSURE REDUCTION TO GENERATE POWER	\$57,997	\$240,000	4.1	n/a
SF0385	OPTIMIZE PLANT POWER FACTOR	\$9,677	\$23,715	2.5	n/a
SF0385	UTILIZE HIGHER EFFICIENCY LAMPS AND/OR BALLASTS	\$8,355	\$18,588	2.2	n/a
SF0385	USE MOST EFFICIENT TYPE OF ELECTRIC MOTORS	\$6,021	\$12,770	2.1	n/a
SF0385	USE ADJUSTABLE FREQUENCY DRIVE TO REPLACE MECHANICAL DRIVE	\$3,444	\$7,188	2.1	n/a
SF0385	USE ADJUSTABLE FREQUENCY DRIVE TO REPLACE THROTTLING SYSTEM	\$15,533	\$20,000	1.3	n/a
SF0385	TURN OFF EQUIPMENT DURING BREAKS, REDUCE OPERATING TIME	\$97,444	\$119,566	1.2	n/a
SF0385	INSTALL OCCUPANCY SENSORS	\$5,266	\$5,951	1.1	n/a
SF0385	INSTALL DIRECT ACTING UNITS IN PLACE OF COMPRESSED AIR PRESSURE SYSTEM IN SAFETY SYSTEM	\$640	\$633	1.0	n/a
SF0385	INSTALL TIMERS ON LIGHT SWITCHES IN LITTLE USED AREAS	\$187	\$154	0.8	n/a
SF0385	INSULATE BARE EQUIPMENT	\$1,608	\$750	0.5	n/a
SF0385	USE PHOTOCELL CONTROLS	\$14,856	\$6,800	0.5	n/a
SF0385	UTILIZE CONTROLS TO OPERATE EQUIPMENT ONLY WHEN NEEDED	\$4,350	\$771	0.2	n/a
SF0385	UTILIZE ENERGY-EFFICIENT BELTS AND OTHER IMPROVED MECHANISMS	\$2,136	\$373	0.2	n/a
SF0385	USE HEAT FROM BOILER BLOWDOWN TO PREHEAT BOILER FEED WATER	\$23,195	\$1,760	0.1	n/a
SF0385	ANALYZE FLUE GAS FOR PROPER AIR/FUEL RATIO	\$10,070	\$0	0.0	n/a
SF0385	ELIMINATE LEAKS IN INERT GAS AND COMPRESSED AIR LINES/ VALVES	\$3,058	\$0	0.0	n/a
NC0414	INSTALL OCCUPANCY SENSORS	\$268	\$499	1.9	n/a
NC0414	USE MORE EFFICIENT LIGHT SOURCE	\$868	\$1,450	1.7	n/a
NC0414	UTILIZE HIGHER EFFICIENCY LAMPS AND/OR BALLASTS	\$488	\$562	1.2	n/a

Top 10 IAC Recommendations

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%

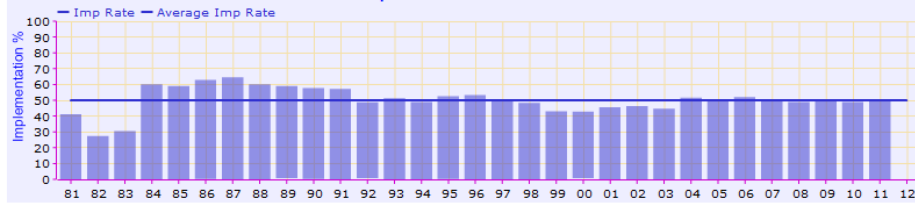
<http://iac.rutgers.edu/database/topten/>

ARC Implementation Rates

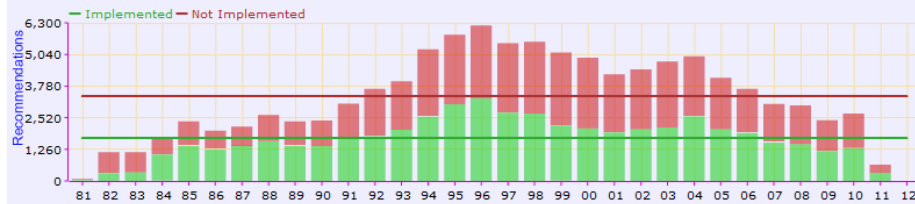
ARC Implementation Rates - beta

Group by: ARC: Any ARC Center:
 State: SIC: NAICS:

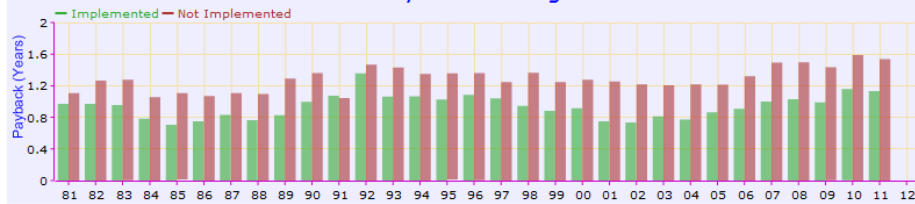
IAC Implementation Rates



IAC Recommendations



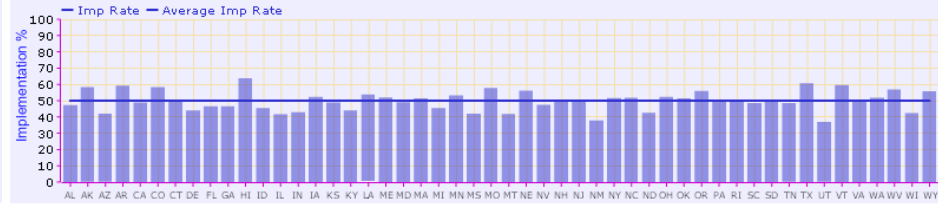
IAC Payback Averages



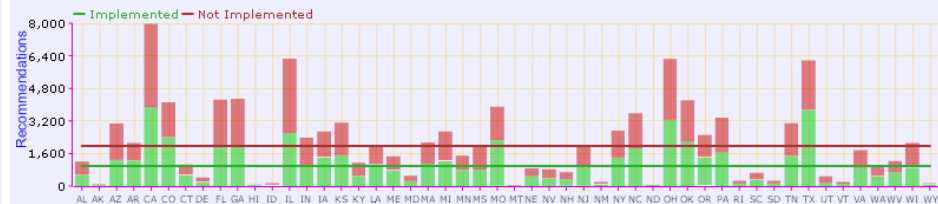
ARC Implementation Rates - beta

Group by: ARC: Any ARC Center:
 State: SIC: NAICS:

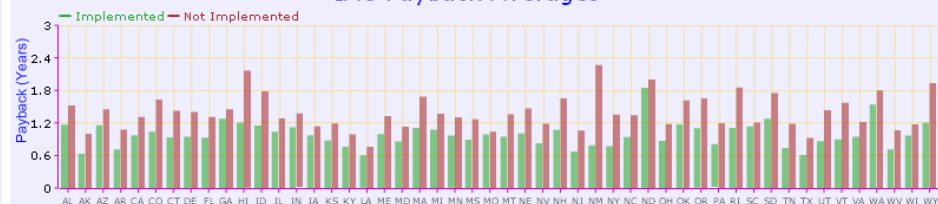
IAC Implementation Rates



IAC Recommendations



IAC Payback Averages



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

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
<ol style="list-style-type: none">1. Operate furnaces and boilers at or close to design capacity2. Reduce excess air used for combustion3. Clean heat transfer surfaces4. Reduce radiation losses from openings5. Use proper furnace or boiler insulation to reduce wall heat losses6. Adequately insulate air or water-cooled surfaces exposed to the furnace environment and steam lines leaving the boiler	<ol style="list-style-type: none">1. Improve water treatment to minimize boiler blow down2. Optimize de-aerator vent rate3. Repair steam leaks4. Implement effective steam trap maintenance program5. Use high-pressure condensate to make low pressure steam6. Utilize backpressure turbine instead of pressure-reducing or release valves7. Optimize condensate recovery	<ol style="list-style-type: none">1. Minimize air leakage into the furnace by sealing openings2. Maintain proper, slightly positive furnace pressure3. Reduce weight of or eliminate material handling fixtures4. Modify the furnace system or use a separate heating system to recover furnace exhaust gas heat5. Recover part of the furnace exhaust heat for use in lower-temperature processes

Additional Energy-Saving Opportunities

Lighting	HVAC	Water
<ol style="list-style-type: none">1. Upgrade exit signs to LED2. Replace older T12 fluorescent lamps with “super” T8 lamps and high efficiency electronic ballasts3. Consider using daylighting sensors	<ol style="list-style-type: none">1. Inspect ducts and pipe insulation for damage and repair/replace as needed2. Clean heat transfer coils on chillers, heat pumps, and air conditioners3. Replace air filters and dampers4. Repair boiler steam traps and clean boiler tubs	<ol style="list-style-type: none">1. Install insulation around domestic hot water tanks and pipes2. Consider using heat exchangers to capture heat from hot wastewater

Tools for Any Approach

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>

— Cross-cutting

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

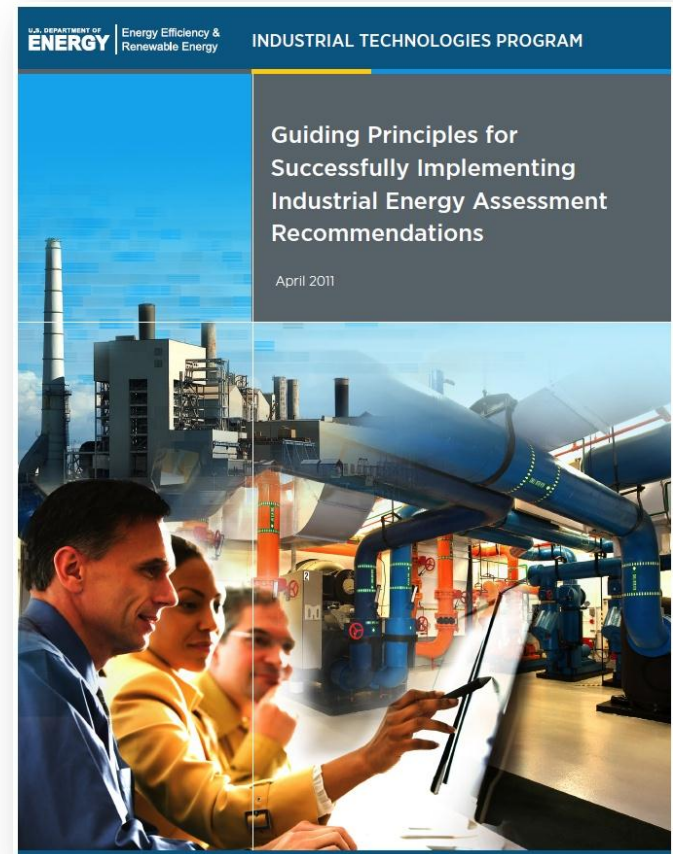
— Sector-specific

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



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



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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BRIGGS & STRATTON CORPORATION

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



*More than 15,000
Authorized B&S Dealers*

Engine Power Products



Power Products





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

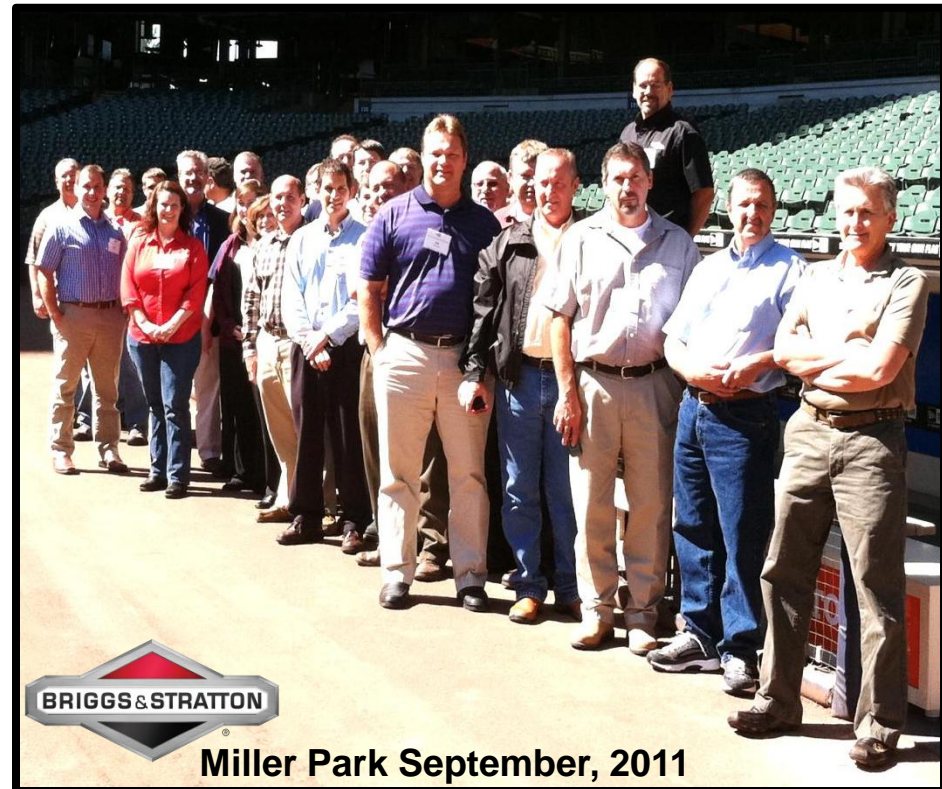
B&S Energy Team

- **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

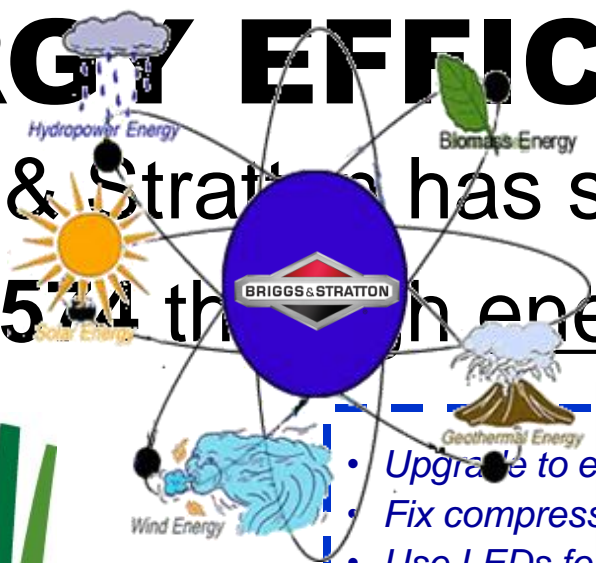
- Global Economic Conditions
- Energy projects must compete with future product line enhancements including marketplace demands and environmental regulations
- Challenge to obtain internal budget commitment for large scale capital projects (> \$500k) and a payback of > 24 months
- Advanced technology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

The Best Renewable Energy

--- ENERGY EFFICIENCY ---

- Briggs & Stratton has saved

\$2,735,544 through energy efficiency

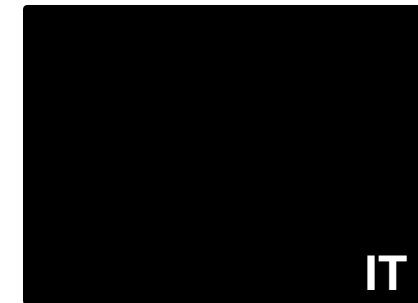


- Upgrade to energy efficient lighting
- Fix compressed air leaks
- Use LEDs for equipment
- Upgrade furnace and boiler
- Upgrade oil
- Efficient
- Implement
- Manufacturing process efficiency
- Synchronous belts
- High efficiency air filters
- Correct wasteful operations

A Briggs & Stratton Commitment

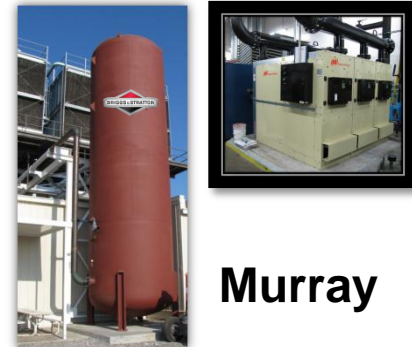
Projects

- **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**]

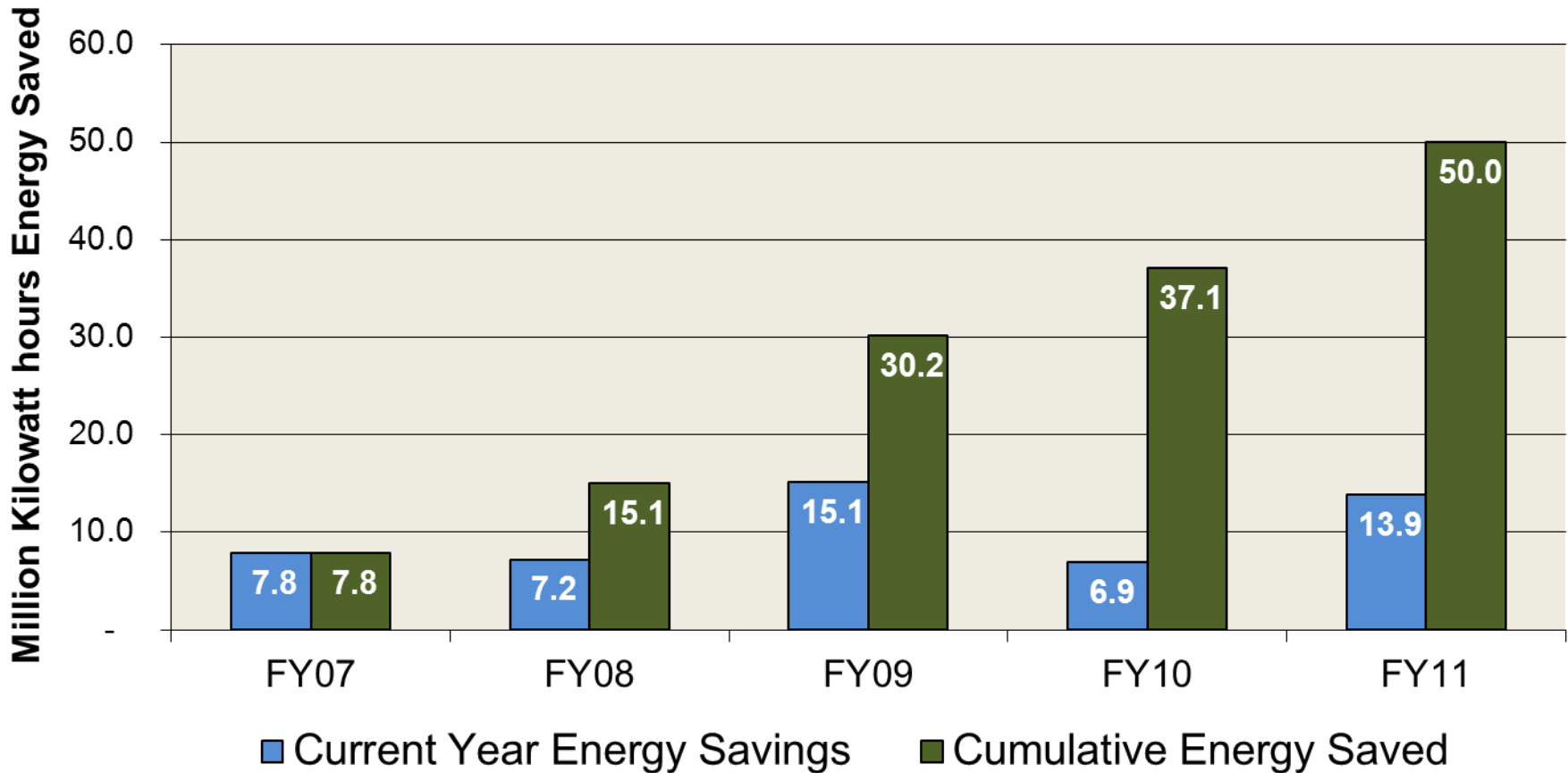


FY11 Projects with DOE Support

- **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*)



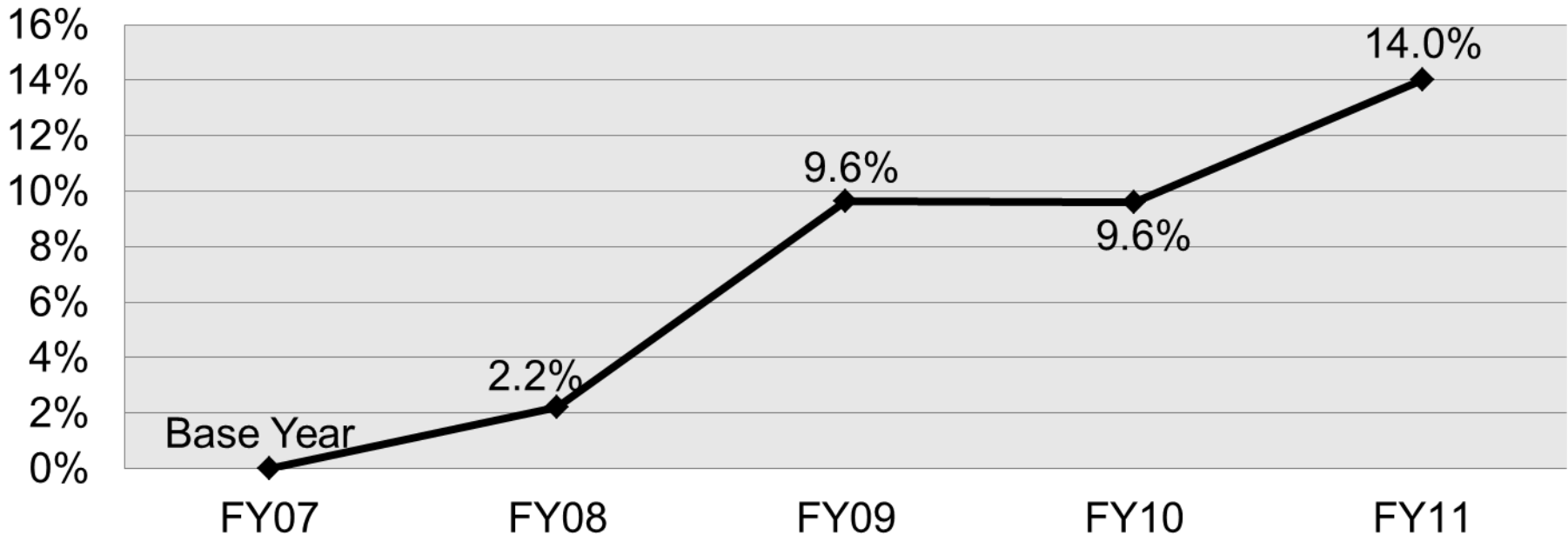
Energy Saved through B&S Energy Efficiency Measures



Energy Goal Progress

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

Energy Intensity Reduction Energy Used / Production Units



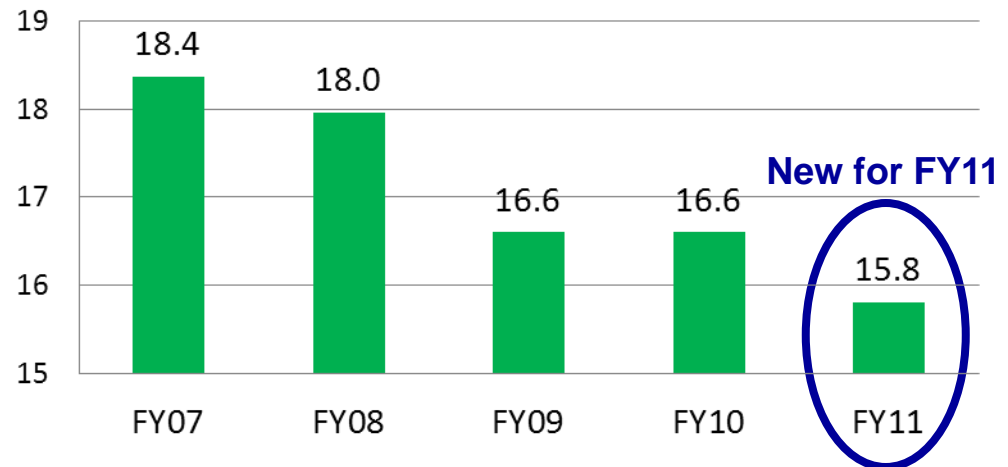
Sustainability

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



Energy Intensity

(Energy Used / Production Units)



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.



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 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

Recognized as an Energy Leader

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





THE POWER WITHIN™

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Slides from Previous Webcasts

The screenshot shows the EERE website's navigation bar with the U.S. Department of Energy logo and the text "Energy Efficiency & Renewable Energy". The main header is "Advanced Manufacturing Office" with a search bar. Below the header is a navigation menu with categories: HOME, ABOUT, RESEARCH & DEVELOPMENT, TECHNOLOGY DEPLOYMENT, INDUSTRIES & TECHNOLOGIES, INFORMATION RESOURCES (highlighted), FINANCIAL OPPORTUNITIES, NEWS, and EVENTS. The breadcrumb trail reads "EERE » Advanced Manufacturing Office » Information Resources".

Publications
Databases
Program News
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Tuesday Webcasts for Industry

Here you will find information on the Industrial Technologies Program (ITP) Tuesday Webcasts for Industry, including past presentations.

ITP's Tuesday Webcasts for Industry help industrial personnel learn about ITP's software assessment tools, technologies, partnership opportunities, *Save Energy Now* energy assessments, and other resources that can be used to find ways to save energy and reduce carbon emissions. The webcasts are held on the first Tuesday of every month from 2:00 to 3:00 p.m. Eastern time and are presented by ITP staff, partners, and experts.

You can register to participate in upcoming Tuesday webcasts by visiting the ITP [events calendar](#) or [best practices training calendar](#). Each entry includes the webcast's date, topic, and registration link, and provides a detailed description of the webcast.

Past Tuesday and Thursday Webcasts for Industry

Presentations from previous webcasts can be found below by topic, then by date. All are available as Adobe Acrobat PDFs. [Download Adobe Reader](#). Webcasts from 2010 on are also available as audio files.

- [Data Center Efficiency](#)
- [Energy Assessments](#)
- [Energy Management and Financing](#)
- [Energy Systems](#)
- [ITP Program Overview](#)
- [ITP Software Tools](#)
- [New and Emerging Technologies](#)
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Data Center Efficiency

- April 23, 2009 – [Data Center Assessment Case Study: Verizon](#)
- November 13, 2008 – [Assessing Data Center Energy Use](#)

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Energy Assessments

- October 11, 2011 – [Unveiling the Implementation Guide](#)
- May 7, 2009 and April 16, 2009 – [Energy Assessment Results: Most Commonly Identified Recommendations](#)
- February 19, 2009 – [Energy Assessments: What are the Benefits to Small- and Medium-Size Facilities?](#)
- February 12, 2009 – [Energy Assessments: What are the Benefits to Large Facilities?](#)
- November 6, 2008 – [Energy Assessments: What are the Benefits to Small and Medium Facilities?](#)
- October 16, 2008 – [Energy Assessments: What are the Benefits to Large Facilities?](#)

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Next Month's Webcast

**Please
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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>
