

Superior Energy Performance^{cm}: Getting the Most Value from ISO 50001- Energy Management Systems



**US Department of Energy
Advanced Manufacturing Office**

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- Time and again, industrial energy efficiency has been demonstrated to be *cost effective* while having a positive effect on productivity
- Despite this, energy efficiency improvements with very favorable payback periods often *do not get implemented*
- Even projects that are implemented may *not be sustained* due to lack of supportive operational and maintenance practices

Problem: ***Energy efficiency is not integrated into daily management practices.***

Solution: ***Staff at all levels within an organization need to be engaged in the management of energy on an ongoing basis.***

Energy management requires an organization to shift from a project-by-project approach to one of continual improvement in energy performance

ISO 50001- Energy Management System Standard establishes a framework for industrial and commercial facilities and organizations to manage energy.



Potential impacts:

- Could influence up to 60% of the world's energy use across many economic sectors

Uptake of ISO 50001 will be driven by companies seeking an internationally recognized response to:

- Corporate sustainability programs
- **Energy cost reduction initiatives**
- Demand created along the manufacturing supply chain
- Future national cap and trade programs; carbon or energy taxes; increasing market value of “green manufacturing” / reduced carbon footprint
- International climate agreements

Status of ISO 50001

- Developed by ISO Project Committee 242; United States and Brazil lead effort with United Kingdom and China
- 56 countries involved in development
- Published June 15, 2011
- ISO PC 242 transitioned to TC 242, developing standards and guidance related to implementation of ISO 50001

- *Significant (10-25 percent) improvements in energy performance can be achieved* through operational changes.
- Actively managing energy requires an *organizational change in culture*.
- *Top management needs to be engaged* in the management of energy on an ongoing basis.
- *Provides a context for informed decisions* concerning proposed energy efficiency projects, including new technologies.
- At its core, energy management requires a group of people to *change their behavior* and *sustain the change*.

Scope of energy management

facilities

equipment

personnel

systems

processes

1. *Energy policy* - top management's official statement of the organization's commitment to managing energy.
2. *Cross-divisional management team* led by a representative who reports directly to management and is responsible for overseeing the implementation of the energy management system (EnMS).
3. *An energy planning process* to assess energy use and consumption, identify significant energy uses, and determine opportunities for improvement.
4. *A baseline* of the organization's energy consumption.
5. *Identification of energy performance indicators* (EnPIs) that are unique to the organization and are tracked to measure progress.

6. *Energy objectives and targets* for energy performance improvement at relevant functions, levels, processes or facilities within an organization.
7. *Action plans* to meet those targets and objectives.
8. *Operating controls and procedures* for key characteristics of the EnMS, including significant energy uses
9. *Measurement, management, and documentation* for continual improvement of energy performance.
10. *Internal audits and periodic reporting of progress* to management based on these audits.

- Applies to all factors that can be monitored and influenced by the organization to affect energy use and consumption.
- Designed to be used independently, yet can be aligned or integrated with other management systems (e.g., ISO 9001 and ISO 14001).
- Applicable to all organizations that use energy.
- ***Certification is not required*** to benefit from use of ISO 50001
- ***Does not prescribe specific performance criteria or results*** with respect to energy.
- Needs ***enabling policies*** to realize its global potential for GHG emissions reductions



International
Organization for
Standardization

What is Superior Energy Performance?

A market-based, ANSI/ANAB-accredited certification program that provides industrial and commercial facilities with a roadmap for achieving continual improvement in energy efficiency while boosting competitiveness.

Goals:

- Drive continual improvement in energy performance
- Develop a transparent system to validate energy performance improvements and management practices
- Encourage broad participation throughout industry
- Support and build the energy efficiency market and workforce



Superior Energy Performance for industry will be launched nationwide in October 2012.

SEP-Commercial Buildings in demonstration.

U.S. Council for Energy-Efficient Manufacturing

- Acts as champion of U.S. industry in pursuing national energy efficiency goals.
- Seeks to improve the energy intensity of U.S. manufacturing through a series of initiatives.
- Guides development of **Superior Energy Performance**.



Certification Requirements:

An ANSI/ANAB-accredited Verification Body will conduct a third-party audit to verify that the following requirements are met:

1. Energy Management System conformance to ISO 50001 Energy Management System Standard.
2. Energy performance improvement (5% minimum over 3 years).
 - Additional pathway to certification for facilities that have engaged in energy efficiency activities.



ISO 50001 is a foundational tool that any organization can use to manage energy.

ISO 50001
Components in place:

- Baseline
- Policy
- Plan
- Team/Leader



Superior Energy Performance

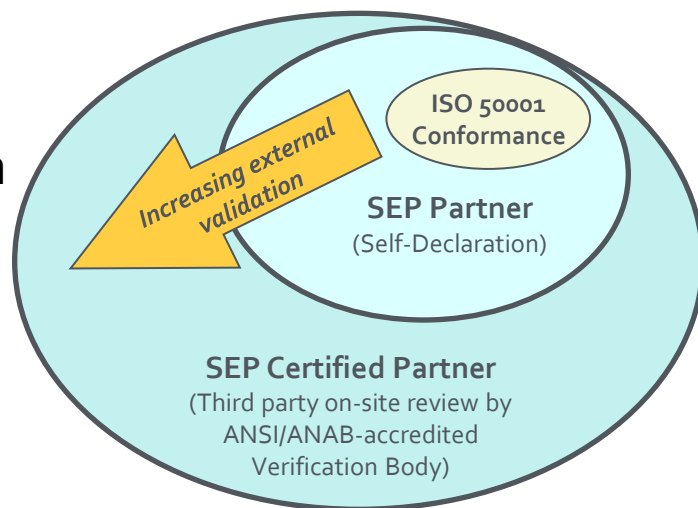
Single facility ISO 50001 conformance with validated energy performance improvement

ISO 50001



The two-tiered approach accommodates:

- Maturity of facility's energy management program
- Level of external validation desired
- Business climate/cycle



Two Program Tiers:

Partner
<p><i>Self Declaration</i></p> <p>Criteria</p> <ul style="list-style-type: none"> ▪ Conformance to ISO 50001 ▪ Measure and audit energy performance improvement <p>Performance Levels</p> <ul style="list-style-type: none"> ▪ Energy performance improvement required <p>Method of Verifying Results</p> <ul style="list-style-type: none"> ▪ Self Declaration

Certified Partner
<p><i>ANSI/ANAB-accredited certification</i></p> <p>Criteria</p> <ul style="list-style-type: none"> ▪ Conformance to ISO 50001 ▪ Measure, verify, and certify energy performance improvement <p>Performance Levels</p> <ul style="list-style-type: none"> ▪ Energy performance improvement required, minimum requirements set by program ▪ Two pathways available: Energy Performance or Mature Energy <p>Method of Verifying Results</p> <ul style="list-style-type: none"> ▪ ANSI/ANAB-accredited certification with on-site review



SEP Performance Criteria for Certification Levels

Performance Characteristics		Silver	Gold	Platinum
Energy Performance Pathway	Energy Performance Improvement	Meets 5% energy performance improvement threshold over the last 3 years.	Meets 10% energy performance improvement threshold over the last 3 years.	Meets 15% energy performance improvement threshold over the last 3 years.
Mature Energy Pathway	Energy Performance Improvement	Demonstrates an energy performance improvement of 15% or more over the last 10 years.	Demonstrates an energy performance improvement of 15% or more over the last 10 years.	Demonstrates an energy performance improvement of 15% or more over the last 10 years.
	Score on Best Practice Scorecard <i>Includes credits for energy management best practices and energy performance improvements beyond 15% over the last 10 years.</i>	<ul style="list-style-type: none"> Meets a score of at least 35 and up to 60 out of 100 total points for Best Practice Scorecard Minimum of 25 points required for the energy management best practices. 	<ul style="list-style-type: none"> Meets a score of at least 61 and up to 80 out of 100 total points for Best Practice Scorecard Minimum of 25 points required for the energy management best practices and 10 for energy performance. 	<ul style="list-style-type: none"> Meets a score of at least 81 out of 100 total points for Best Practice Scorecard Minimum of 25 points required for the energy management best practices and 10 for energy performance.

Assessment standards for specific energy systems provide immediate opportunity for energy performance improvement in many facilities.

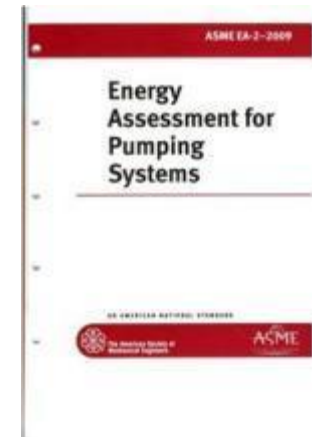
Use of the standards is **not** required for certification but will help plants define a pathway for achieving energy savings.

Standards address:

- Organizing an assessment
- Conducting an assessment
- Analyzing the data collected and developing efficiency recommendations
- Reporting and documentation

Available Standards:

- Pumping
- Compressed Air
- Steam
- Process Heating



Purchase standards and guidance documents from ASME for \$35 (print or digital):

- <http://www.asme.org/search.aspx?searchText=EA&#page=1,category=STANDARD>

The SEP Industrial Measurement and Verification (M&V) Protocol is a methodology to:

1. Verify results and impact from implementing the energy management standard.
2. Track energy performance changes over time for the overall facility.
3. Document energy performance normalized to production.



Training and skill are required for appropriate application of ISO 50001 and verification of conformance and resulting energy performance improvement. Superior Energy Performance will help to build this workforce.

- **Certified Practitioners in Energy Management Systems (CP EnMS):**
Help facilities implement ISO 50001 and prepare for SEP certification
- **Certified Practitioner in Systems:**
Four planned- perform compressed air, process heating, pumping, or steam system assessments using ASME system assessment standards to identify energy performance opportunities
- **SEP Lead Auditors and SEP Performance Verifiers:**
Perform third-party audits to verify that a facility meets Superior Energy Performance requirements

- Dec 2011: First class & exam for Certified Practitioners in Energy Management Systems
- Next class and exam May 2012
Sign up to receive updates on Superior Energy Performance website.

http://www.superiorenergyperformance.net/certified_practitioners.html

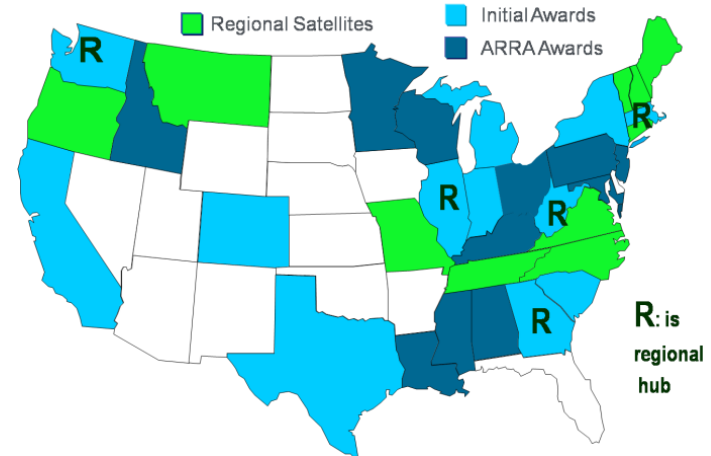
DOE worked with the **University of Texas at Austin** to pilot Superior Energy Performance in Texas facilities:

- Field tested elements of Superior Energy Performance
- Implemented energy management systems using ANSI MSE 2000:2008, which is consistent with ISO 50001
- Conducted audits and tested SEP measurement and verification
- Established the first ANSI/ANAB-accredited Verification Body for Superior Energy Performance
- **Certified the first plants to Superior Energy Performance**



First Facilities Certified to Superior Energy Performance	% Energy Performance Improvement
Cook Composites and Polymers Houston, TX	14.9
Freescal Semiconductor, Inc. West Austin, TX	6.5
Owens Corning Waxahachie, TX	9.6
Dow Chemical Company Texas City, TX (manufacturing facility)	17.1
Dow Chemical Company Texas City, TX (energy systems facility)	8.1

States, regions, and utilities are partnering with U.S. DOE to further **test Superior Energy Performance** and to **build energy management expertise**.



Industrial Participants:

- 3M
- Alcoa
- Allsteel
- Amcor PET
- Ascend Performance Materials
- Bentley Prince Street
- Bridgestone Tire
- Coca-Cola
- Cook Composites & Polymers
- Cooper Tire
- Cummins
- Didion Milling, Inc
- Dixie Chemical
- Dow Chemical
- Eaton
- General Dynamics
- Harbec Inc.
- Haynes International
- Holcim
- Ingersoll Rand
- JR Simplot
- Kenworth Trucks
- Lockheed Martin
- MedImmune
- Neenah Foundry Company
- Nissan
- OLAM Spices
- Republic Conduit
- Schneider Electric
- Spirax Sarco
- Traco
- UTC/Sikorsky
- United States Mint
- Volvo
- World Kitchen

<http://www.eere.energy.gov/industry/energymanagementdemonstrations/>

Benefits of Superior Energy Performance

- ISO 50001 ensures that a facility has adopted the operational structure, systems, and practices to identify, prioritize, implement and measure the impacts of energy-saving projects on a continuing basis (to ensure persistence of energy benefits).
- Superior Energy Performance provides added value through third-party validation of a facility's use of the energy management system to actually achieve and sustain improved energy performance. Potential benefits:
 - Recognition from regional/national/international programs
 - Qualification for preferred supplier status and enhanced utility incentives
 - Positive public image with stockholders, customers and prospective employees
- Certified Practitioner credentialing increases energy management expertise in the workforce.



ISO 50001:

www.eere.energy.gov/energymanagement

Superior Energy Performance:

www.superiorenergyperformance.net/

Energy Management Demonstrations:

www.eere.energy.gov/industry/energymanagementdemonstrations/

Texas Pilot Program, Superior Energy Performance Case Studies:

www.superiorenergyperformance.net/texas_pilot.html

"Superior Energy Performance: Getting the Most Value from ISO 50001"

Joe Almaguer

Global Energy Efficiency Leader
The Dow Chemical Company



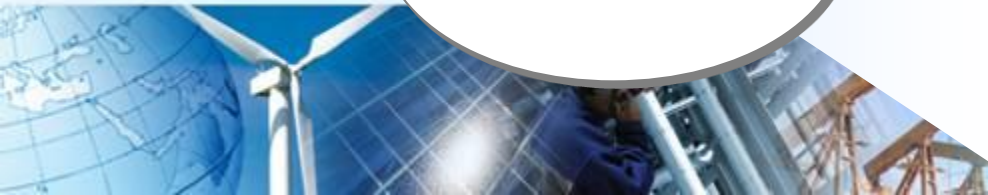
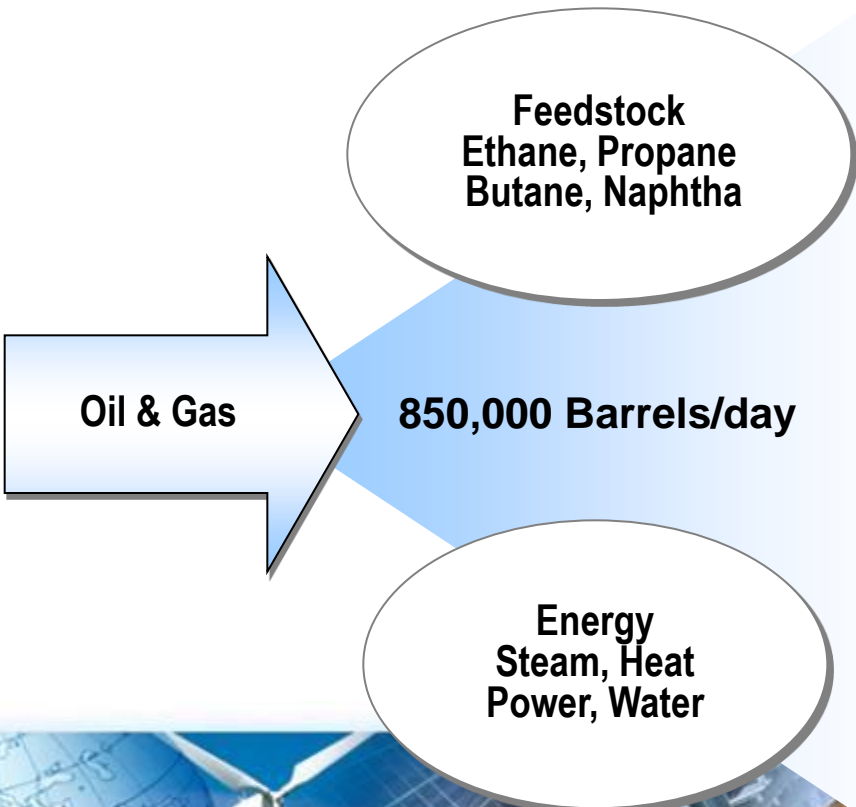
About Dow

- Largest diversified chemical company in the world
- Founded in Midland, Michigan in **1897**
- Supplies more than **5,000 products** to customers in **160 countries**
- Annual sales of **\$54 billion**
- **50,000 employees** worldwide
- One of the world's largest industrial **energy** consumers
- Committed to **Sustainability**



About Dow

For Dow Oil & Gas = Energy & Feedstock



Organizational Model

- 10 Divisions and 40 Global Businesses
- Divisions / Businesses operate semi-autonomously
- Performance objectives, goals & targets are set by business but align to the Company
- Implementation and improvement of Dow's Energy Management System is driven by the Corporation across Dow
- Energy Performance accountability is established both at the site level and at the business/division level
- Dow's Office of Sustainability provides overall coordination and structure across all sustainably goals

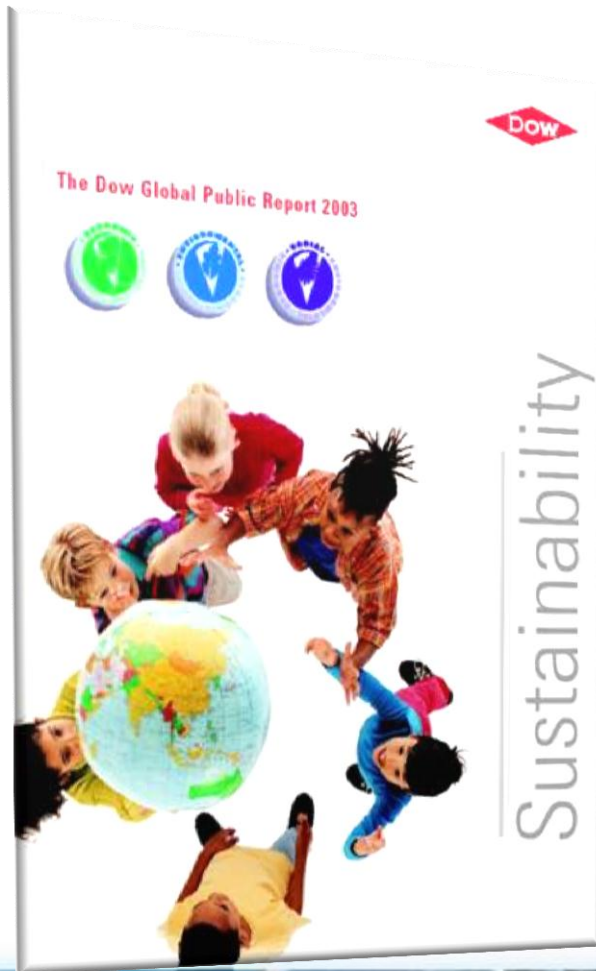


Manufacturing Assets

- Dow consumes about 600 Trillion BTUs/yr of source energy
- We have 150 manufacturing sites in 35 Countries with a total of about 600 plants
- Largest Site in Freeport TX. Consists:
 - 80 world scale manufacturing plants
 - Self generates power/steam/utilities
 - Buys and sells power to the electric grid
 - Consumes about 140 Trillion BTUs/Yr of source energy
 - Functions as an Industrial Park



Dow's Energy Management System



Formal EMS started with our public commitment in 1995:

- To Reduce Energy Intensity
- By 20% by the year 2005
- From Base Year 1994



Corporate Commitment & Accountability

- Further reduce global energy intensity by 25% from 2005 to 2015
- Reduce GHG emissions intensity by 2.5 % per year thru 2015
- Aspire to reduce absolute emissions within the company by 2025

“No one in the world is more intensely aware of the need, ultimately, to reinvent our dependency on oil and natural gas than we are... We will lead the way on energy transformation because we have to. And we have taken important steps already.”

***-- Andrew Liveris
Chairman, CEO & President
The Dow Chemical Company***



Liveris Launches 2015 Sustainability Goals



Dow's Energy Management System

Key Elements

Demonstrated Strong Leadership Commitment

Energy Efficiency Organizational Structures: Corporate, Business and Site Centered

Stated Objectives, Goals and Performance Targets

Established Energy Performance Baselines for each plant, site, business

A robust Energy Performance Tracking and Reporting System

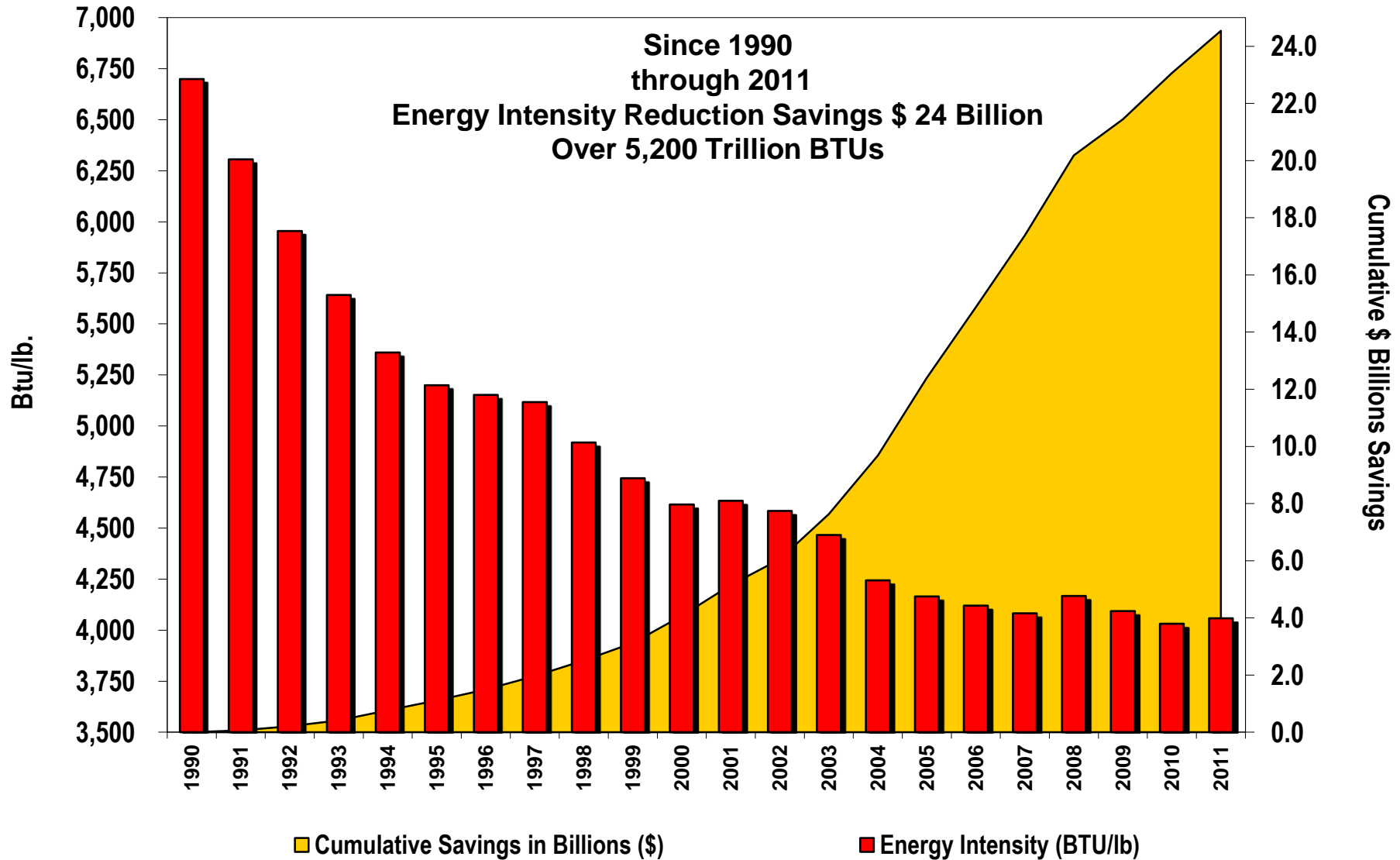
Energy Planning and review Work Process

Program and Performance Review with top management

Performance Forecasting and Identified Intervention Options based on what if scenario



Energy Intensity Performance



Value Creation through SEP

Even with Dow's established, mature Energy Management System and demonstrated EE Performance, we believe that:

- Significant opportunities remain to enhance and strengthen the effectiveness our EMS through adoption of ISO 50001's key elements
- We are currently working to get 6 Sites Certified on 50001 in Germany and 1 in the US.
- ISO 50001 brings a more discipline approach to EMS and is more comprehensive:
 - Designing in EE into facilities and systems
 - EE considerations in the procurement of equipment, systems and services
 - Requires "EE practices" to be institutionalized



Value Creation through SEP

Even with Dow's established, mature Energy Management System and demonstrated EE Performance, we believe that:

- Superior Energy Performance goes beyond the adoption of the standard:
 - It is in fact, the framework that extracts the value implied in 50001
 - It challenges the organization to set aggressive goals
 - Achievement of levels of performance is emphasized beyond EMS
 - Drives the EMS and performance to the plant or facility level
 - It offers pathways toward continual performance improvement for both mature and nascent EE practitioners.
 - It provides more segment specific requirements and specific best practices



Conclusion



- While we have achieved much, more is possible
- ISO 50001 is good, but SEP raises the bar
- SEP goes for performance
- Performance is where the savings \$\$\$ and BTUs get delivered
- It will be more challenging
- It's not for the faint of heart



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".

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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](#)
- [Partnerships](#)

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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http://www1.eere.energy.gov/manufacturing/resources/tuesday_webcasts.html

Next Month's Webcast

**Please
join us
for our
next
Webcast.**

Topic: Engaging Supply Chains in Energy Management

Date and Time: Tuesday, April 10 at 11:00 a.m. PDT/2:00 p.m. EDT

To Register:

<https://www1.gotomeeting.com/register/252022224>
