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

Superior Energy Performance:

Better Plants Webinar

December 17, 2013

Paul Scheihing
Advanced Manufacturing Office

The energy challenge in facilities across the country

How can you achieve these objectives in your facility?

- Identify new opportunities for improving energy performance
- Move to a higher level of sophistication in data utilization
- Achieve energy improvements with little to no capital investment
- Build greater confidence among senior management that you are achieving returns and delivering results
- Broaden energy management engagement to employees at all levels, including top levels of management
- Integrate energy performance into management practices
- Receive external recognition for third party verified results
- Contribute to national goals to strengthen the economy, protect the environment, and reduce dependence on foreign oil

Industrial Energy Efficiency Programs and Resources

DOE programs and resources drive measureable energy savings.

Better Plants Challenge and Program
Corporate Level

Superior Energy Performance Program
Facility Level

AMO Energy Resources Center
Corporate- and Facility-Level Tools and Training

DOE Resources for Companies

DOE Resources for Facilities

Results

- CEO commitment
- Corporate energy goals and management plans
- Resources dedicated for facilities
- Established energy management programs
- Continual energy performance improvements
- SEP-certified facilities
- Dollar savings
- Replicated best practices

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

ADVANCED MANUFACTURING OFFICE

Better Plants & SEP: Complementary Programs

DOE's Better Plants

Corporate-wide
Prospective Goal:
Pledge to improve energy performance by
25% in the next 10 years

Superior Energy Performance

Facility-level
Retrospective requirement:
Achieved an improvement in energy performance of
greater than 5% in the past 3 years

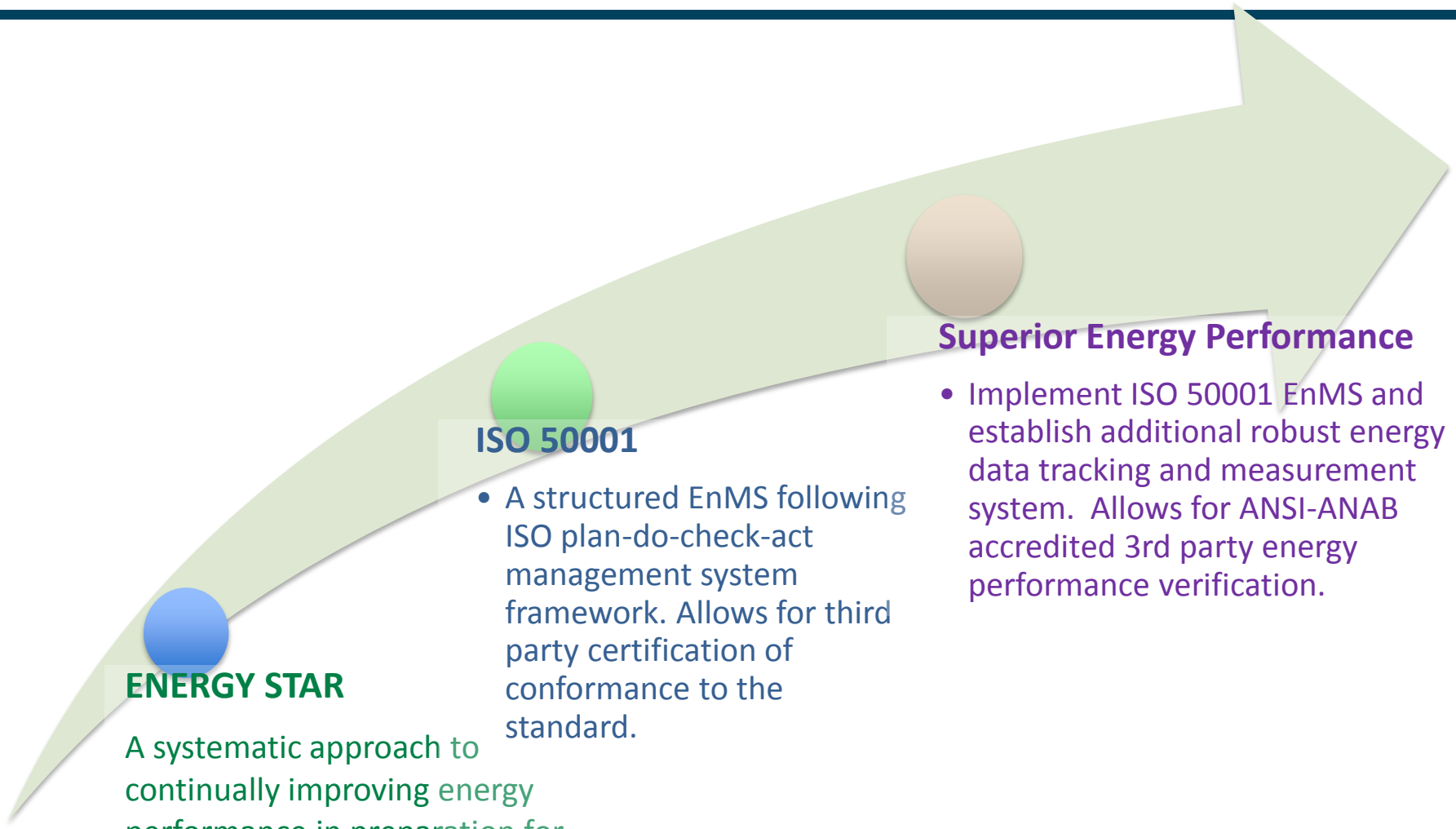
SEP Helps Better Plant Partners

- Helps individual plants to accelerate energy savings that will contribute toward corporate goal
- Provides rigor of energy performance measurement at the facility level

Better Plants Helps SEP Participants

- Provides structure for corporate-wide energy efficiency goals
- Can encourage replication of SEP at other facilities

Strategic Energy Management Continuum



ENERGY STAR

A systematic approach to continually improving energy performance in preparation for ISO 50001 implementation.

ISO 50001

- A structured EnMS following ISO plan-do-check-act management system framework. Allows for third party certification of conformance to the standard.

Superior Energy Performance

- Implement ISO 50001 EnMS and establish additional robust energy data tracking and measurement system. Allows for ANSI-ANAB accredited 3rd party energy performance verification.

Superior Energy Performance™ Certification Requirements

A certification and recognition program for facilities demonstrating energy management excellence and sustained energy savings.

Certification Requirements: An ANSI-ANAB Accredited Verification Body conducts a third-party audit to verify the following:

1. Energy management system conformance to ISO 50001
2. Applicant meets energy performance improvement and additional requirements that have been codified under the ANSI/MSE 50021

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

ISO 50001

Components in place:
- Top Management
- Energy Team
- Policy
- Planning
- Baseline
- Performance Metrics

Superior Energy Performance

Single facility ISO 50001 conformance with verified energy performance improvement

ISO 50001

U.S. Council for Energy-Efficient Manufacturing

Guides development of **Superior Energy Performance** for industry

- Active in SEP program design and standards/protocol updates
- Helps to review SEP website and program information
- Helps to promote SEP

See www.usceem.org

What is ISO 50001?

- International framework for industrial plants, commercial facilities, or organizations to manage energy, including all aspects of procurement and use
- Energy management systems help an organization institutionalize the policies, procedures, and tools to systematically track, analyze, and improve energy efficiency—leading to continual improvements in energy performance

Source: Reinhard Peglau, German Federal Environment Agency

ISO 50001 certifications December 2013

Country	ISO 50001 Certifications
Global	**4300**
Germany	2345
United Kingdom	333
Sweden	177
Spain	168
Italy	166
India	105
Korea	98
Ireland	89
Turkey	84
Austria	75
United States	50
Japan	35
China	11
Canada	8

SEP Performance Criteria for Achieving Performance Levels

SEP offers two pathways to achieve SEP certification at Silver, Gold, or Platinum levels.

Performance Characteristics		Silver	Gold	Platinum
Energy Performance Pathway	**Energy Performance Improvement**	Meets a specified energy performance threshold over the last **3** years:		
		5%	**10%**	**15%**
Mature Energy Pathway Uses Best Practice Scorecard to earn points for energy management best practices and energy performance improvements.	**Energy Performance Improvement**	Meets **15%** energy performance improvement threshold over the last **10** years.		
	Score on Best Practice Scorecard (out of 100 total points)	• **At least 35 points** • Minimum of 30 points for energy management best practices	• **At least 61 points** • Minimum of 40 points for energy management best practices and 10 points for energy performance (beyond 15% over the last 10 years)	• **At least 81 points** • Minimum of 40 points for energy management best practices and 20 points for energy performance (beyond 15% over the last 10 years)

SEP Results and Business Case

Billboard at the Roanoke Regional Airport. Image: Volvo Trucks

SEP Certified Facilities: 16 total

Facility Name	% Energy Performance Improvement*
Mack Trucks | *Macungie, PA*	**41.9 ****
Volvo Trucks, NA | *Dublin, VA*	**25.8**
Dow Chemical Company | *Texas City, TX: Manufacturing facility*	**17.1**
Bridgestone Americas Tire | *Wilson, NC*	**16.8 ****
Harbec Plastics | *Ontario, NY*	**16.4**
3M Canada Company | *Brockville, Ontario, Canada*	**15.2**
Cook Composites and Polymers | *Houston, TX*	**14.9**
General Dynamics | *Scranton, PA*	**11.9**
Allsteel | *Muscatine, IA*	**10.2**
Cooper Tire | *Texarkana, AR*	**10.1**
Olam Spices | *Gilroy, CA*	**9.8**
Owens Corning | *Waxahachie, TX*	**9.6**
Dow Chemical Company | *Texas City, TX: Energy systems facility*	**8.1**
Nissan, NA | *Smyrna, TN*	**7.2**
Freescale Semiconductor, Inc. | *West Austin, TX*	**6.5**
3M Company| *Cordova, IL*	**5.6**

* Energy performance improvement is over a 3-year period, including capital and operational improvement

** Mature energy pathway and improvement over 10 years

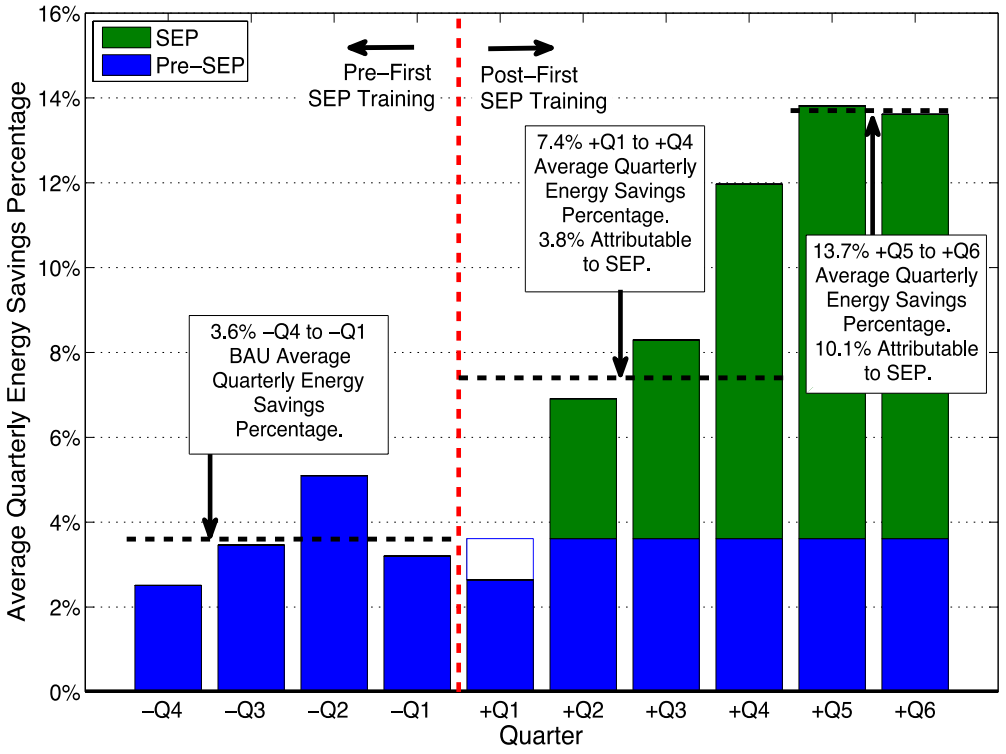
6% to 26% improvement in energy performance over three years in a wide range of industries.

40+ additional plants pursuing certification, and SEP now open to accept enrollment and applications

Data and Metrics: Making the Business Case

Recent study: Nine industrial facilities certified to Superior Energy Performance have:

- Improved their energy performance by an average of 10% and over $500,000 per year over business-as-usual in the first 18 months of SEP implementation
- Saved on average $503,000 per year from operational improvements (low/no cost investment) attributable to SEP

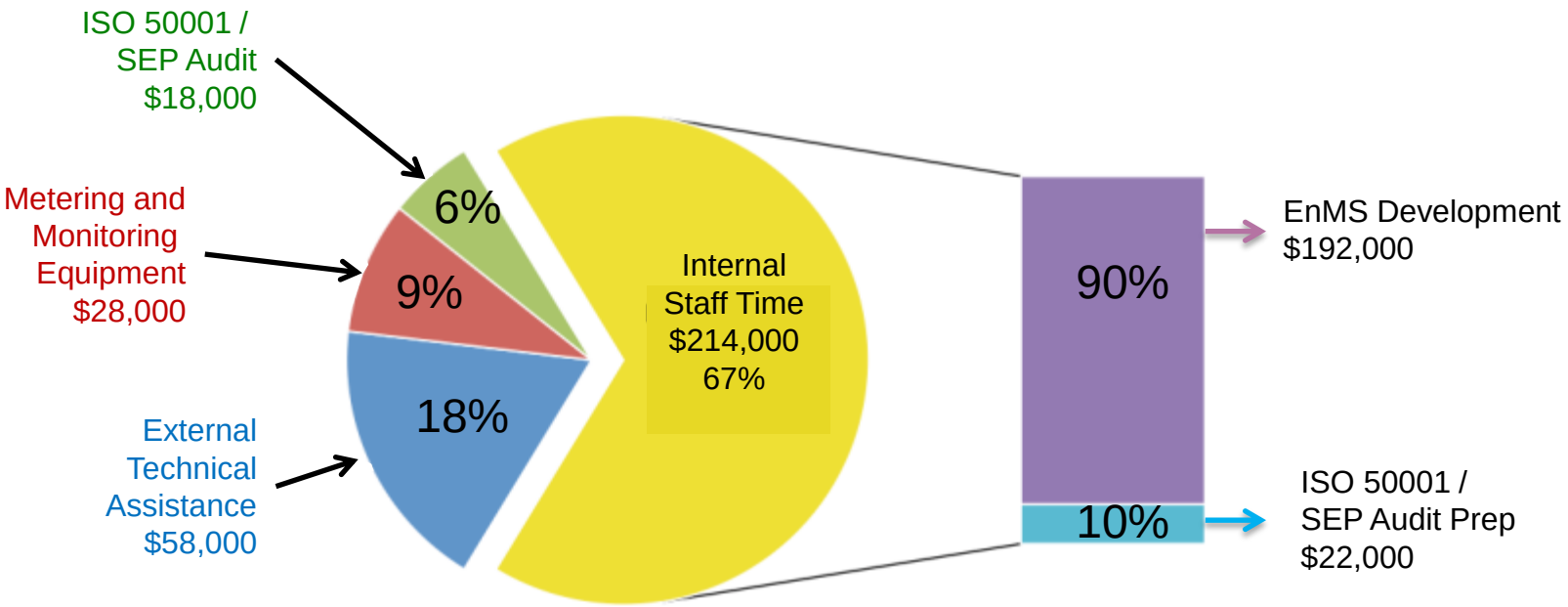


Average quarterly percentage energy savings as a function of average quarterly baseline energy consumption for all nine facilities. Results are aligned across facilities so that the first quarter starts when the facilities received their first SEP training. Subtracting the BAU quarterly energy savings percentage from quarterly post-first training energy savings percentages reveals savings attributable to SEP.

View full study at: http://www.superiorenergyperformance.energy.gov/pdfs/sep_costbenefits_paper13.pdf

Data and Metrics: Making the Business Case (continued)

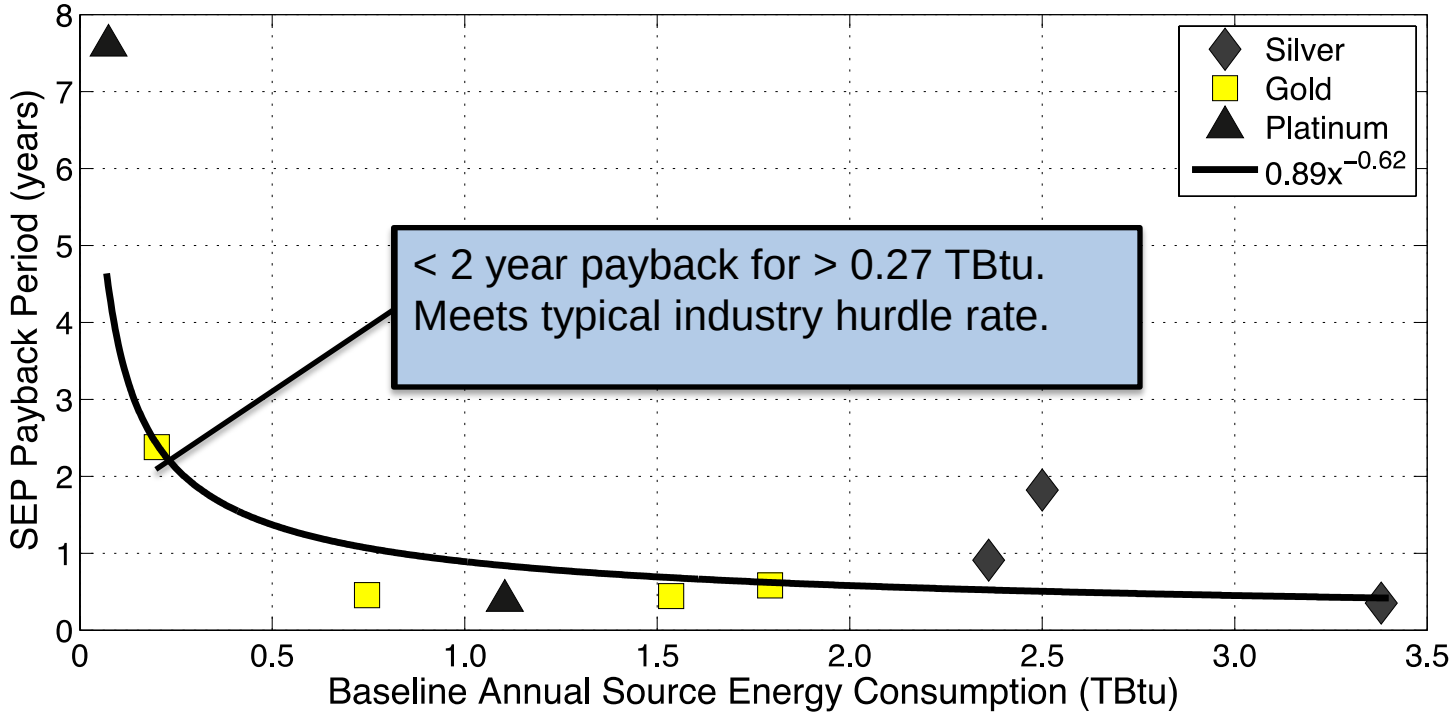
- ISO 50001/SEP program participation costs for facilities: Staff Time, Technical Assistance, EnMS Monitoring/Metering Equipment, and 3rd Party Certification



- Cost of ISO 50001 and SEP certification marginally higher than ISO 50001 alone and comparable to other standards (e.g., ISO 14001)
- Facilities noted cost of third party certification was small and outweighed by the benefits

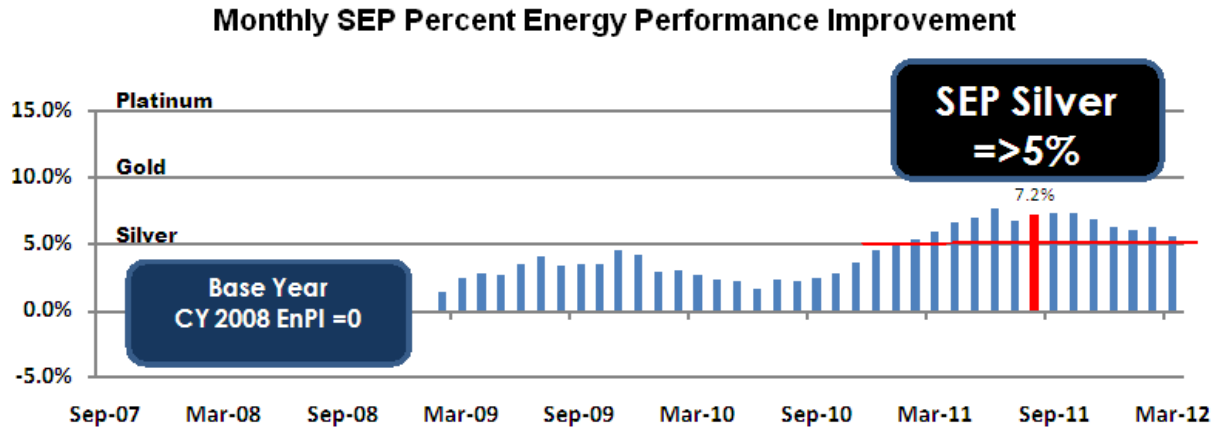
Data and Metrics: Making the Business Case (continued)

- SEP marginal payback figures are calculated for each plant by dividing SEP costs (not including capital project costs) by associated SEP operational energy savings beyond business-as-usual operational energy savings prior to SEP



Nissan Case Study – SEP certification of Smyrna, TN plant

Nissan improved energy savings at its vehicle assembly plant in Smyrna, TN by 7.2% with a 4-month payback implementing SEP, saving over $900,000.




Global Energy Management System Implementation: Case Study

USA, Superior Energy Performance

Nissan

ISO 50001

Business Benefits Achieved

View the full case study:
www.cleanenergyministerial.org/Portals/2/pdfs/GSEP_EMWG_case_study_Nissan_10-2013.pdf

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

ADVANCED MANUFACTURING OFFICE

End User Testimonials

SEP certified facilities achieve greater savings potential

"SEP has helped justify expenditures to management. The measurement and verification requirement helps to identify real cost savings, allowing us to reinvest those savings into additional energy projects."

— Cooper Tire, Texarkana, AR

SEP creates higher confidence in energy efficiency investments

"The verification was more important than the management standard because it provides a performance metric. SEP provides the ability to have proven performance metrics to quantify actual savings, giving both internal and external credibility to savings claims."

— Volvo Trucks, Dublin, VA

Third-party verification bolsters a plant's internal reputation and the company's public image

"Third-party certification removes any potential of "green washing" and provides credibility to savings."

— General Dynamics, Scranton, PA

End User Noted Benefits of SEP

- **Advantages of the rigor of SEP:**
  - Improves measurement of energy performance of manufacturing processes
  - Helps find new savings opportunities that were not originally apparent, including those that are low/no cost

- **Highlights process energy savings:**
  - Enables incentives and measureable improvements on the process energy side of manufacturing (vs. focusing on specific pieces of equipment or measures)
  - Engages process engineers in energy management

- **Promoting the business case for SEP:**
  - SEP provides plant managers top level metrics on the bottom-line business value
  - Plant managers are confident presenting real and accurately calculated savings to management due to third party verification

New SEP Initiative and Recent Activities

Better Buildings Industrial SEP Accelerator

The Industrial SEP Accelerator is part of the Better Buildings Initiative to transform markets for accelerated energy efficiency

Purpose: DOE is exploring ways to make SEP certification easier and more affordable for industrial facilities.

- **SEP Enterprise-wide Accelerator**: Companies are testing strategies to implement SEP across a corporation, business unit, or multiple plants to benefit from economies of scale. Six Partners committed, with 30 participating facilities located in the U.S., Canada, and Mexico:
  - 3M Company, Cummins Inc., General Dynamics Ordnance & Tactical Systems, Nissan North America, Inc., Schneider Electric, Volvo North American Group
- **SEP Ratepayer-funded Program Accelerator**: Utilities and energy efficiency program administrators are testing SEP as a practical, energy-saving program offering for their industrial customers.
  - Bonneville Power Administration, Efficiency Vermont, Northeast Utilities, including Connecticut Light & Power Company, Yankee Gas, and NSTAR Electric & Gas

http://www1.eere.energy.gov/buildings/betterbuildings/accelerators/

Six Better Plants partners & 28 U.S. manufacturing facilities

3M Company (6 U.S., 1 Canada)

- Aberdeen, SD
- Decatur, AL
- Hutchinson, MN
- Cynthiana, KY
- Prairie du Chien, WI
- Cordova, IL
- Brockville, Ontario, Canada

Cummins, Inc. (4 U.S.)

- Columbus, IN
- Lakewood, NY
- Minneapolis, MN
- Rocky Mount, NC

General Dynamics Ordnance & Tactical Systems (3 U.S.)

- Joplin, MO
- Red Lion, PA
- Scranton, PA

Nissan North America, Inc. (4 U.S.)

- Smyrna, TN
- Decherd, TN machining
- Decherd, TN forging
- Decherd, TN casting

Schneider Electric (8 U.S., 1 Canada, 1 Mexico)

- Clovis, CA
- Peru, IN
- Cedar Rapids, IA
- Columbia, SC
- Smyrna, TN
- Lincoln, NE
- Seneca, SC
- Lexington, KY
- Victoria, British Columbia, Canada
- Iztapalapa, Mexico

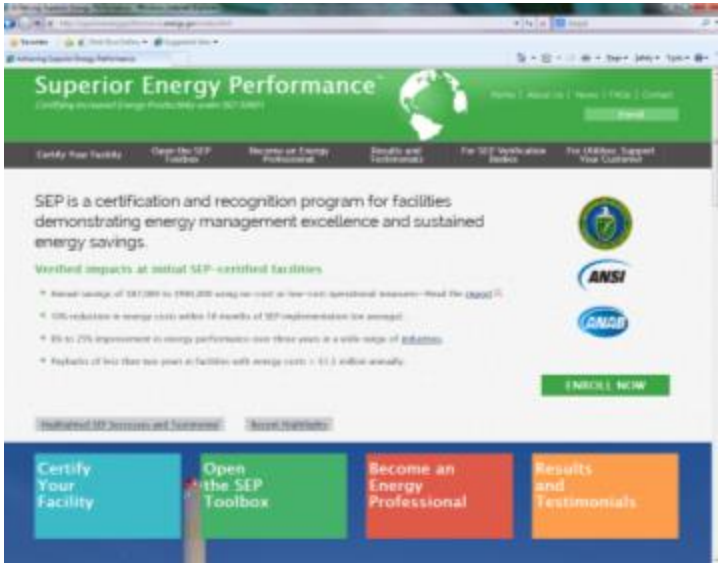
Volvo Group North America (3 U.S.)

- Hagerstown, MD
- New River Valley, VA
- Macungie, PA

SEP Status: Redesigned Website

Visit our new website: www.superiorenergyperformance.energy.gov

- DOE acting as SEP Administrator to develop, test, and refine the processes for industrial plants to register and become certified to SEP
  - **Enrollment:** Open to any U.S. industrial facility at any stage of the SEP implementation process
  - **Application:** Any U.S. industrial facility may submit an application for certification when ready for its SEP audit



Additional website features:

- Access SEP software tools and technical resources
- Read case studies and watch video testimonials from SEP-certified facilities
- Find a professional to assist with SEP implementation, or pursue training and credentialing opportunities
- Sign up to receive the latest SEP updates

SEP Resources

SEP Resources for Better Plants program partners

- Certified Practitioner in Energy Management Systems (CP EnMS) training and certification

See http://superiorenergyperformance.energy.gov/energy_professional.html

- eGuide for ISO 50001

- EnPI tool

See http://superiorenergyperformance.energy.gov/intro_resource_energy_management.html

- SEP Checklist – Coming soon

- Technical Account Manager

Certified Practitioner in Energy Management System (CP EnMS) Training

- CP EnMS help facilities implement the ISO 50001 and prepare for SEP certification
- Specific skills are required for appropriate application of ISO 50001 and the SEP M&V Protocol
  - Targeted trainees as part of the Accelerator: Utility SEM program implementers
- Training (which is strongly recommended but not mandatory for certification) involves some on-line prep work and 4 days of in-class training
- Exam for CP EnMS is one day and tests knowledge of ISO 50001 standard, energy engineering principles, SEP standards and requirements, and knowledge of industrial energy practices and concepts

http://www.superiorenergyperformance.energy.gov/cp_trainingexams.html

eGuide for ISO 50001

- Meant for organizations that have at least some experience with energy management and that have an energy management system in place.
- Toolkit designed to help organizations improve their current energy management approach and prepare them for becoming ISO 50001 certified. A variety of DOE and EPA resources are available.
- Includes forms, checklists, templates, examples and guidance to assist the Energy Champion and Energy Team throughout the implementation process.
- 7 steps takes the user from the decision to utilize an energy management system, through implementation and into system maintenance.
- Uses a proven continual improvement process and ISO 50001.
- Organizations that complete the eGuide will have a clear understanding of the framework that ISO 50001 establishes for pursuing continual energy improvement.

https://ecenter.ee.doe.gov

Energy Performance Indicator (EnPI) Tool

Purpose

- To assist organizations in calculating energy performance indicators while normalizing for variables such as weather, production, moisture content, etc.

Intended Users

- Better Buildings, Better Plants participants
- Superior Energy Performance participants
- Any organization seeking to create and track facility energy performance over time

http://ecenter.ee.doe.gov/EM/tools/Pages/EnPI.aspx

Benefits of Regression Analysis

- Regression analysis is a statistical technique that estimates the dependence of a variable (typically energy consumption for energy use and intensity tracking) on one or more independent variables, such as ambient temperature, while controlling for the influence of other variables at the same time
- Regression analysis is employed to allow for a more accurate "apples-to-apples" comparisons, holding critical variables constant over time, such as:
  - Weather, e.g., HDDs, CDDs, humidity, etc.
  - Production, e.g., product output, moisture content, raw materials, etc.
  - Space utilization, e.g., changes in conditioned floor space in a building

Technical Account Manager

- An initial resource for the Better Plants partner company on the SEM continuum and explaining where SEP fits
- Helps the partner apply the SEP checklist and perform a gap analysis with current energy management activities
- Helps partner with:
  - Learning more about SEP
  - Resources on SEP website: fact sheet, case studies, M&V Protocol
  - eGuide for ISO 50001
  - EnPI tool

Conclusion

SEP…

- Adds measurement rigor to find low/no cost savings
- Highlights process energy savings; engages process engineers into energy management
- Provides third party verification of savings, which internally strengthens credibility with upper management and externally bolsters the company's public image
- **Supports Better Plants partners in reaching their Better Plants pledge goal**

Enroll Today and begin SEP implementation:

SEP resources can help Better Plant partner facilities achieve verified savings.

Individual plants complete SEP enrollment form. Facilities that enroll in Superior Energy Performance™ (SEP) gain access to resources to help streamline the SEP implementation process, such as program updates, tips, and phone support.

- **Resources to promote SEP to your facilities**:
  - SEP fact sheet: http://www.superiorenergyperformance.energy.gov/pdfs/superior_energy_performance_factsheet.pdf
  - SEP Slide Library: to be available on website in January
  - SEP website: http://superiorenergyperformance.energy.gov/

Questions?

Thank You

Paul Scheihing
Technology Manager, Technical Assistance
Advanced Manufacturing Office
US Department of Energy
paul.scheihing@ee.doe.gov
202-586-7234

http://www1.eere.energy.gov/manufacturing/index.html
http://www1.eere.energy.gov/manufacturing/tech_assistance/index.html