



**Superior  
Energy  
Performance®**  
U.S. DEPARTMENT OF ENERGY

# Superior Energy Performance® program

*Certifying Increased Energy Productivity under ISO 50001*

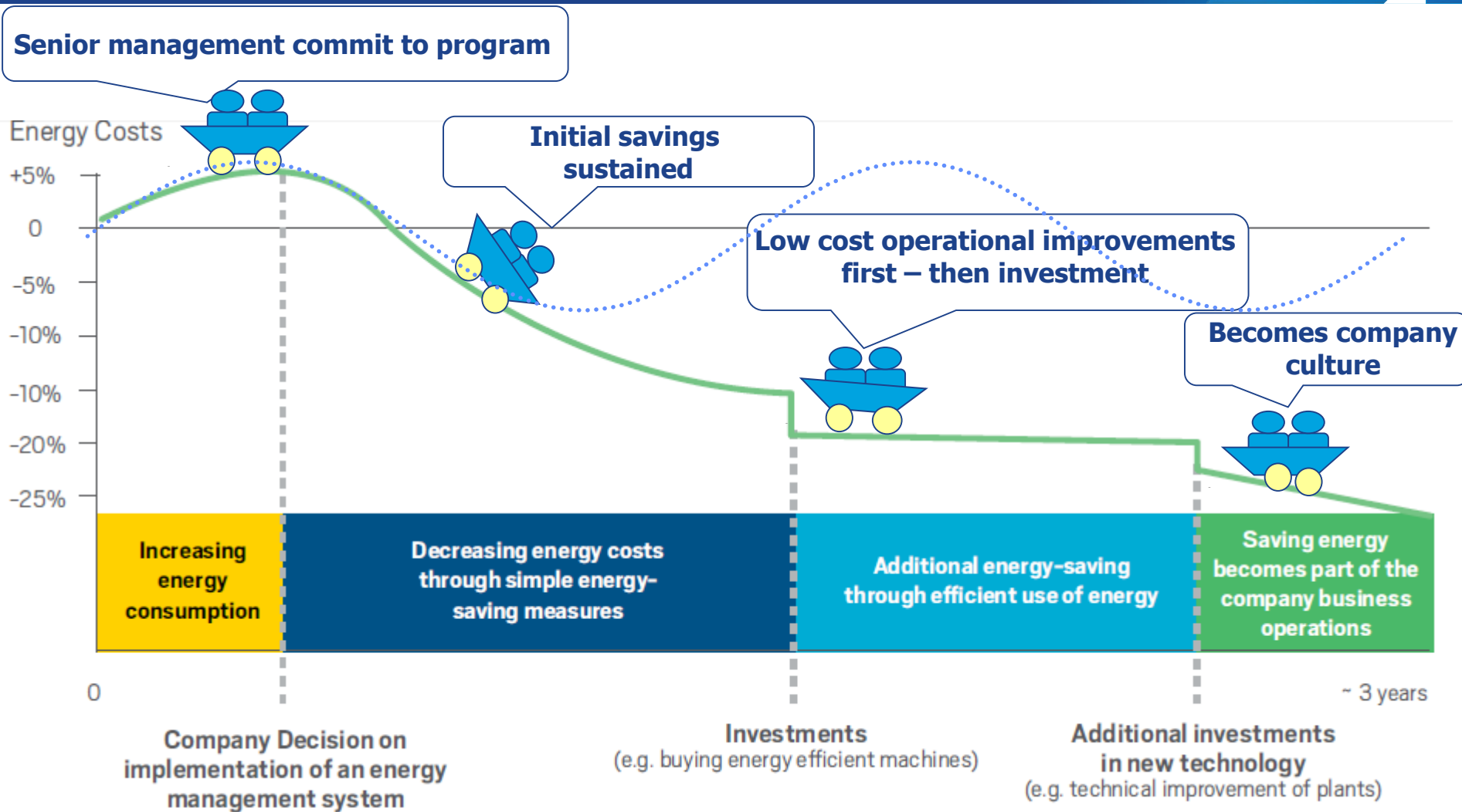
December 8, 2015

Presentation to Council of Industrial Boiler Owners

# Ad hoc Approach to Energy Management

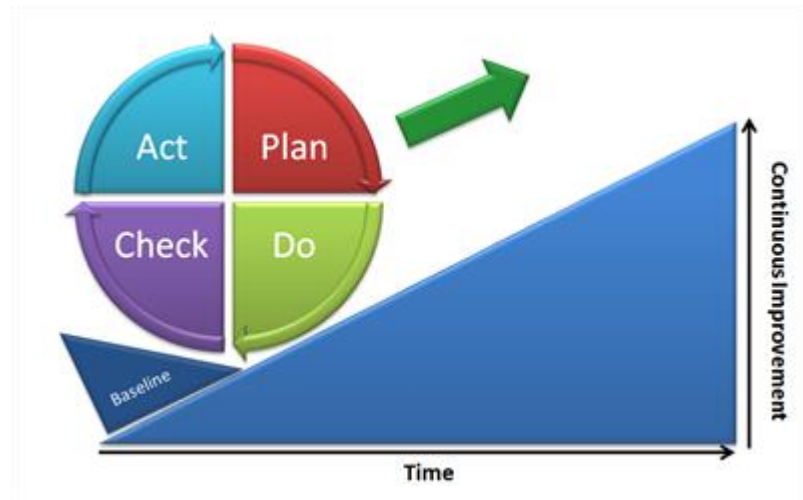


# Structured Approach to Energy Management



# Energy Management System (EnMS)

- Elevates and integrates energy into normal business systems, as has happened for safety & quality
- Involves staff from the board room to the shop floor:  
Organizational change in culture
- Systematic energy management leads to **continual improvements** in energy and cost performance



Energy & cost savings over time

# ISO 50001–Energy Management Systems (EnMS)

International standard that draws from **best practices around the world**. Developed with input from 56 countries, many countries now adopting it as a national standard.

ISO 50001 specifies requirements for establishing, implementing, maintaining and improving an EnMS.

*It does not prescribe specific energy performance improvement criteria.*



Light blue text represents new data-driven sections in ISO 50001 that are not in ISO 9001 & ISO 14001

# Superior Energy Performance® (SEP™)

SEP is a DOE certification program that verifies energy management excellence and sustained energy savings.

## SEP is ISO 50001 plus:

- **Deeper, sustained savings at less cost** through robust tracking and measurement with advanced tools
- **Credible, third-party verification** by ANSI-ANAB accredited entity that market can reward supply chains, utilities, and carbon trading
- **National recognition** by U.S. DOE identifying sustainability leaders



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# Strategic Energy Management (SEM) Continuum

## SEP

Verified energy performance and ISO 50001

### Superior Energy Performance (SEP):

- Rigorous third-party measurement and verification
- **Marginal effort beyond ISO 50001**

## ISO 50001

Standard Energy Management System (EnMS) framework for global operations

- ISO standard for EnMS
- Similar framework to ISO 9001 & ISO 14001
- Third-party certification

## Foundational Energy Management

(e.g., ENERGY STAR For Buildings & Plants)

- Systematic approach
- Operation of many utility SEM programs at this level

# SEP Requirements

SEP certification requires industrial facilities and commercial buildings to meet the ISO 50001 standard and improve energy performance.

## Superior Energy Performance



**ISO 50001  
certification**



**Verified energy  
performance  
improvement**

### Silver

**5%**  
energy performance  
improvement over  
3 years

-or-

15% energy  
performance  
improvement over  
10 years

+

**30** Best Practice  
Scorecard points

### Gold

**10%**  
energy performance  
improvement over  
3 years

-or-

15% energy  
performance  
improvement over  
10 years

+

**61** Best Practice  
Scorecard points

### Platinum

**15%**  
energy performance  
improvement over  
3 years

-or-

15% energy  
performance  
improvement over  
10 years

+

**81** Best Practice  
Scorecard points

Shorter time frames than 3 or 10 years may be allowed, see M&V Protocol for details.



# SEP Certified Facilities and Verified Energy Performance Improvement



Saanichton, BC Canada	<b>30.6%</b>
Smyrna, TN	<b>23.1%</b>
Clovis, CA	<b>16.7%</b>
Seneca, SC	<b>15.6%</b>
Hopkins, SC	<b>10.2%</b>
Tijuana, Mexico	<b>10.2%</b>
Peru, IN	<b>24.9% over 10 years</b>
Cedar Rapids, IA	<b>8.8%</b>
Lexington, KY	<b>6.9%</b>
Lincoln, NE	<b>6.5%</b>
Rojo Gomez, Mexico	<b>5.9%</b>
Mack Trucks, Macungie, PA	<b>41.9% over 10 years</b>
Dublin, VA	<b>28.4% over 10 years</b>
Hagerstown, MD	<b>20.9%</b>



Improvement over 3 years unless stated otherwise

	Brockville, Ontario Canada	<b>21.4% over 7 years</b>
	Cordova, IL	<b>5.6%</b>
	Smyrna, TN	<b>17.7%</b>
	Ontario, NY	<b>16.5%</b>
	Whitakers, NC	<b>12.6%</b>
	Dunedin, FL	<b>12.2%</b>
	Scranton, PA	<b>11.9%</b>
	Wilson, NC	<b>16.8% over 10 years</b>
	Gilroy, CA	<b>9.8%</b>
	Gaithersburg, MD	<b>8.5%</b>
	Cheswick, PA	<b>7.6%</b>
	Carlisle, PA	<b>5.7%</b>

SEP Measurement & Verification Protocol provides robust methodology to track and verify energy performance improvement.

# Savings: Cost-effective, deeper, credible

## Deeper, more rapid savings at less cost

- 2015 study of 10 SEP-certified facilities
  - 12% reduction in energy costs within 15 months of starting to implement SEP, on average
  - Saved over **\$430,000/year** on average from **low/no cost operational improvements**

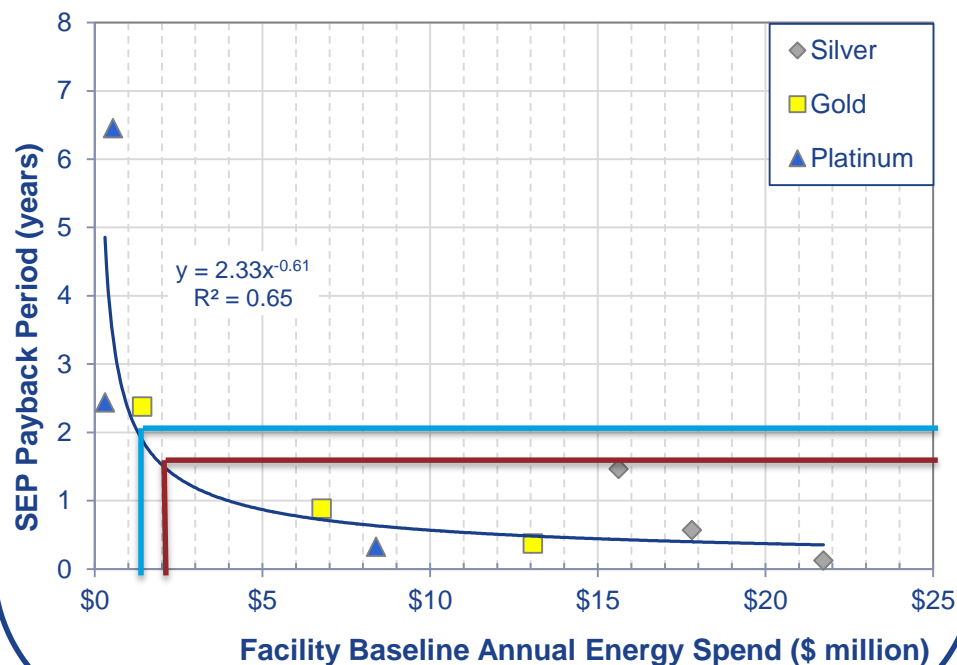
## Credible, third-party verification

- Valuable data and analysis for **higher confidence in energy efficiency investments**

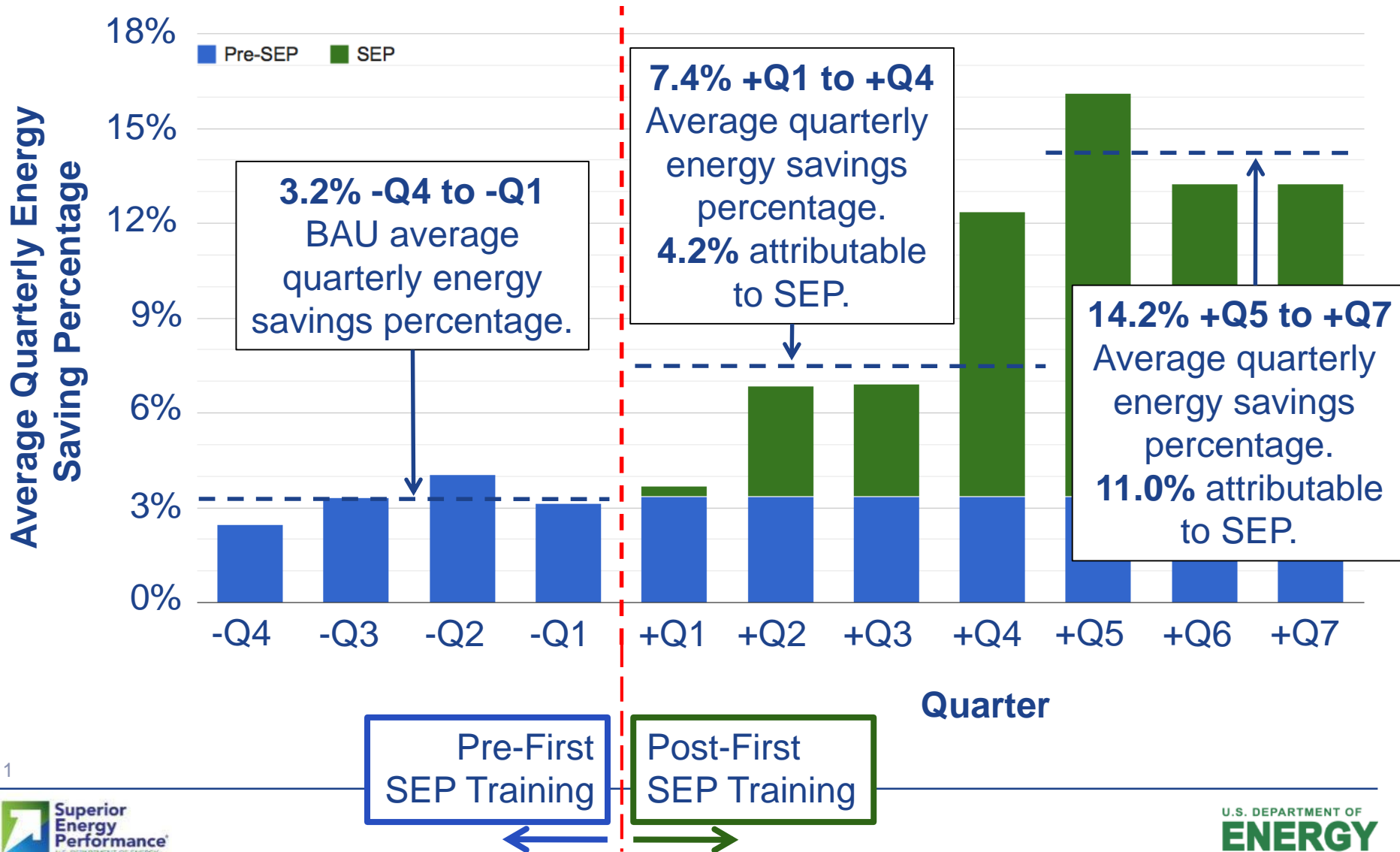
### Payback:

**Less than 2 year payback** for facility with a baseline annual energy spend greater than \$1M

**Less than 1.5 year payback** for facility with a baseline annual energy spend greater than \$2M



# Verified Facility Wide Energy Savings Attributable to SEP



# Nissan: Smyrna, TN



“SEP adds rigor, analysis, and gives good guidance. It’s one thing to have a target and objective, but SEP gives tools that empower you to be more disciplined and prove the impact certain activities have.”

-Nissan North America Energy Team

- **SEP Platinum Certified:**  
Smyrna, TN vehicle assembly plant
- **Sustained achievement:**
  - 2015 Recertified SEP Platinum
    - 17.7% improvement in energy performance over 3 years
    - **6 week payback**
  - 2012 Certified SEP Silver
    - **\$938,000 total annual energy savings; 7.2% improvement over 3 years**
    - **4 month payback**
- **Used DOE EnPI Tool** to measure & track improvements



# HARBEC Inc.: Ontario, NY



HARBEC Inc. President, Bob Bechtold, and Energy Team Amy Bechtold and Jeff Eisenhauer.

“We are wary of statements of intent, but third-party verification under SEP provides evidence of proven energy savings. Without verification, stated savings are just a nice statement.”

- Bob Bechtold, President

2013-16 | PLATINUM



- **SEP Platinum Certified:** Ontario, NY, facility
- 16.5% improvement in energy performance over 3 years
- \$52,000 in annual savings through operational improvements ***with no capital investment***
- SEP is the organizing framework in driving the company's goal to be a ***carbon-neutral company***
- Adopted a CHP system and two wind turbines
  - ISO 50001/SEP strengthens management of this equipment, increasing the benefits gained



# Land O'Lakes: Carlisle, PA



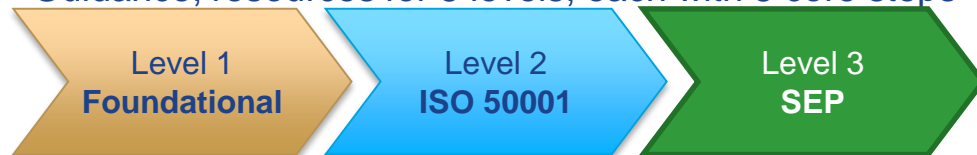
- **SEP Silver Certified:** Carlisle, PA facility
- First dairy manufacturer to be SEP and ISO 50001 certified
- 5.7% improvement in energy performance over 3 years
- DOE Better Plants Partner

# Tools and Resources for SEP

Accelerate SEP implementation with SEP tools and resources:

**DOE eGuide**: Use this comprehensive, step-by-step online toolkit to implement ISO 50001 and SEP [energy.gov/eguide](https://energy.gov/eguide)

Guidance, resources for 3 levels, each with 5 core steps



Step 1: Engage Management

Step 2: Plan for Energy Management

Step 3: Implement Energy Management

Step 4: Measure and Check Results

Step 5: Review for Continual Improvement

Widely applicable: Industrial end users, commercial end users, federal & state public facilities, university campuses, utilities & program administrators

**Energy Footprint Tool**: Helps to establish a basic understanding of the facility energy consumption and use as well as the specific application energy consumption.

<https://ecenter.ee.doe.gov/EM/tools/Pages/EnergyFootprint.aspx>

( or Google “DOE energy footprint tool” )

**EnPI Tool**: Enter energy consumption data, adjust for variables for a normalized view of energy performance & calculate SEP metrics [energy.gov/enpi](https://energy.gov/enpi)



# Certified Professionals that Support SEP

**SEP is building workforce capacity for energy management implementation and measurement & verification.**

Training and skill are required for appropriate application of the ISO 50001 and SEP standards, and to conduct the SEP certification audit.

- **Certified Practitioners in EnMS (CP EnMS):**  
Help facilities implement an ISO 50001 energy management system and prepare to meet SEP requirements.  
  
Find a CP EnMS:  
[http://ienmp.org/pro\\_search/index.php?action=1](http://ienmp.org/pro_search/index.php?action=1)  
  
Become a CP EnMS:  
[energy.gov/eere/amo/become-energy-management-professional](http://energy.gov/eere/amo/become-energy-management-professional)
- **SEP Lead Auditors:**  
Assess a facilities energy management system conformance to ISO 50001 and additional SEP requirements
- **SEP Performance Verifiers:**  
Assess a facility's conformance to the (1) measurement and verification protocol and (2) SEP energy performance improvement requirements.

# SEP Expansion: Implementation across multiple facilities to reduce costs

Companies are testing strategies to implement SEP across multiple facilities and benefit from economies of scale.

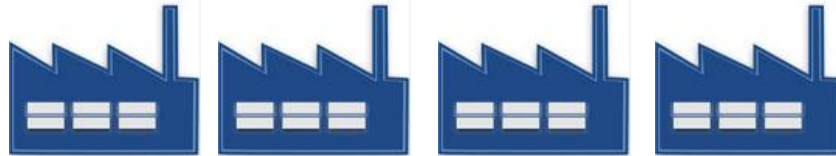
Central office works with facility staff - reduce level of effort & auditing costs per facility

Central office



ISO 50001 certification audit at enterprise-wide level

and facilities



ISO 50001 EnMS conformance sampled at facility level

SEP energy performance improvement verified at each facility

- 28 participating facilities from 5 companies:
  - 3M Company
  - Cummins
  - General Dynamics
  - Nissan North America
  - Schneider Electric
  - Participating sites in U.S., Canada, and Mexico

# SEP Expansion

Organizations beyond industrial are using SEP to achieve energy and savings goals.

- Commercial building pilots
  - Hospitality sector
  - University campus
- International
  - **North American initiative**
  - ISO 50001 Lead Auditor
  - Clean Energy Ministerial—  
Energy Management Working  
Group (EMWG)
- Water/wastewater
  - Des Moines, IA (2)
  - Delta Diablo, CA
  - Ithaca, NY
  - Kent County, DE
  - Victor Valley, CA
  - Alexandria (VA) Renew  
Enterprises
- Federal
  - DOD contractors
  - DOE national labs

# North American Energy Management Program

- An initiative of the CEC in partnership with
  - Natural Resources Canada
  - *Comisión Nacional para el Uso Eficiente de la Energía*
  - US Department of Energy (USDOE) Superior Energy Performance program.
- The CEC facilitates cooperation to foster the conservation, protection, and enhancement of the North American environment for the benefit of present and future generations.

Website: [www.cec.org](http://www.cec.org)

## Commission for Environmental Cooperation

Canada, Mexico and the United States created the CEC in 1994 as part the North American Agreement on Environmental Cooperation, a side agreement to NAFTA.



# Elements of the Program

A collaborative initiative between the U.S., Canadian and Mexican governments, national standard bodies, industry, and cities will strive to:

1. establish an accreditation system for ISO 50001 auditors and SEP programs recognized throughout North America;
2. jointly develop tools and training to assist end users to adopt ISO 50001 and SEP across North America; and
3. demonstrate the benefits of ISO 50001 and SEP through pilot projects focused on the North American truck and bus supply chain, municipal facilities, and other segments of the commercial and industrial sector agreed to by participants.

# North American Energy Management Pilot Program

**Objective:** Accelerate energy and cost savings and reduce GHG emissions in industrial and commercial sectors through energy management training to implement ISO 50001 standards and Superior Energy Performance (SEP).

The aim is to train 15 large companies with facilities across North America.

# Pilot Program Overview

## Implement in priority sectors across North America

- 5-6 companies to be selected from each country (10-15 facilities, maximum of 30 trainees)
- Three 2.5-day training sessions + coaching for one facility (Feb 2016 to June 2017). See program description at [www.cec.org/energy\\_program](http://www.cec.org/energy_program)
- Cost-sharing:
  - Companies: US\$12,000 per company for up to three facilities in one training location (program value US\$30,000)
    - *Training costs waived for any selected DOE Better Plants Partners*
- Other costs borne by the company:
  - Travel costs for trainees
  - Implementation and certification costs

## Disseminate success and exchange best practices

- Case studies for selected companies
- Peer learning networks



# Resources Offered

**Three 2-1/2-day workshops over 18 months:** Training workshops to implement ISO 50001 and meet criteria for Superior Energy Performance® and one-on-one monthly company coaching provided by certified energy consultants to one facility.

**1. PLAN:** First workshop defines key elements of planning:

- Understand facility's current energy management environment
- Develop energy policy and set organizational goals to adhere to it
- Establish a baseline of energy consumption
- Set performance indicators and review processes

**2. DO:** Second workshop focuses on successful tactical implementation:

- Use baselines to set targets and implement action plans
- Build energy awareness through the organization
- Advance energy management system competencies through training

**3. CHECK/ACT:** Third workshop measures your improvement curve:

- Use performance indicators to measure success
- Create corrective and preventive action processes
- Prioritize objectives

# Resources Offered, Continued

## **Assigned coaching teams**

Each partner company will be assigned an experienced EnMS coaching team for one of its facilities.

## **Monthly online training webinars and coaching calls**

In addition to the three multi-day training workshops, training webinars and coaching calls with each CEC Partner's implementation

## **Implementation tools**

Topic-specific ISO 50001 implementation tools and related resources will be introduced in the face-to-face group training workshops for each phase and in the monthly webinars.

## **Defined deliverables (including homework)**

*A Deliverables and Events Schedule* will guide the team activities in each phase of the EnMS implementation process.

## **Readiness Review**

After the EnMS has been fully implemented and in operation for 30 to 60 days, an experienced audit team will conduct a "Readiness Review" of the entire EnMS.

# Selection Criteria for Partner Companies

- Senior-level commitment to energy management and energy performance improvement
- Experience with energy management systems
- Desire to pursue ISO 50001 or Superior Energy Performance® certification
- Priority given to companies with facilities in all three countries: Canada, Mexico, and United States
- Willingness to expand ISO 50001/SEP implementation to other North American or global facilities

# Application Process

- Interested companies can apply online at [www.cec.org/energy\\_program](http://www.cec.org/energy_program) until 8 January 2016.
- Interviews will be scheduled with eligible applicants to explore their level of readiness and commitment and to clarify training objectives and logistics.
- Selected applicants will be asked to sign a Partnership Agreement and assign a team of energy management personnel for the duration of the program.

## Paul Scheihing

Technology Manager, Technical Assistance

Advanced Manufacturing Office

US Department of Energy

[paul.scheihing@ee.doe.gov](mailto:paul.scheihing@ee.doe.gov)

1-202-586-7234

[energy.gov/eere/amo](http://energy.gov/eere/amo)

[energy.gov/eere/amo/ta](http://energy.gov/eere/amo/ta)



Learn more:

[energy.gov/isosep](http://energy.gov/isosep)

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# Additional Slides

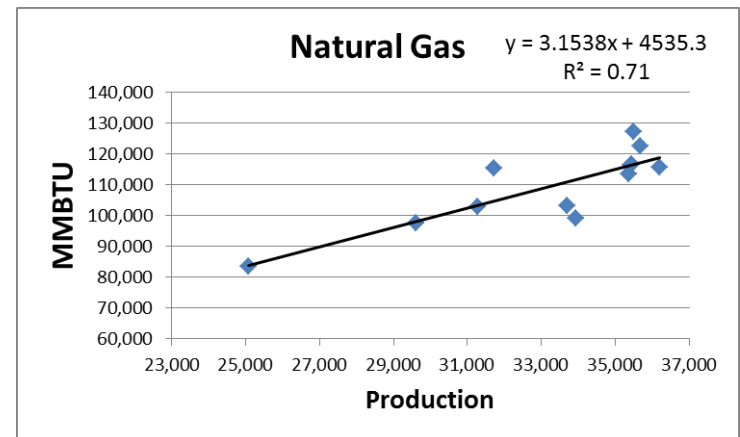
# SEP Measurement & Verification

## SEP energy performance is demonstrated by:

1. Top-down, whole facility SEP EnPI (“SEnPI”)

$$SEnPI = \frac{BTU_{Tot\ actual}}{BTU_{Tot\ expected}}$$

Where  $BTU_{Tot\ expected} = f(X1, X2, \dots Xn)$



2. Bottom-up sanity check

Project-specific energy saving estimates based on engineering calculations give confidence in top-down result



# Better Plants complements SEP

## DOE's Better Plants

### Corporate-wide Recognition

*Aspirational Focus:*

Pledge to improve energy performance by **25% in the next 10 years**

## Superior Energy Performance

### Facility-level Certification

*Achievement Focus:*

Energy performance improved **5% or more over past 3 years or 15% or more over past 10 years**

### Better Plants Helps SEP Participants

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

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

### SEP Helps Better Plants Partners