



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

Introduction to the Superior Energy Performance[®] program

Certifying Increased Energy Productivity under ISO 50001

July 2016

Deloitte Sustainability Survey

A global survey in 14 countries of 250 CFOs

Key findings:

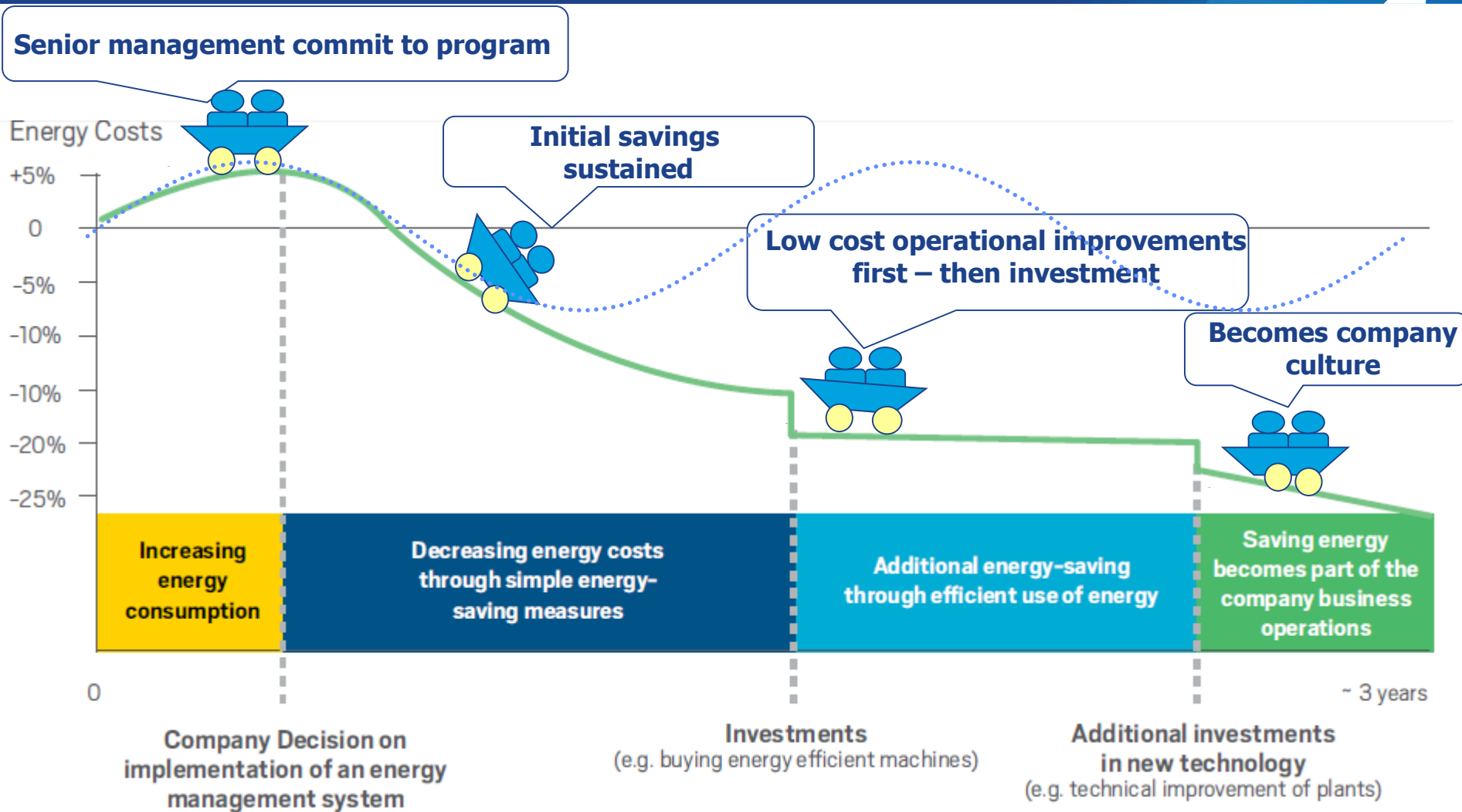
- Energy tops CFOs list of sustainability issues**
 - Energy management is viewed as a challenging issue and energy prices are viewed as a significant risk.**
 - More robust, verifiable data is needed** to report performance and risk.
- only 12% of CFOs consider the level of their sustainability data to be excellent
 - the quality and credibility of energy data will become more important

Source: The 2012 Sustainability & the CFO Survey. Conducted by Verdantix on behalf of Deloitte, 2012

Ad hoc Approach to Energy Management

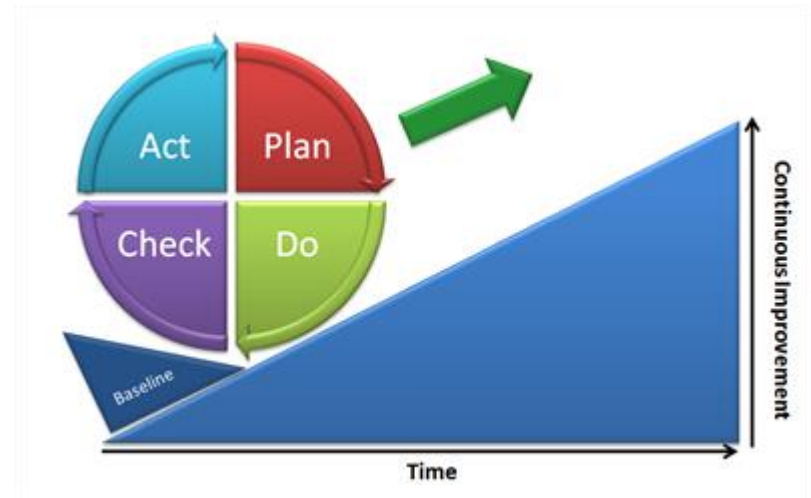


Structured Approach to Energy Management



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™)

Leaders in energy management and performance

- Achieving up to \$1 million in annual savings
- Significant savings from operational improvements with no capital investment
- Reducing carbon emissions, with third-party verified energy performance improvement

Through certification to Superior Energy Performance...



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



iStock photo: 16418416

SEP Certification



ISO 50001 certification



Verified energy performance improvement

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

PLATINUM

3M Canada Company Brockville, Ontario, Canada
Cummins, Inc. Columbus, IN
Detroit Diesel Corporation Detroit, MI
HARBEC Inc. Ontario, NY
Hilton Washington, DC
JW Marriott Hotel Washington, DC
Mack Trucks Macungie, PA
Nissan NA Smyrna, TN
Rexroth Bosch Corporation Bethlehem, PA
Schneider Electric Saanichton, British Columbia, Canada
Schneider Electric Costa Mesa, CA
Schneider Electric West Kingston, RI
Schneider Electric Smyrna, TN
Schneider Electric Clovis, CA
Schneider Electric Seneca, SC
Volvo Group Trucks Hagerstown, MD
Volvo Trucks, NA Dublin, VA

GOLD

3M Company Aberdeen, SD	3M Company Hutchinson, MN
Coca-Cola Refreshments USA, Inc. Dunedin, FL	
Cummins, Inc. Whitakers, NC	
Schneider Electric Columbia, MO	Schneider Electric Peru, IN
Schneider Electric Hopkins, SC	Schneider Electric Tijuana, Mexico
Schneider Electric Apodaca, Mexico (Monterrey 2)	

SILVER

3M Company Cordova, IL	Hilton San Francisco, CA
3M Company Cynthiana, KY	Hilton Honolulu, HI
3M Company Decatur, AL	MedImmune Gaithersburg, MD
3M Company Prairie du Chien, WI	Schneider Electric Apodaca, Mexico (Monterrey 3)
Bridgestone Wilson, NC	Schneider Electric Cedar Rapids, IA
Curtiss-Wright Cheswick, PA	Schneider Electric Lexington, KY
Land O' Lakes Carlisle, PA	Schneider Electric Lincoln, NE
	Schneider Electric Rojo Gomez, Mexico

SEP Certified Facilities and Verified Energy Performance Improvement

Improvement over 3 years unless stated otherwise

	Saanichton, BC Canada	30.6%		Brockville, Ontario Canada	21.4% / 7 yrs
	Smyrna, TN	23.1%		Aberdeen, SD	11.0%
	Clovis, CA	16.7%		Hutchinson, MN	10.7%
	Seneca, SC	15.6%		Cynthiana, KY	6.9%
	Peru, IN	24.9% / 10 yrs		Cordova, IL	5.7%
	Costa Mesa, CA	23.4%/15 mo's		Decatur, AL	5.2%
	West Kingston, RI	20.0%		Prairie du Chien, WI	5.2%
	Columbia, MO	13.3% / 1 yr		Columbus, IN	16.8%
	Apodaca, Mexico (Monterrey 2)	11.3%		Whitakers, NC	12.6% / 2 yrs
	Hopkins, SC	10.2%		Detroit, MI	32.5% / 10 yrs
	Tijuana, Mexico	10.2%		Smyrna, TN	17.7%
	Cedar Rapids, IA	8.8%		Bethlehem, PA	17.0%
	Apodaca, Mexico (Monterrey 3)	7.8%		Washington, DC	16.5%
	Lexington, KY	6.9%		Ontario, NY	16.5%
	Lincoln, NE	6.5%		Dunedin, FL	12.2% / 2 yrs
Rojo Gomez, Mexico	5.9%		Wilson, NC	15.1% / 10 yrs	
Washington, DC	15.9%		Gaithersburg, MD	8.5%	
	Honolulu, HI	8.4%		Cheswick, PA	7.6%
	San Francisco, CA	6.3%		Carlisle, PA	5.7%
		Mack Trucks, Macungie, PA	41.9% / 10 yrs		
Dublin, VA		28.4% / 10 yrs			
Hagerstown, MD		20.9%			
					
					

Last updated: July 7, 2016

ENERGY

Measurement and Verification Guiding Principles

M&V Principles	SEP M&V Protocol
Transparency	<input checked="" type="checkbox"/> Requires transparent data and calculations
Completeness	<input checked="" type="checkbox"/> Data sources for SEnPI calculations of sufficient quality to be verified
Balance certainty of results with cost to achieve results	<input checked="" type="checkbox"/> Balances rigor with industry practicality
Relevant data	<input checked="" type="checkbox"/> Specifies required data
Consistency	<input checked="" type="checkbox"/> Designed to maximize consistency among users

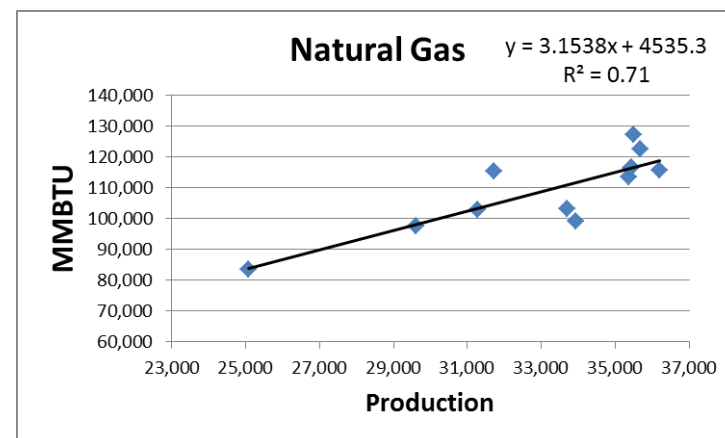
SEP Measurement & Verification

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

SEP M&V Protocol: <http://www.energy.gov/eere/amo/downloads/superior-energy-performance-measurement-and-verification-protocol-industry>

Annual Cost Savings

Company	Facility	Annual Savings	Payback
Cummins	Rocky Mount Engine Plant, Whitakers, NC facility	\$716,000	11 months
General Dynamics	Scranton, PA facility	\$956,000	6 months
Nissan	Smyrna, TN facility – initial certification	\$938,000	6 weeks
Nissan	Smyrna, TN facility – recertification	\$748,000	5 weeks
Volvo Trucks	Dublin, VA facility – initial certification	\$866,000	4 months

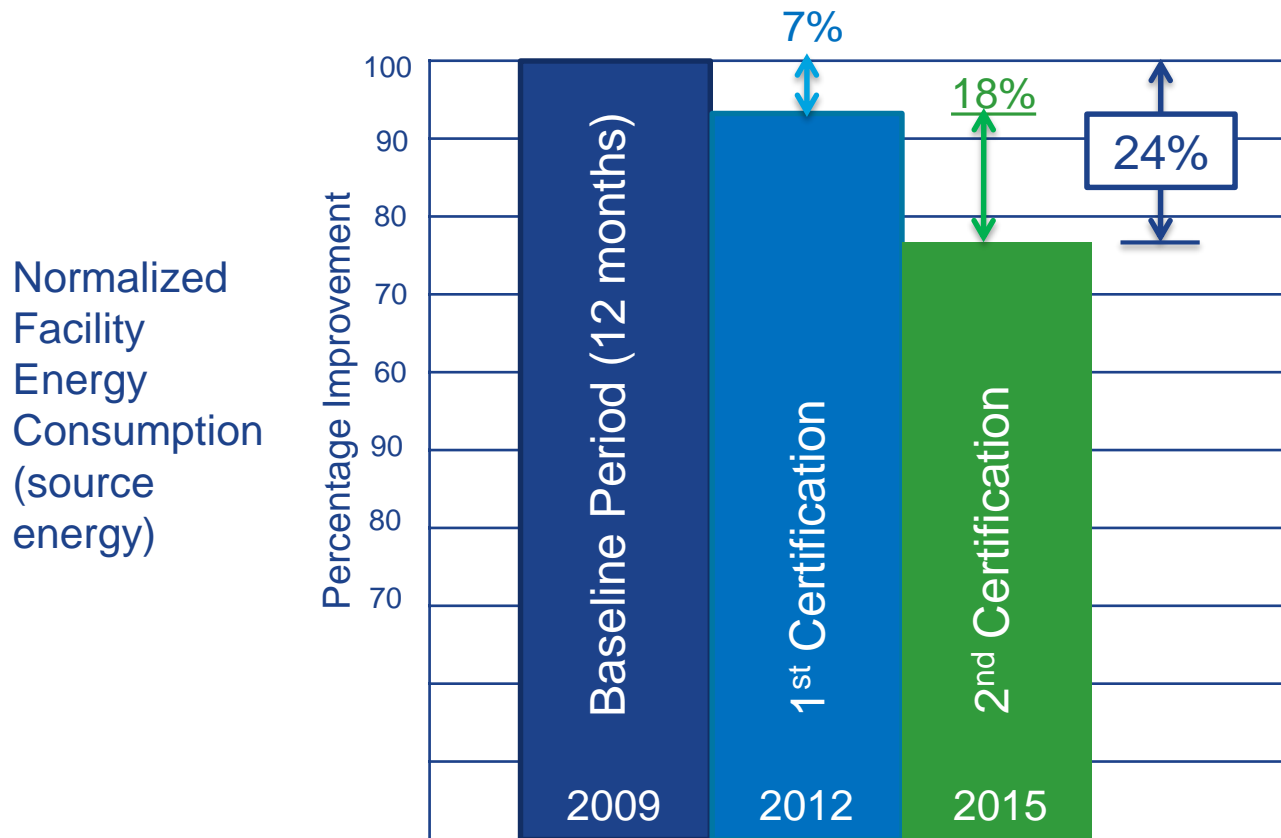
“SEP verification provides the ability to have proven performance metrics to quantify actual savings, giving both internal and external credibility to savings claims.”

*Volvo Trucks
Dublin, VA*

2015 study of 10 SEP-certified facilities:

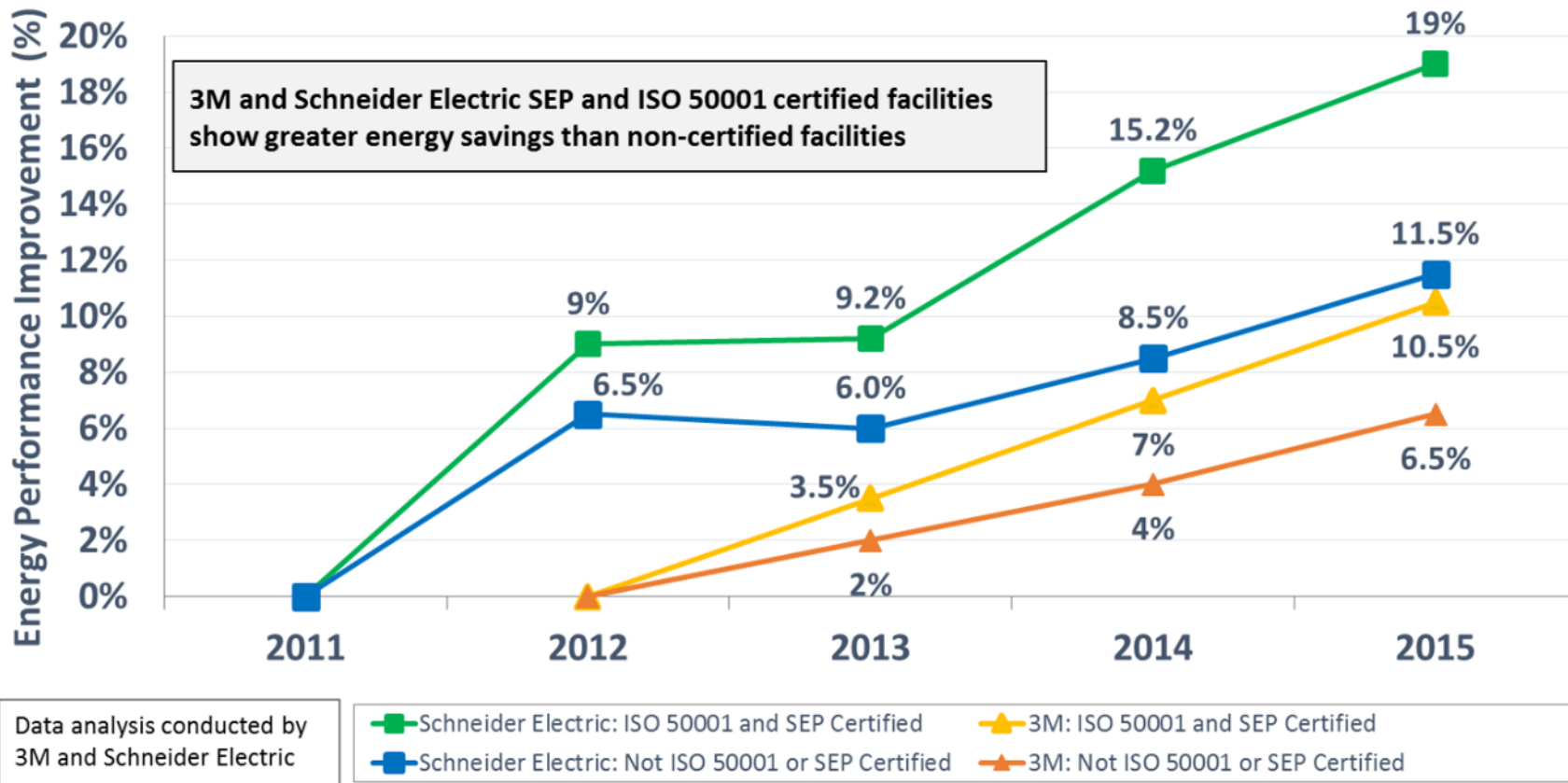
- **Average 12% reduction in energy costs** within 15 months of starting to implement SEP
- Saved over **\$430,000/year** on average from **low/no cost operational improvements**

Recertified Facilities Show Continual Energy Performance Improvement



Nissan – Smyrna, TN facility

ISO 50001 and SEP Certified Facilities Outperform Company Peers



Savings at certified facilities greater on average compared to non-certified facilities:

- **3M: 62% greater over 3 years:** 18 ISO 50001 certified sites across 7 countries; 2 US SEP, 1 Korea SEP certified; 257 non-ISO 50001
- **Schneider Electric: 65% greater over 4 years:** 20 ISO 50001 certified in North America; 16 US SEP certified; 30 non-ISO 50001

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 SEP implementation, on average
 - Saved over **\$430,000/year** on average from **low/no cost operational improvements**

Credible, third-party verification

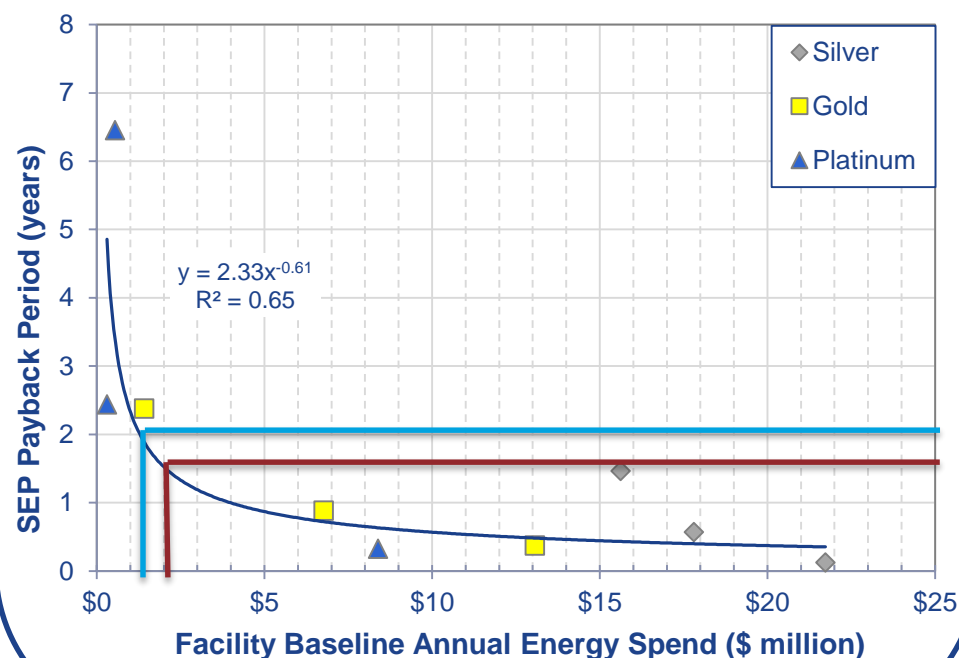
- Valuable data and analysis for **higher confidence in energy efficiency investments**

www.energy.gov/eere/amo/downloads/sep-2015-cost-benefit-analysis-paper

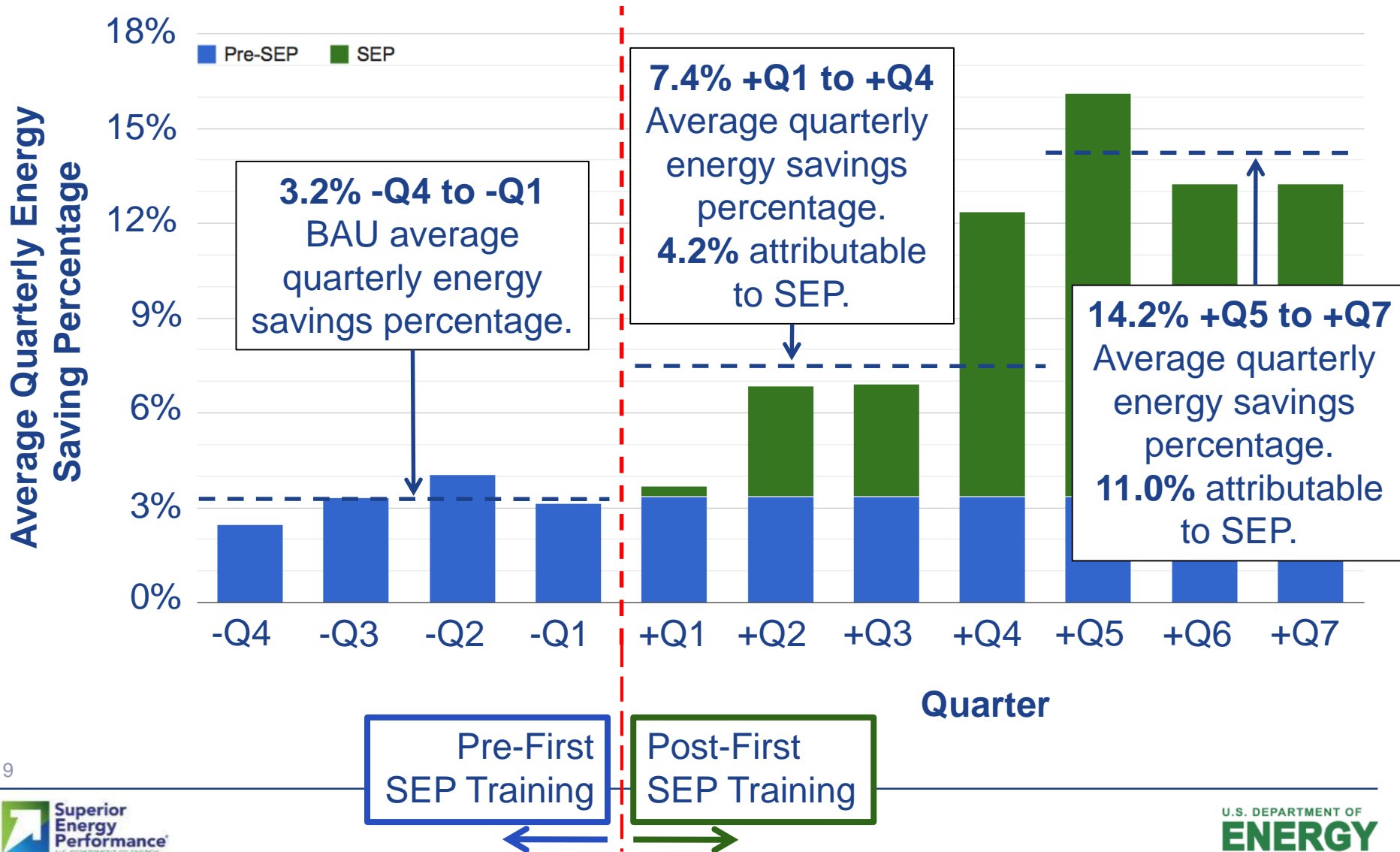
Payback:

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



SEP Certification Process

1

Enroll

Gain access to SEP resources such as program updates, tips, and phone support. No fees or commitment required, enroll today!

2

Prepare

Implement an EnMS in your facility and work towards meeting SEP requirements; see DOE tools, such as the eGuide

3

Apply

Submit an application to the SEP Administrator, no fees. Once approved, the application will be sent to your selected SEP Verification Body.

4

Verify

The SEP Verification Body uses certified auditors to verify conformance to SEP requirements and issues SEP and ISO 50001 certificates.

Recognize Achievement and Maintain Momentum

Your facility will receive recognition from the SEP Administrator, currently the U.S. DOE. SEP certification is valid for three years, as long as your facility completes the annual surveillance audits to confirm continued EnMS maintenance (an ISO 50001 requirement).

View full details at: www.energy.gov/eere/amo/sep-and-iso-50001-certification-process

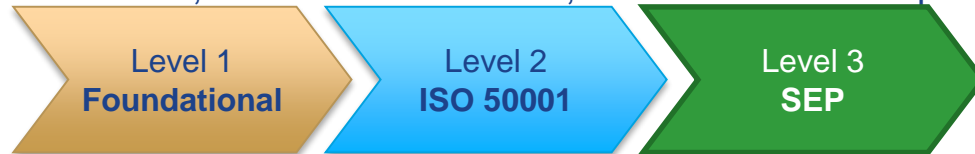
Find an SEP Verification Body: www.energy.gov/eere/amo/sep-and-iso-50001-certification-process#choose-a-VB

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

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

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

More SEP resources at:

energy.gov/eere/amo/toolbox-and-expertise:

- **Strategic Energy Management Checklist**: High-level assessment to determine readiness for SEP or ISO 50001 & define practical next steps
- **System Assessment Standards**: Assess specific energy systems (compressed air, process heating, pumping, and steam) to help identify opportunities
- **DOE Tools and Training**: Resources on specific energy systems, webinars & more

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

Become a CP EnMS:
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 benefits facilities of all sizes,

Some of your sites may have the strongest business case



Even a small facility saved \$50K+ a year from operational energy cost savings
Less than 2.5-yr payback

Source: HARBEC case study



Those with an annual energy spend < \$2 million
Less than 2-year payback



Annual energy spend > \$2 million
Less than 1.5-year payback

Source: Development of an Enhanced Payback Function of the Superior Energy Performance Program, LBNL, 2015.

SEP Expansion: Implementation across multiple facilities to reduce costs

A single facility can participate in SEP. Also, companies can implement SEP across multiple facilities to benefit from economies of scale, see below.

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 are testing these strategies:
 - 3M Company
 - Cummins, Inc.
 - General Dynamics
 - Nissan North America
 - Schneider Electric
 - Participating sites in U.S., Canada, and Mexico

SEP Expansion: Industrial Ratepayer-funded Program Accelerator

Utilities and program administrators (PAs) are working with DOE to offer SEP for their industrial customers.

Benefits to utilities and PAs:

- Cost effective, persistent energy savings
- Additional energy savings projects identified addressing all energy uses
- Option to provide higher value to customers and regulators by offering measurement and verification of projects
- Opportunities to improve relationships with high value customers

SEP Expansion: Industrial Ratepayer-funded Program Accelerator

DOE offers a toolkit to help utilities and Program Administrators (PAs) develop SEP offerings. The toolkit provides SEP program information, cost-effectiveness tools, and guidance and tools for program plans and reports.

Industrial Ratepayer-Funded SEP Toolkit:

- **SEP Guide for the Development of Energy Efficiency Program Plans (“Program Planning Guide”)**
- **SEP Program Planning Template**
- **Cost Effectiveness Screening Tool** to estimate SEP benefits & costs
- **Program Transition Tables** for info on level of effort moving between SEM, ISO 50001 and SEP, from perspectives of PA and customer
- **SEP Presentations:** general, for PAs, and for customers
- **Utility EM&V Resources**

SEP Expansion

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

- Commercial building pilots
 - Hospitality sector
 - University campus
- International
 - North American Energy Management Pilot Program (NAEMPP)
 - www.cec.org/energy_program
 - ISO 50001 Lead Auditor Certification
 - www.epicertified.org
 - Clean Energy Ministerial—Energy Management Working Group (EMWG)
 - www.cleanenergyministerial.org/EnergyManagement
- Water/wastewater
 - Delta Diablo, Antioch, CA
 - Victor Valley, Victorville, CA
 - Alexandria Renew Corporation, Alexandria, VA
 - Des Moines Water, Des Moines, IA
 - Kent County Water/WWT, Dover, DE
 - City of Laredo, Laredo, TX
 - Utilities, Inc., Charlotte, NC
- Federal
 - DOD contractors
 - DOE national labs

Paul Scheihing

Technology Manager, Technical Assistance

Advanced Manufacturing Office

US Department of Energy

paul.scheihing@ee.doe.gov

1-202-586-7234

energy.gov/eere/amo

energy.gov/eere/amo/ta



Learn more:

energy.gov/isosep

superiorenergyperformance@ee.doe.gov

Stay updated on SEP News

- Visit energy.gov/isosep
- Look to the bottom of the navigation links on the right hand side
- Enter your email in the box to receive the latest SEP news & program updates, notification on upcoming webinars, etc.
- Unsubscribe anytime!



ENROLL OR APPLY TODAY

NAVIGATE THE SEP SITE

Superior Energy Performance

SEP and ISO 50001 Certification Process

The Business Case for SEP

Case Studies

Certified Facilities

Toolbox and Expertise

SEP Webinars

About SEP

About ISO 50001

Contact SEP

RECEIVE SEP UPDATES

Enter your email address to receive updates about the SEP Program.

SUBSCRIBE

Additional Slides

SEP Program Update – Refinement

DOE is refining SEP to improve and simplify the program based on experiences and feedback to date. Improvements include:

- **Single, unified scoring system and qualification pathway** combines best features of the Energy Performance and Mature Energy Pathways
- Provide **flexibility in setting facility baseline year to align with corporate or enterprise**; enable companies to more easily expand SEP participation across facilities
- **Motivate plants to enhance energy management programs** through use of the Scorecard at Gold and Platinum levels
- **For recertification, provide practical and flexible energy performance improvement requirement** that is sustainable over multiple certification cycles

Certification to updated program design anticipated by Fall 2016

- SEP standards and protocols to be updated and peer reviewed
- Current program will continue to be available during a transition period

SEP Program Update – Preview

Initial Certification

SEP - Initial Certification

Performance Levels



**ISO 50001
certification**



**Verified
energy
performance
improvement**

	Bronze	Silver	Gold	Platinum
Achievement period	Energy Performance Improvement			
12-36 months (1-3 yrs)	1%		5%	
37-48 months (~3-4 yrs)	N/A		7%	
49-60 months (~4-5 yrs)	N/A		8%	
61-72 months (~5-6 yrs)	N/A		10%	
73-84 months (~6-7 yrs)	N/A		12%	
85-96 months (~7-8 yrs)	N/A		13%	
97-108 months (~8-9 yrs)	N/A		15%	
109-120 months (~9-10 yrs)	N/A		16%	

Certification to this updated program design anticipated by Fall 2016.

Current program will continue to be available during a transition period.

+ 40 SEP
Scorecard
credits,
including:

20 points for
Energy
Management
System

+ 60 SEP Scorecard
credits, including:

35 points for Energy
Management
System
- and -
10 points for
Advanced Practices
and Additional
Energy
Performance

SEP Program Update – Preview

Recertification

SEP - Recertification

Performance Levels



	Bronze	Silver	Gold	Platinum
Achievement period	Energy Performance Improvement			
12-36 months (1-3 yrs)	1%		3%	
37-48 months (~3-4 yrs)	1% over most recent 3 years		3% over most recent 3 years	
49-60 months (~4-5 yrs)	1% over most recent 3 years		3% over most recent 3 years	
61-72 months (~5-6 yrs)	1% over most recent 3 years		3% over most recent 3 years	
73-84 months (~6-7 yrs)	1% over most recent 3 years		3% over most recent 3 years	
85-96 months (~7-8 yrs)	1% over most recent 3 years		3% over most recent 3 years	
97-108 months (~8-9 yrs)	1% over most recent 3 years		3% over most recent 3 years	
109-120 months (~9-10 yrs)	1% over most recent 3 years		3% over most recent 3 years	
			+ 40 SEP Scorecard credits, including: 20 points for Energy Management System	+ 60 SEP Scorecard credits, including: 35 points for Energy Management System - and - 10 points for Advanced Practices and Additional Energy Performance

Certification to this updated program design anticipated by Fall 2016.
Current program will continue to be available during a transition period.

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