



Better Buildings Accelerator: Industrial Superior Energy Performance Meeting

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Better Buildings Industrial SEP Accelerator: Enterprise-wide

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SEP Accelerator Purpose

The Better Buildings Industrial SEP Accelerator is designed to demonstrate cost savings from implementing SEP enterprise-wide, as well as to demonstrate strategic energy management through SEP as an effective ratepayer-funded energy efficiency program offering for industrial facilities.

There are two engagement opportunities:

1. Ratepayer-funded Program Partners are utilities and energy efficiency program administrators that agree to work towards deployment of SEP to manufacturers across their service territories.
2. Enterprise-wide offers Partners an opportunity to implement International Organization for Standardization (ISO) 50001 and SEP enterprise-wide, such as across a corporation, business unit, or multiple plants to achieve greater energy cost savings.

SEP Accelerator

- **Accomplishments to Date**

Conducted gap assessments at 5 of 6 enterprise-wide partners

Prepared flexible training curriculum for partners to accommodate use of existing and new SEP program design.

Prepared SEP communication package for SEP Ratepayer-funded program partners and their customers.

Completed utility and SEP program descriptions from which to build GAP analysis for ratepayer-funded partners

Identified Certified Practitioners EnMS training opportunities for ratepayer-funded partners

SEP Enterprise-Wide Accelerator

- **Review of SEP Enterprise-Wide Accelerator:**
responsibilities, commitment involved
- **Data collection and modeling / sampling strategy**
- **Recap of findings from gap assessments at enterprise-wide companies**
- **Overview of training**

SEP Enterprise-Wide Accelerator

- **Review of SEP Enterprise-Wide Accelerator:**
responsibilities, commitment involved

SEP Enterprise-Wide Accelerator

Purpose

- Clearly *define the relationship* between ISO 50001 at the enterprise (which could be at a corporate or division level, or a subset of facilities) and at the SEP facility level
- Provide a *continual improvement pathway* across an entire company or division to:
 - Apply corporate or division level ISO 50001-conformant elements of an energy management system (EnMS) to facilities seeking SEP certification
 - Provide an overall structure for expanding the number of SEP certified facilities over time in a flexible manner
 - Create a platform for sharing EnMS and SEP implementation best practices across a company or division
 - **Increase cost efficiencies and economies of scale. Goal is to reduce SEP implementation cost by 20 percent on a per facility basis.**

SEP Enterprise-wide Accelerator Assumptions

- ISO 50001 certification must be from an accredited SEP Verification Body
- Verification of energy performance improvement will occur at the facility level
- EnMS resides at an enterprise level
- The Facility owns:
 - The data
 - Objectives, targets, and action plans
 - Monitoring and measurement
- Technical resources can be shared across facilities

SEP Program Transition: SEP Enterprise-wide and New SEP Program Design

Enterprise-wide Accelerator

- Training and coaching to assist with company implementation
- Gap assessment of current energy management processes as compared to ISO 50001 requirements (corporate/enterprise) and SEP (facility)
- EnMS sampling approach to make auditing more streamlined and cost effective
- Initial testing of offsite sampling methodologies for SEP performance verification (not used in certification audit)
- Testing of reporting and data collection process

New SEP Program Design

Enterprise-wide participating companies will have the option of applying the new SEP program design in certification audits by June 2015

SEP program elements to be modified

- Revised SEP Scorecard with integrated point system and updated SEP M&V Protocol
- ANSI MSE 50021-- SEP additional requirements

SEP Enterprise-Wide Accelerator

- **Data collection and modeling / sampling strategy**

Data Collection

- Each facility will be asked to provide data similar to what was provided during post-certification interviews of SEP demo plants
- Collected data will help...
 - Facilities considering SEP to better understand impact on operations based on peer experience
 - Understand how costs and benefits trend with ISO 50001 and SEP experience
- Overall goals of data collection
 - Document the SEP implementation and certification process
 - Understand the costs and benefits of SEP conformant ISO 50001 EnMS
- Type of data to collect
 - Basic certification info. such as: facility location, recognition level, SEnPI
 - Costs, both external and internal, associated with implementation and maintenance of ISO 50001 EnMS and SEP certification
 - Better understand energy and cost savings from actions taken during achievement period

Enterprise-wide Sampling During Certification Audits

Purpose: Make SEP certification auditing more streamlined and cost effective.

Rationale:

- Many companies have centralized certain functions of their energy management systems (EnMS)
- Auditing these EnMS functions at the corporate or enterprise level would:
 - Better utilize SEP and ISO 50001 audit team personnel
 - EnMS processes at the company level are audited once and not repeated at site audits
 - EnMS processes at the facility level will be audited at a sample of the locations bounded by the enterprise
 - ISO 50001/SEP audit teams can better match staff skills to auditing the unique characteristics of individual facility operations and verification of energy performance results

Enterprise-wide Sampling During Certification Audits

- Auditing these EnMS functions at the corporate or enterprise level would also
 - Better utilize both internal and external EnMS implementation experts
 - Increase consistency of the certification *audit processes* across locations bounded by the enterprise
 - Increase consistency and transparency of certification *audit results*
 - Position companies to more readily expand the number of facilities that are certified to SEP

Developing the Enterprise-wide Audit Model

- Two types of Audit Models
 1. ISO 50001- Energy management system – Sampling per ISO 50003
 2. Superior Energy Performance™ (SEP) - Facility Performance Verification
- Technical Assumptions
 - ISO 50001 EnMS is bounded by the Enterprise (corporation, company, regional or national operational unit)
 - SEP continues to be bounded by the specific industrial facility
- Responsibility
 - ISO 50001/SEP certification costs will be the responsibility of the participating Enterprise
 - The cost for testing sampling techniques will be borne by DOE
- Liability
 - Application of sampling methods during the Accelerator will be for testing purposes only and will not impact certification results
 - Participation in sampling is voluntary

Applying the Enterprise-wide Audit Models

Process

- Each Enterprise will receive a complete ISO 50001 audit, which will include
 - On-site assessment of centralized EnMS processes
 - Sampling of decentralized facility level EnMS processes using approaches proven for other management system certification audits
 - Requirements for centrally managed/controlled processes are described in ISO 50003 and the following slide
- Each facility seeking SEP certification in the Enterprise-wide Accelerator will receive a full SEP on-site Performance Verification certification audit to quantify on-site verified results, building on any energy performance data captured during the on-site assessment of centralized EnMS processes.

Applying the Enterprise-wide Audit Model

What needs to be centralized in the EnMS and audited at the central location?

Management system requirements:

- energy policy
- system documentation and system changes authorized by the central office
- management review, as compiled from all sites
- evaluation of corrective actions
- internal audit planning and evaluation of the results
- legal and other requirements

Energy performance requirements:

- consistent energy planning process
- consistent criteria for determining and adjusting baselines, relevant variables, energy performance indicators (EnPIs), and significant deviation response criteria
- consistent criteria for establishing objectives and targets and site action plans
- centralized processes for evaluating applicability and effectiveness of action plans and EnPIs
- energy performance data is centrally aggregated

SEP Energy Performance Sampling Testing

- Separately and for testing purposes only, DOE Team will use data from audited Enterprise EnMS processes and facility reporting to the Enterprise level to model facility-specific energy performance improvement results
- Modeled results will be compared to on-site SEP verified energy performance improvement results
- Analysis will be conducted across multiple tests to identify factors that are likely to impact the accuracy of modeled results as compared to on-site verified results

- **Recap of findings from gap assessments at EWA companies**

Gap Assessments

- 2 Georgia Tech Energy Management System experts met with each SEP Enterprise-wide Accelerator Partner team for 2 days (see next slide)
- Covered ISO 50001, ANSI/MSE 50021-2013, and basics of SEP M&V Protocol
- Representatives from Partner's corporate team and plant teams to participated
- Key documentation from SEP certified plant(s) provided to Georgia Tech for gap assessment, such as:
 - Energy manual
 - Energy planning procedure
 - List of significant energy uses and applications which they apply
 - Energy targets, objectives and action plans
 - Management review procedure
- Corporate description of current energy management program
- Outputs:
 - Identified existing processes that meet or partially meet requirements
 - Identified gaps where processes will need development
 - Preliminary determinations over what parts of system will be corporate vs plant
 - Gap results to be used to develop work plan and determine needed and desired services

Gap Assessments

SEP EWA Partner	Gap dates	Location	NOTES:
Cummins, Inc.	March 4 – 5	Jamestown, NY	<ul style="list-style-type: none"> • Strong corporate ISO MS experience • ISO 50001 enterprise certification and SEP certification for 3 plants by end of 2014
Schneider Electric	March 10 – 11	Victoria, BC, Canada	<ul style="list-style-type: none"> • Aggressive schedule for SEP certification for 10 facilities • Assessing timing of ISO 50001 enterprise implementation
3M	March 19 – 20	Minneapolis, MN	<ul style="list-style-type: none"> • Strong Energy Star program • ISO 50001 enterprise implementation on track for Summer 2015 • 5 plants to achieve initial SEP certification
Volvo Trucks NA	April 16 – 17	Hagerstown, MD	<ul style="list-style-type: none"> • 2 existing SEP certified plants • 3rd plant certified by August 2014 • Assessing timing of ISO 50001 enterprise implementation
Nissan NA	April 22 – 23	Smyrna, TN	<ul style="list-style-type: none"> • 1 SEP certified plant • ISO 50001 enterprise implementation on track for Summer 2015 with new SEP certification scheme • 2 plants to achieve initial SEP certification • Assessing treatment of Smyrna battery plant
General Dynamics OTS	TBD, most likely June	TBD	<ul style="list-style-type: none"> • Delayed startup • Multiple plants recently recruited to SEP enterprise-wide

Gap Assessment – Summary of Major Findings

Category	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5
Enterprise	52.1%	72.1%	51.0%	TBD	TBD
Facility	82.1%	62.3%	53.1%	TBD	TBD

- Scoring Levels varied but showed strong foundation to build EnMS
- Experience with Enterprise-level MS varied considerably
- Not all partners understood the requirements for an enterprise-wide MS, especially in regards to centralized office function
 - *Central office will “own” EnMS and will be audited*
 - *Most likely, one of facilities will act as central office*
 - *Communication and authority needs strengthening between central office and facilities*
- In some cases, ISO 50001 enterprise EnMS will be integrated with other ISO management systems
- Participation of existing SEP certified plants in ISO 50001 enterprise MS will vary significantly. Build on SEP experience from certified plants.



SEP Enterprise-Wide Accelerator

- **Overview of training**

SEP Accelerator Enterprise-Wide Training & Coaching

- Phase-based Implementation Approach (Plan / Do / Check-Act)
- Initial Gap Assessment
- Modes of Delivery:



- Readiness Review

- ▶ Customizable:
 - Core Training and Coaching
 - Online
 - Classroom
 - Webinars
 - Optional Services
 - CP EnMS
 - Additional Coaching / Training
 - Energy Systems Assessment
- ▶ Flexible:
 - company teaming
 - Training locations

SEP Enterprise-Wide Training Update

Partner	Training Dates
Cummins	May 5-7, 2014
3M	June 4-5, 2014
Nissan	Being scheduled
Volvo Trucks, S-E, GD OTS	TBD

- Training design - **FLEXIBLE**:
 - Central office and plant level
 - Existing and new SEP design
 - Training can be modified for partner needs; mix and match
 - Exercises customizable
- Training content designed for both existing and new SEP certification design
 - Target date for ISO 50001 enterprise and SEP certification varies widely for partners – end 2014 to Fall 2015 (allow new plants to join)
 - Key documents for new SEP certification design – Scorecard and SEP M&V Protocol – completed by August 2014; training updated after August 2014
- Existing SEP certified plants bring experience that will allow customization of exercises; use actual partner examples of documents and procedures
- Extent of training / coaching will vary significantly by partner depending on internal training expertise and enterprise-wide MS experience



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Superior Energy Performance Ratepayer Information Package

May 2014

Advanced Manufacturing Office

Agenda

- ▶ Value of Energy Management
- ▶ ISO 50001- Energy management systems
- ▶ Superior Energy Performance
- ▶ SEP and Continual energy performance improvement
- ▶ SEP Accelerator
- ▶ Alignment with regulatory requirements

Existing Industrial Energy Efficiency Programs

- ▶ Industrial sector has largest energy savings potential for all major energy-using sectors in the U.S. (Glatt and Schwentker 2010)
- ▶ Wide variation exists in offerings to industrial customers
 - Savings targeted: equipment vs. operational vs. both
 - Segmentation: same approach for all C&I customers vs. industry-specific marketing and implementation
 - Account executive training: wide range of specialized efficiency training
 - Marketing: customer-initiated vs. administrator-initiated/targeted
- ▶ Many administrators are already providing services to industrial customers, although services may not be comprehensive
- ▶ These administrators may be concerned about exhausting the “low-hanging fruit” and are looking for tools to better target and more comprehensively address the needs of this market segment
- ▶ Superior Energy Performance (SEP) can deliver deeper and more sustained energy savings, especially for large industrial customers that are already receiving services

Value of Energy Management

Value of Energy Management

- Energy efficiency improvements with very favorable payback periods often *do not get implemented* due to other operational priorities
- Energy efficiency projects that are implemented may *not be sustained* due to lack of supportive operational and maintenance practices
- Commissioning or re-commissioning new equipment or systems only addresses a *point in time*
- The only constant in the life of most industrial facilities is *change*
 - product mix, production, management, personnel -*

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 going basis.*

Benefits of an Energy Management System (EnMS)

An EnMS allows an organization to:

- ▶ *Manage future changes* in an energy efficient manner, while preserving operational integrity
- ▶ *Evaluate what works* to improve energy performance based on hard data--and build on it
- ▶ *Develop a structure and framework* for communicating results both internally and externally
- ▶ *Integrate energy management* into existing management processes
- ▶ *Effectively communicate* energy management roles and responsibilities across the organization

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

Implementation of an EnMS

- ▶ **Shifts the energy efficiency focus** to a systematic, data-driven approach.
- ▶ **Requires top management to be engaged** on an ongoing basis.
- ▶ **Provides a context for informed decisions** concerning proposed energy efficiency projects, including new technologies.
- ▶ **Increases reliability of outcomes** through emphasis on business processes rather than reliance on a few individuals.
- ▶ **Involves energy users and decision makers**, not just facility personnel and physical systems, to **sustain the change**.

Scope of energy management



ISO 50001- Energy management systems

ISO 50001 Energy management systems

- ▶ American National Standards Institute and US Department of Energy led ISO 50001 development
- ▶ Published in 2011 with input from 56 countries
- ▶ Establishes new international best practice in energy management
- ▶ Emphasis on collection and analysis of *available* energy data to support energy management decision-making, and improve:
 - Ability to benchmark, measure and report
 - Transparency and communication to management
 - Operations and capital cost decisions
- ▶ Flexible and limited documentation requirements (compared to ISO 14001) – focus is on energy performance
- ▶ Applicable to commercial as well as industrial organizations



<http://www1.eere.energy.gov/energymanagement/>

<http://www.iso.org/iso/home/standards/management-standards/iso50001.htm>

Key Terms from ISO 50001

Energy Management System = EnMS

Energy Performance

measurable results related to energy efficiency, energy use and energy consumption

Energy Performance Indicator

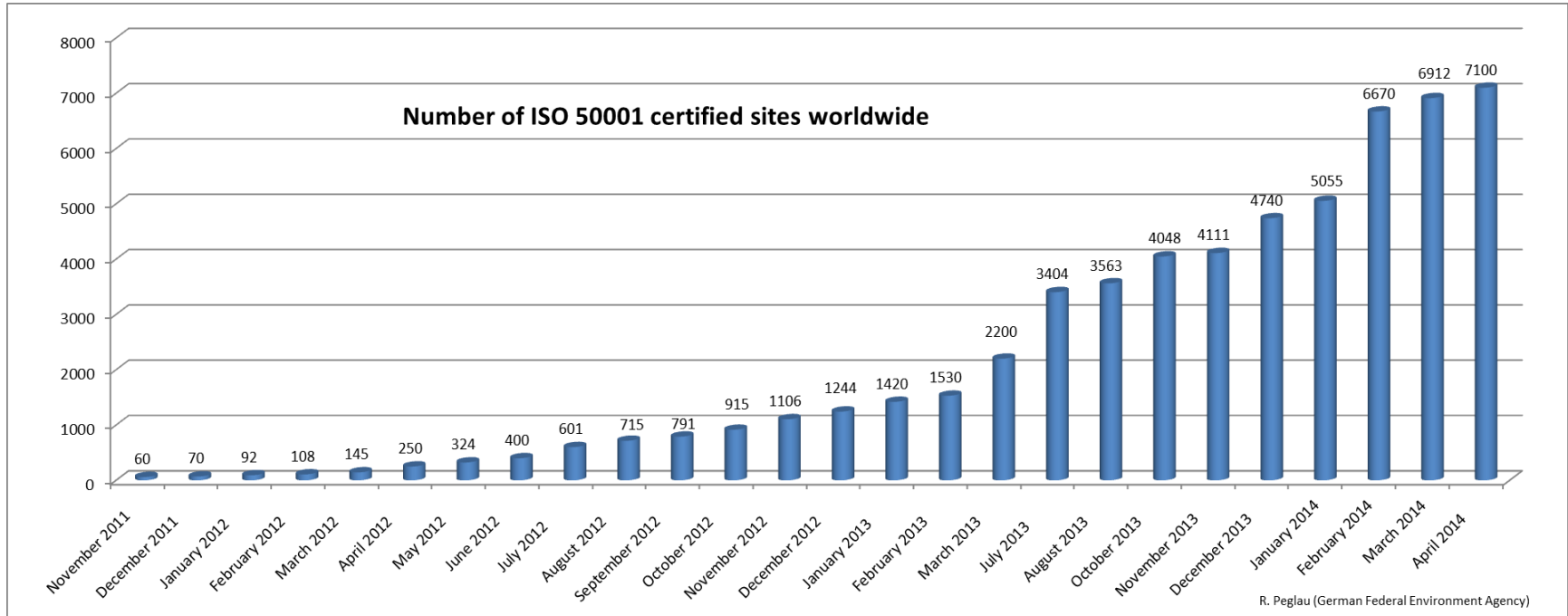
EnPI

quantitative value or measure of energy performance, as defined by the organization

NOTE EnPIs could be expressed as a simple metric, ratio or a more complex model.



ISO 50001 Certifications



Interest in ISO 50001 is increasing

7100 certifications issued world wide through April 2014

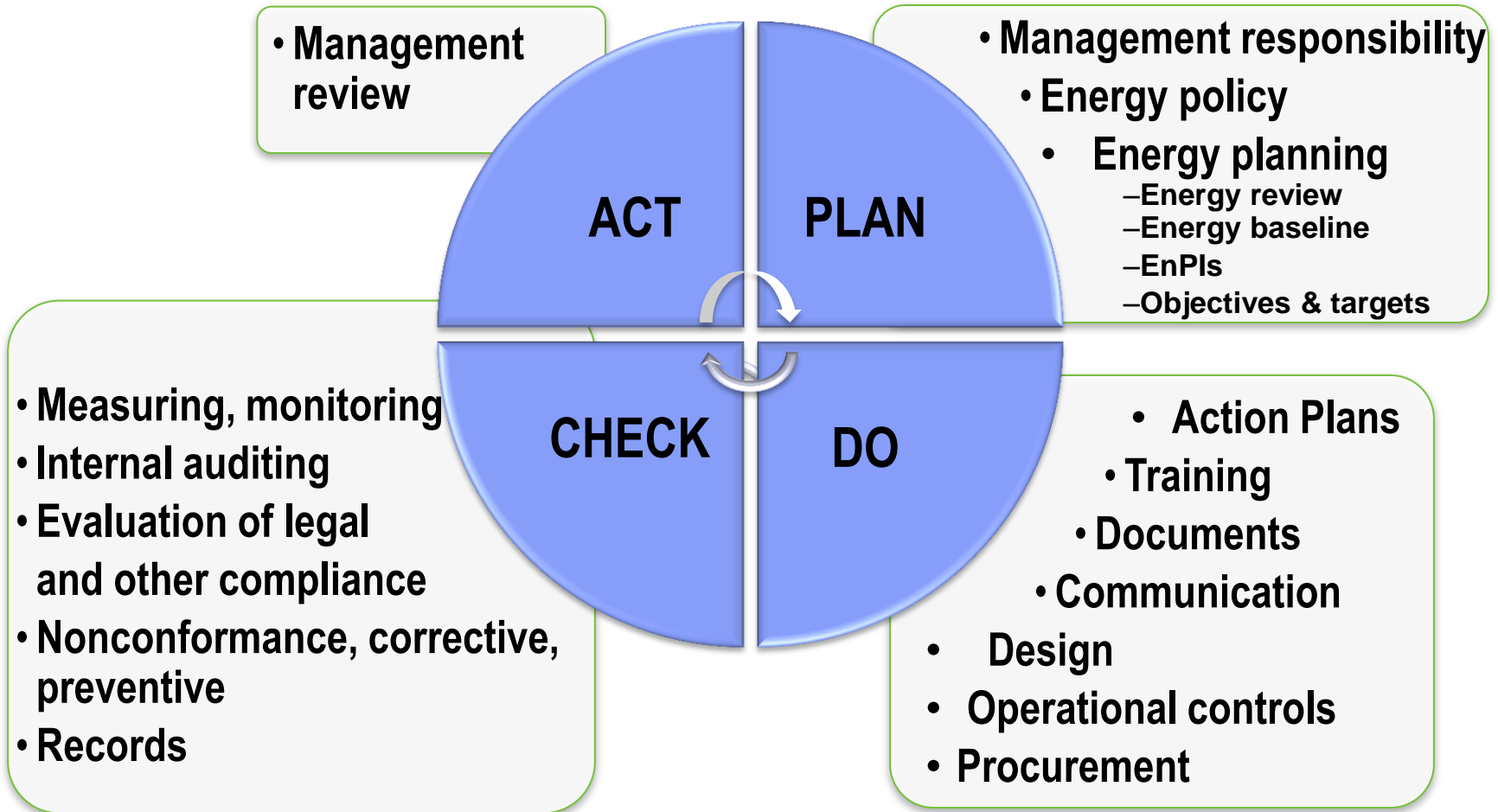
Key Elements of ISO 50001

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 uses, energy sources, and consumption and identify opportunities for improvement
4. **Baseline** of the organization's energy use
5. **Identification of energy performance indicators** (EnPIs) that are unique to the organization and are tracked to measure progress

Key Elements of ISO 50001 (con't)

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** to address all aspects of energy purchase, use, and disposal.
9. **Measurement, management, and documentation** for continuous improvement for energy efficiency
10. **Internal audits and periodic reporting of progress** to management based on measurement and documentation

ISO 50001: Energy Management System



Superior Energy Performance™

What is Superior Energy Performance™ (SEP)?

- Adds an energy performance improvement target to ISO 50001 requirements
- Provides a data-driven structure for continual energy performance improvement across an entire facility
- Involves the entire facility - not dependent on any single individual
- Accommodates change; expandable over time
- Third-party verification of energy performance improvements (by ANSI/ANAB Verification Body)
- Based on internationally recognized standard

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



Why Should a Facility Participate in SEP?

SEP Establishes an Energy Performance Target:

- ▶ Manufacturing facilities certify to SEP for energy performance improvements achieved (retrospective), and verified by a third-party SEP Verification Body.
- ▶ Requires
 - A minimum of 5% improvement over a 3-year period, including capital and operational improvements or
 - A minimum 15% improvement *and* documentation of a robust and expanding EnMS over a longer period (up to 10 years)

“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

“The established targets required by SEP kept the team at 3M Canada motivated and dedicated to achieving those targets. Since ISO 50001 does not specify particular energy savings targets on its own, along with SEP we're able to truly demonstrate our level of achievement, which we're quite proud of.” —3M Canada, Brockville, Ontario

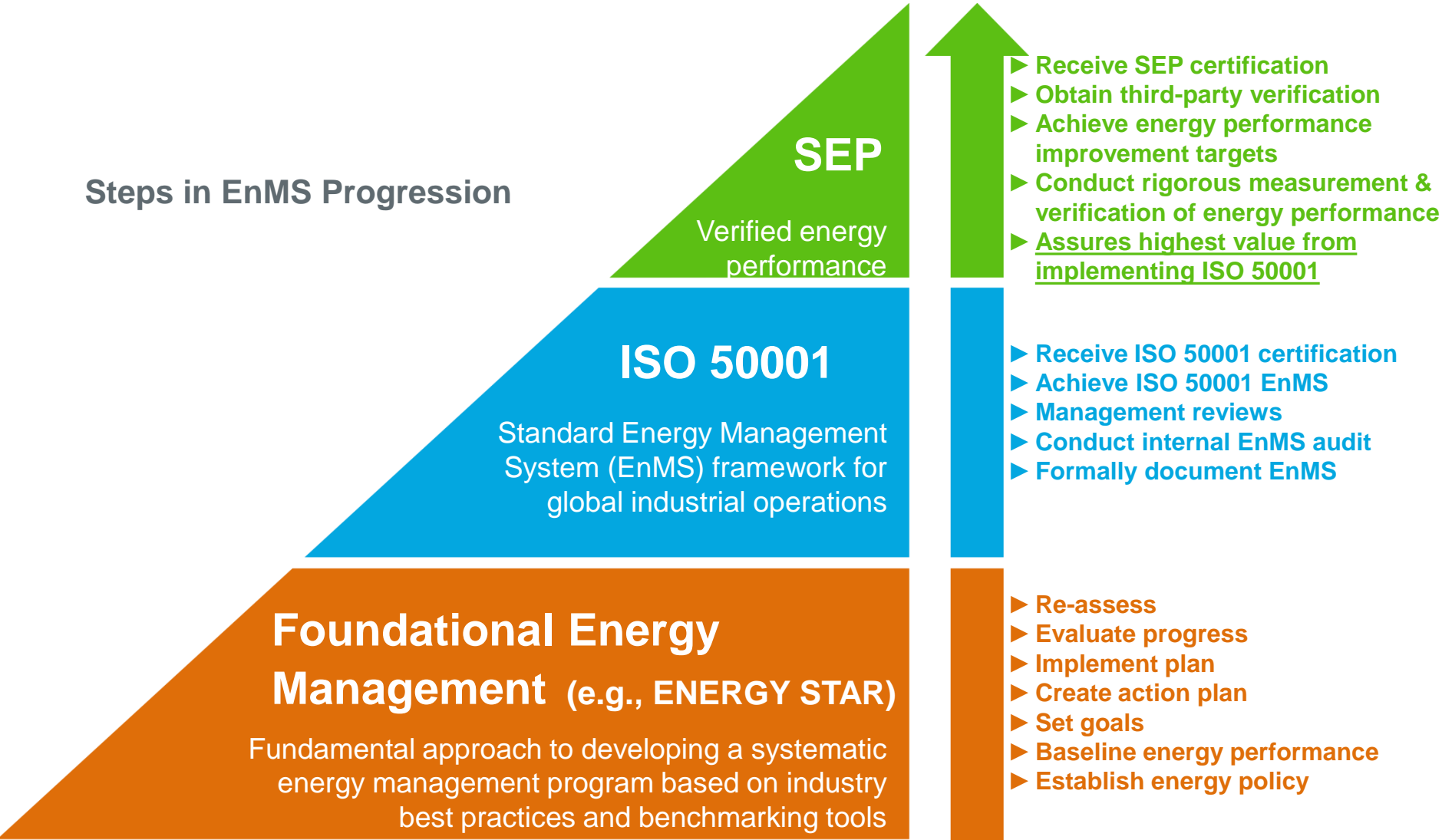
Volvo Trucks SEP Certification

- First ISO 50001 facility in US
- SEP Platinum Certified
- 25% improvement in energy performance over 3 years
- \$866,000/year operational savings
- \$377,000 cost to implement SEP
- 5 month payback



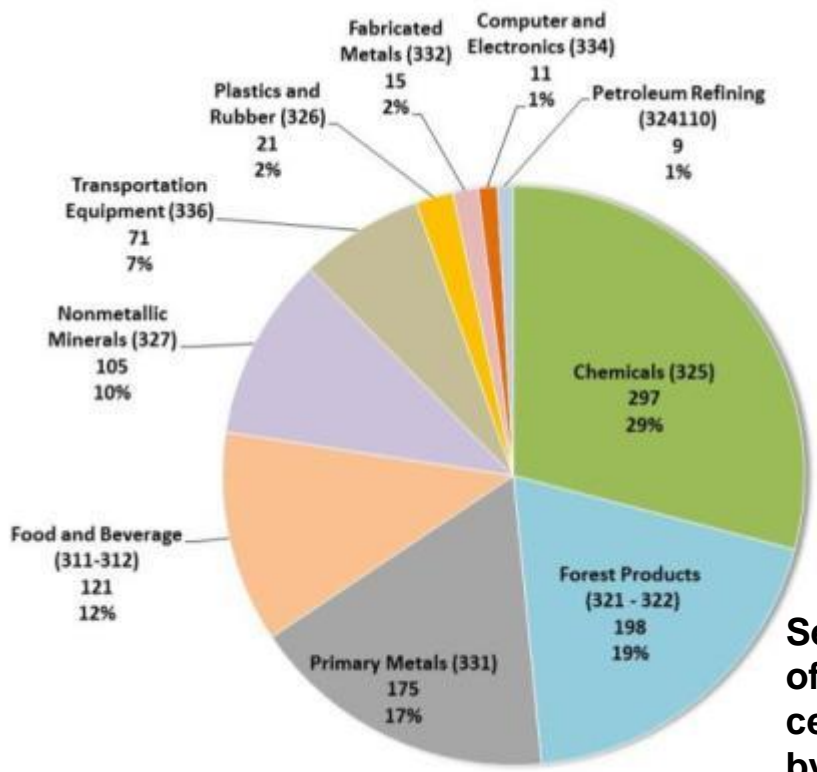
Strategic Energy Management Continuum

Steps in EnMS Progression



SEP Manufacturing Sector Market Potential

- ▶ DOE market analysis has identified initial 3,000+ specific manufacturing facilities to target for SEP certification
- ▶ DOE projects the number of SEP certified facilities to grow to 1,000+ (23% of U.S. manufacturing energy footprint) by 2023, representing a wide array of industrial sectors



Sector breakdown of projected SEP certified facilities by 2023

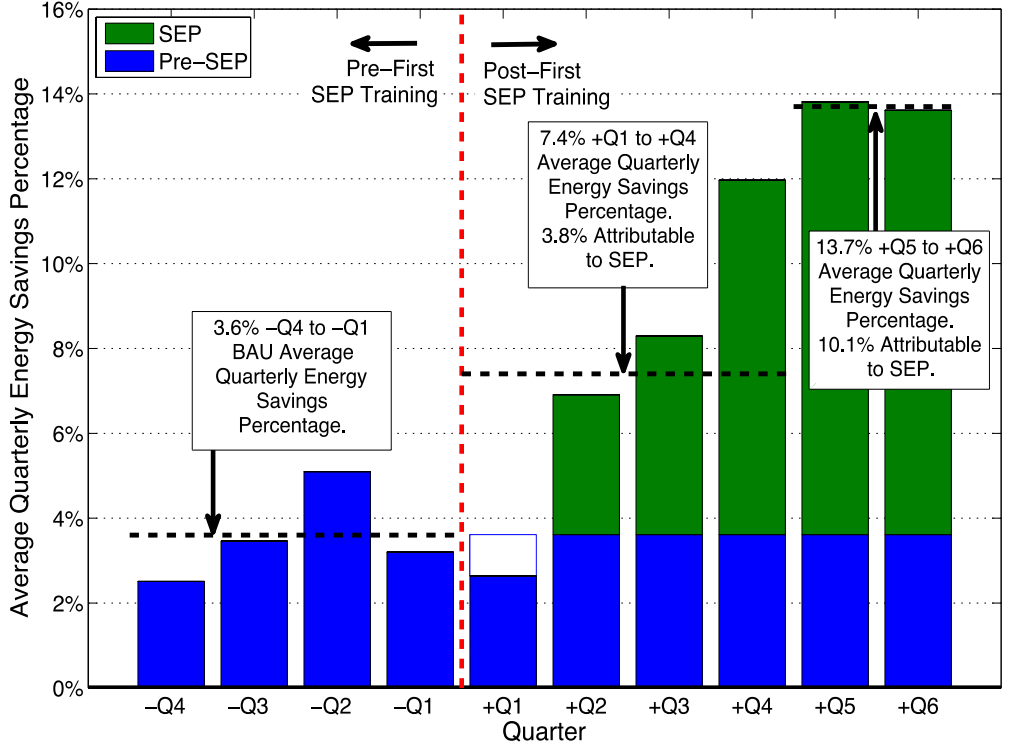
- Prime facilities for SEP certification**
- >\$2 million annual energy bill
 - Prior ISO management system certification
 - Strong sustainability program

SEP & Continual Energy Performance Improvement

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 an average \$503,000/yr. from *operational improvements alone* (low/no cost investment) attributable to SEP



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

- Average quarterly % energy savings as a function of average quarterly baseline energy consumption for all nine facilities.
- Results are aligned across facilities – Q1 starts when the facilities received their first SEP training.
- BAU quarterly energy savings subtracted from % from quarterly post-first training energy savings % = savings attributable to SEP.

SEP Benefits

▶ For Industrial Facilities

- Deeper and more sustained energy savings (11.7%, on average), especially for large industrial customers that are already receiving utility services
- Ongoing cost savings (energy, maintenance)
- Operational efficiency based on improved data utilization
- Cost-effective approach to meeting sustainability targets

▶ For Ratepayers

- Avoided energy and capacity
- Avoided transmission and distribution capacity and line loss
- Avoided environmental compliance costs
- Wholesale market price suppression effects
- Reduced risk
- Additional non-energy benefits

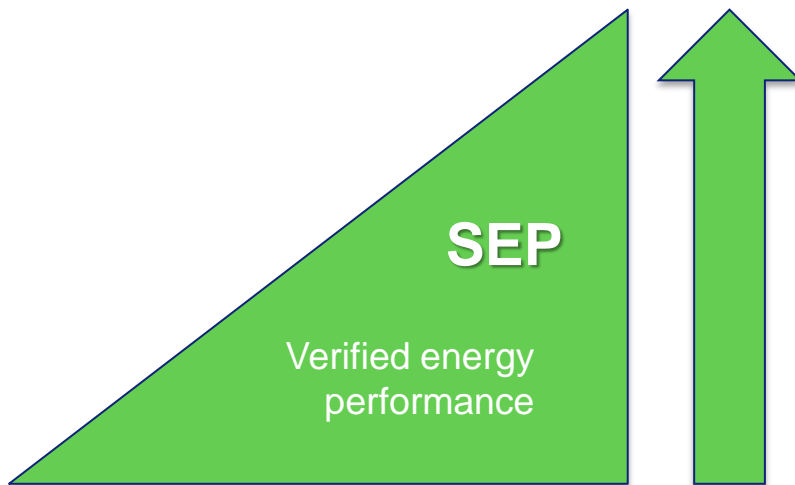
SEP Payback

- ▶ Analysis of 9 certified SEP facilities shows that SEP payback is related to baseline energy consumption and total energy spend.
- ▶ Capital energy performance improvement action costs and savings *not* included.

$$\text{Payback} = \frac{\text{EnMS and SEP Implementation Costs}}{\text{Operational Energy Savings (attributable to SEP in SEP reporting period)}}$$

- ▶ **Less than 2 year payback** for facility with a baseline annual source energy consumption > 0.27 Tbtu (equivalent to 26 GWh delivered electricity)

SEP Measurement & Verification Protocol



SEP requires a facility to determine its energy performance improvement with the:

SEP Measurement and Verification Protocol for Industry

The SEP M&V Protocol offers a best practice methodology to:

1. Verify the results from a facility's implementation of ISO 50001
2. Track energy performance changes over time
3. Document energy performance normalized to production and other relevant variables

How does a facility meet SEP requirements?

In addition to the general requirements of ISO 50001, facilities seeking SEP certification need to:

1. Establish EnMS Scope and Boundaries at the facility level that ***include all energy sources***
2. Collect ***data sufficient to establish a baseline year*** (12 month period)
3. Establish significant energy uses that are ***truly representative*** of facility operations and energy consumption
 - Improve monitoring and measurement of these uses
 - Establish robust operational controls and training
4. Identify Superior Energy Performance Indicators (SEnPIs) to ***accurately track facility-wide improvements*** in energy performance
5. ***Document methodologies used*** to support decisions made during the planning process

How does a facility meet SEP requirements?(con't)

In addition to the general requirements of ISO 50001, facilities seeking SEP certification need to:

6. Prioritize and implement action plans / improve operational processes to ***meet or exceed SEP energy performance improvement requirements***
7. ***Track, report on, and evaluate the effectiveness*** of action plans toward meeting energy performance improvement requirements
8. ***Use sector-specific Measurement and Verification (M&V) Protocol*** to determine SEP energy performance improvement
9. Prepare for a ***third-party audit of both EnMS and energy performance***

Facilities also need to plan beyond the current certification cycle – this is a long term commitment to re-certify every three years, not an isolated accomplishment

M&V and Continual Energy Performance Improvement

- ▶ SEP M&V Protocol includes
 - Familiar approaches*
 - Regression
 - Energy accounting
 - and new elements*
 - Focus on continual improvement in energy performance
 - More than a collection of actions or projects
- ▶ ISO 50001 requires organization to “plan operations and maintenance activities which are related to its significant energy uses”
- ▶ Not all activities *related to operational control* of significant energy uses will require action plans- they are ongoing

ISO 50001 and Continual Improvement

Conducting M&V in the ISO 50001 continual energy performance improvement context requires consideration of both:

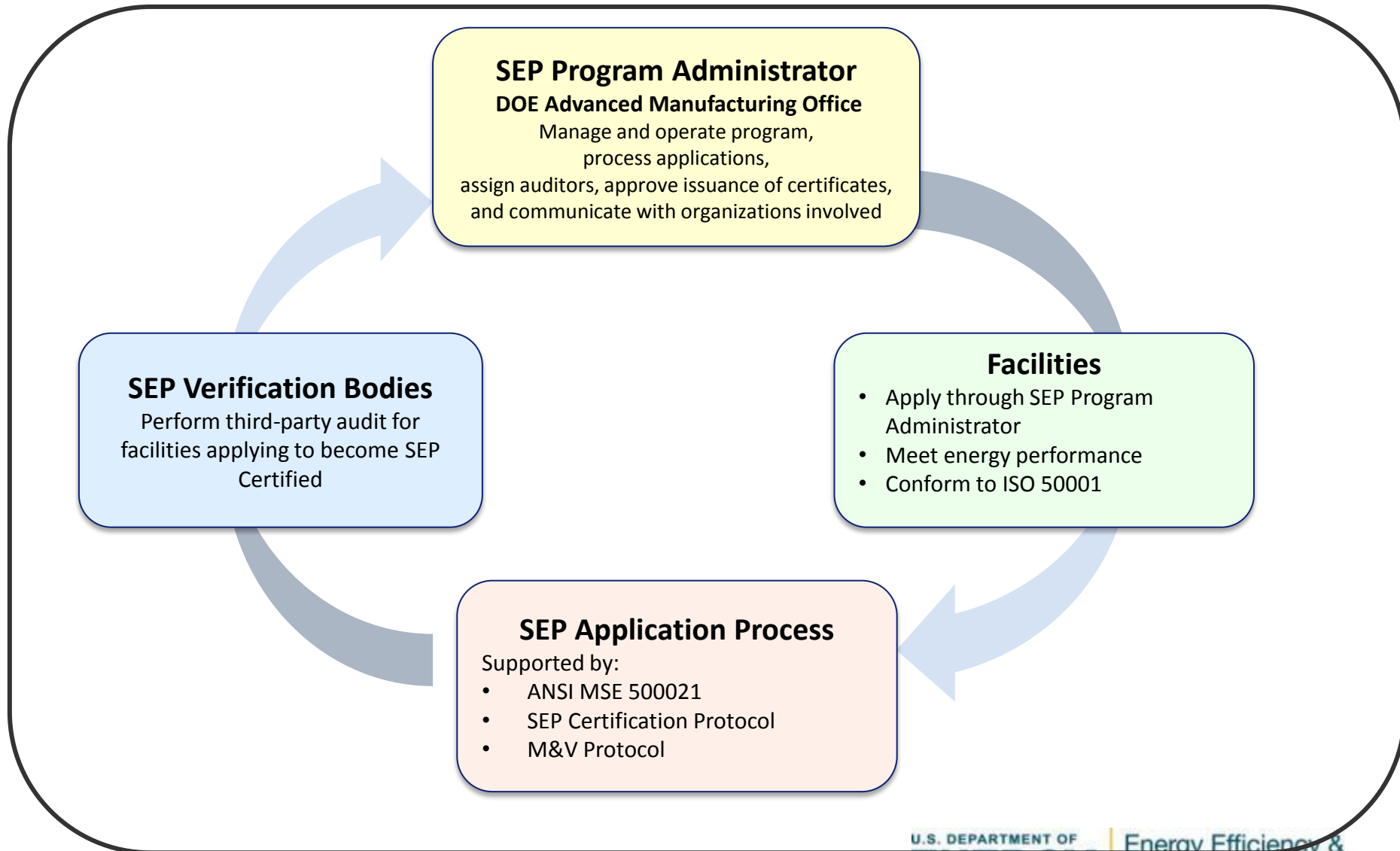
1. The results from implementing of action plans (projects) and
2. Any improvements in energy performance resulting from the ongoing operational control of significant energy uses

Example:

A facility identifies steam as a significant energy use, but has made many energy efficiency upgrades already, including boilers and a steam trap maintenance program.

- ISO 50001 requires that the facility demonstrate *operational control* for the entire steam system, which may be as simple as using existing energy performance data more effectively and training staff on existing operational procedures.
- Implementation of operational control will likely produce some additional improvement in energy performance that is ongoing- not project specific

SEP Certification Process



Superior Energy Performance Certified Plants

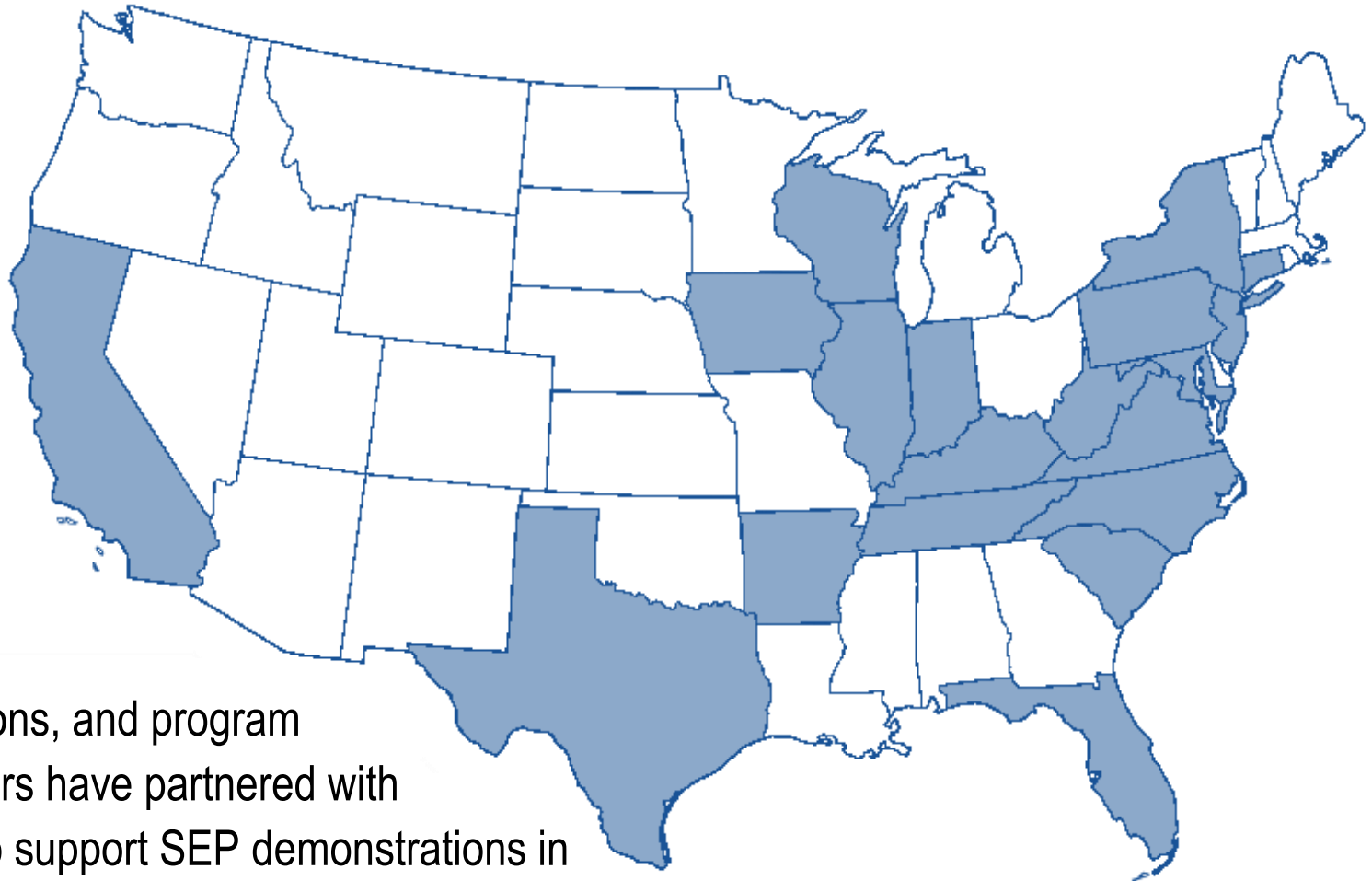
Energy Performance Improvement Achievement Period

	Facility Name	% Energy Performance Improvement*
3 years	Volvo Trucks, NA <i>Dublin, VA</i>	25.8
	Dow Chemical Company <i>Texas City, TX: Manufacturing facility</i>	17.1
	Harbec Plastics <i>Ontario, NY</i>	16.4
	3M Canada Company <i>Brockville, Ontario, Canada</i>	15.2
	Cook Composites and Polymers <i>Houston, TX</i>	14.9
	Cummins <i>Rocky Point, NC</i>	12.6
	General Dynamics <i>Scranton, PA</i>	11.9
	Allsteel <i>Muscatine, IA</i>	10.2
	Cooper Tire <i>Texarkana, AR</i>	10.1
	Olam Spices <i>Gilroy, CA</i>	9.8
	Owens Corning <i>Waxahachie, TX</i>	9.6
	Dow Chemical Company <i>Texas City, TX: Energy systems facility</i>	8.1
	Nissan, NA <i>Smyrna, TN</i>	7.2
	Freescale Semiconductor, Inc. <i>West Austin, TX</i>	6.5
	3M Company <i>Cordova, IL</i>	6.2
10 years	Mack Trucks <i>Macungie, PA **</i>	41.9
	Bridgestone Americas Tire <i>Wilson, NC **</i>	16.8

** Mature energy pathway

- 17 facilities SEP™ certified, ~30 more in process
- SEP™ certified facilities improved their energy performance
 - Between 6.2% and 25.8% over three years
 - Facility average 11.7% over three years
- Cumulative energy savings for 17 certified facilities is 3 Tbtu, with little or no associated capital cost expenditures.

SEP Demonstration Locations



States, regions, and program administrators have partnered with U.S. DOE to support SEP demonstrations in companies across the country.

www.eere.energy.gov/manufacturing/tech_deployment/sep_demonstrations.html

DOE Technical Resources

DOE has developed a portfolio of technical resources for industry including software tools, guidance documents, and in-person assistance from trained and qualified professionals, such as:

- eGuide for ISO 50001 Implementation: step-by-step guidance, forms, checklists, and examples to assist your energy team throughout the implementation process.
- Energy Performance Indicator (EnPI) tool: assists an energy team in creating a regression analysis model to determine energy performance improvement using the SEP M&V Protocol.
- Certified Practitioners in Energy Management Systems: experts that are qualified to assist facilities in implementing ISO 50001 and SEP.
- Training, from basic to expert
- Case studies



AMO Energy Resources Center

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

Institute for Energy Management Professionals www.ienmp.org/

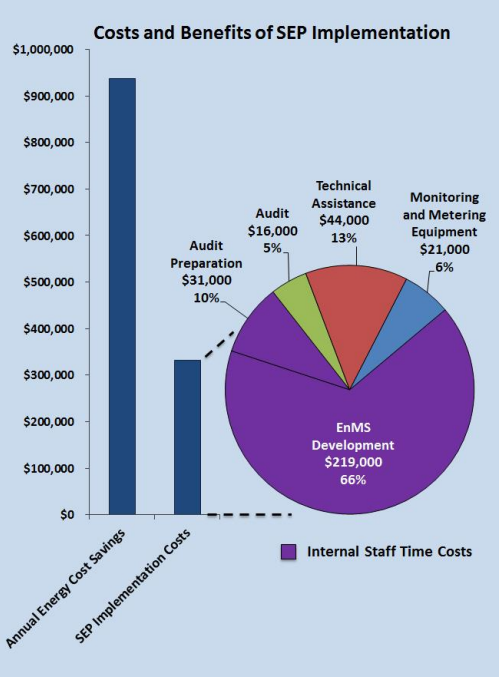
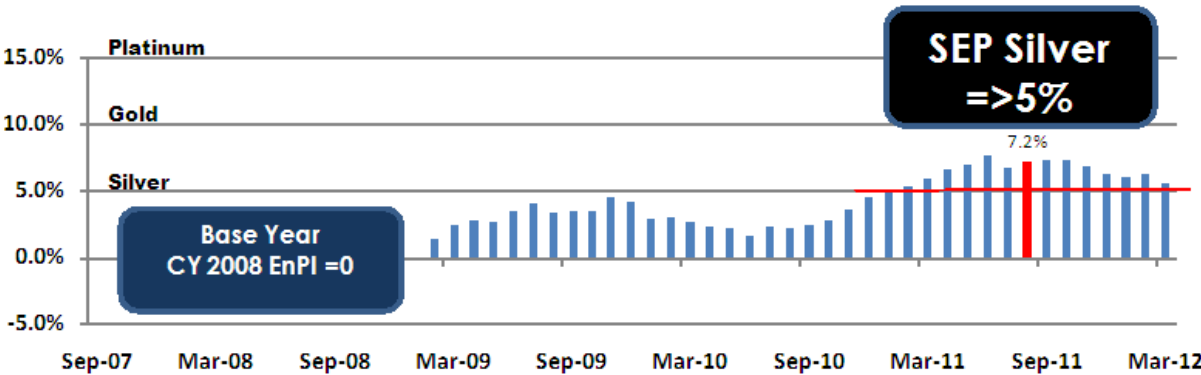


ADVANCED MANUFACTURING OFFICE

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.

Monthly SEP Percent Energy Performance Improvement



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

General Dynamics Case Study: >\$900K savings with 6 month payback

- ▶ First U.S. defense contractor to be SEP and ISO 50001 certified
 - ▶ 11.9% improvement in energy performance over 3 years
 - ▶ \$956,000/year operational savings
 - ▶ \$255,000 cost to implement SEP
 - ▶ 6 month payback
- GENERAL DYNAMICS**
Ordnance and Tactical Systems

Global Energy Management System Implementation: Case Study

USA, Superior Energy Performance

GENERAL DYNAMICS Ordnance and Tactical Systems

Defense contractor improves energy performance nearly 12%, achieving a six-month payback and earning Gold-level certification by Superior Energy Performance



General Dynamics became the first U.S. defense contractor to achieve certification under both ISO 50001 and Superior Energy Performance (SEP), based on the company's energy management system at a plant it operates in Scranton, PA, USA. Photo: U.S. Army

Case Study Snapshot

Industry: Defense Contracting
Energy Management System (EnMS) guidance/standard: ISO 50001
Key driver for EnMS: Environmental stewardship, government requirements, and cost reduction
Improvement focus: Seven processes using significant amounts of energy
Location: Scranton, Pennsylvania, USA
Product(s): Large-caliber artillery and mortar projectiles
Cost to implement: \$255,000
Annual energy cost savings: \$956,000
SEP Marginal Payback period: About six months
Energy sources: Electricity and natural gas
Energy reduction goal: 25% reduction in energy intensity by 2020

Business Benefits Achieved

General Dynamics Ordnance and Tactical Systems (GD-OTS) worked with the U.S. Department of Energy's Advanced Manufacturing Office to successfully implement an energy management system (EnMS) at a federal ammunition plant in Scranton, Pennsylvania. GD-OTS staff members set an energy baseline and assessed opportunities to save energy in the plant's significant energy-using systems. By implementing the recommended projects and the EnMS in compliance with ISO 50001 and Superior Energy Performance (SEP), GD-OTS staff improved energy performance at the plant by 11.9%.
Energy achievements at the Scranton plant were verified by a third party to establish GD-OTS as a SEP Gold Certified Partner. The plant's energy resources are now proactively managed via a rigorous business system to sustain those energy savings and continue strengthening plant energy performance in the future.

About Superior Energy Performance (SEP)
SEP is a market-based plant certification program that provides industrial facilities with a clear path to achieve continual improvement in energy performance while also boosting competitiveness.
To be certified under SEP, an industrial plant must implement an energy management system (EnMS) in conformance with ISO 50001 and make verified improvements in energy performance. SEP is accredited by the American National Standards Institute.

"SEP brought to light many energy intensity savings opportunities that were previously hard to justify. With the EnMS system in place and metering instruments installed, it is much easier to justify improvement projects, and management is more receptive to these proposals."

- Stephen Cannizzaro, Sustainability Manager

See the case study at: http://superiorenergyperformance.energy.gov/successes_and_testimonials.html



ADVANCED MANUFACTURING OFFICE

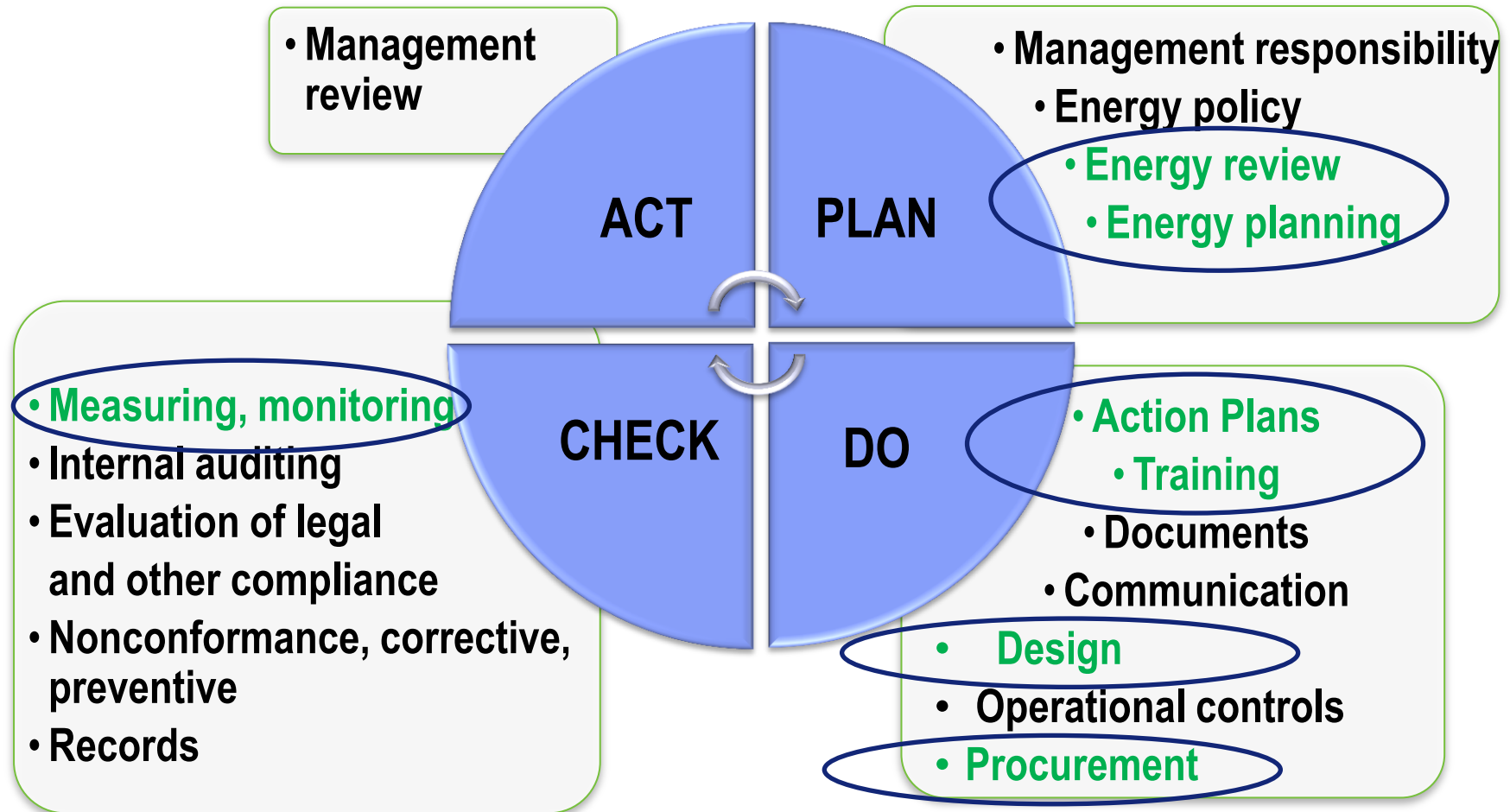
SEP Accelerator

Benefits of Participating in SEP Accelerator

By offering SEP to your customers, Program Administrators can expect:

- ▶ Increased opportunities to interact with high value customers
- ▶ Opportunity to offer customers program addressing all energy uses
- ▶ Better utilization of existing technical assistance offerings
- ▶ Improved coordination across technical assistance offerings
- ▶ More energy savings projects
- ▶ Option to provide higher value to customer and regulators by offering M&V of projects
 - Contributes to customer's SEP certification claim
 - Provides flow of verified project savings to report
 - Supports project M&V results through third-party verification at facility level (paid by customer)
- ▶ Upgraded skills for third-party providers through Certified Practitioner training

Existing Program Offerings Contributing to an Energy Management System (EnMS)



Based on Deming's Plan-Do-Check-Act cycle

Connections to Current Program Offerings

- ▶ Energy Review
 - Energy audits
 - System assessments
 - Engineering studies
- ▶ Energy Planning
 - Goal setting
- ▶ Implementing Action Plans
 - Track and tune
 - Metering programs
 - Rebates and other financial incentives
- ▶ Training
 - Systems
 - Strategic Energy Management
 - Cohort meeting(s) for sharing best practices
- ▶ Design and procurement
 - Energy efficient equipment and system incentives (deemed or custom)
- ▶ Measuring and Monitoring
 - Metering programs
 - Performance tracking system
 - Technical assistance with developing project reports for achievements

EnMS Market Barriers

What are the market barriers (or perceived barriers) that prevent companies from adopting an EnMS?

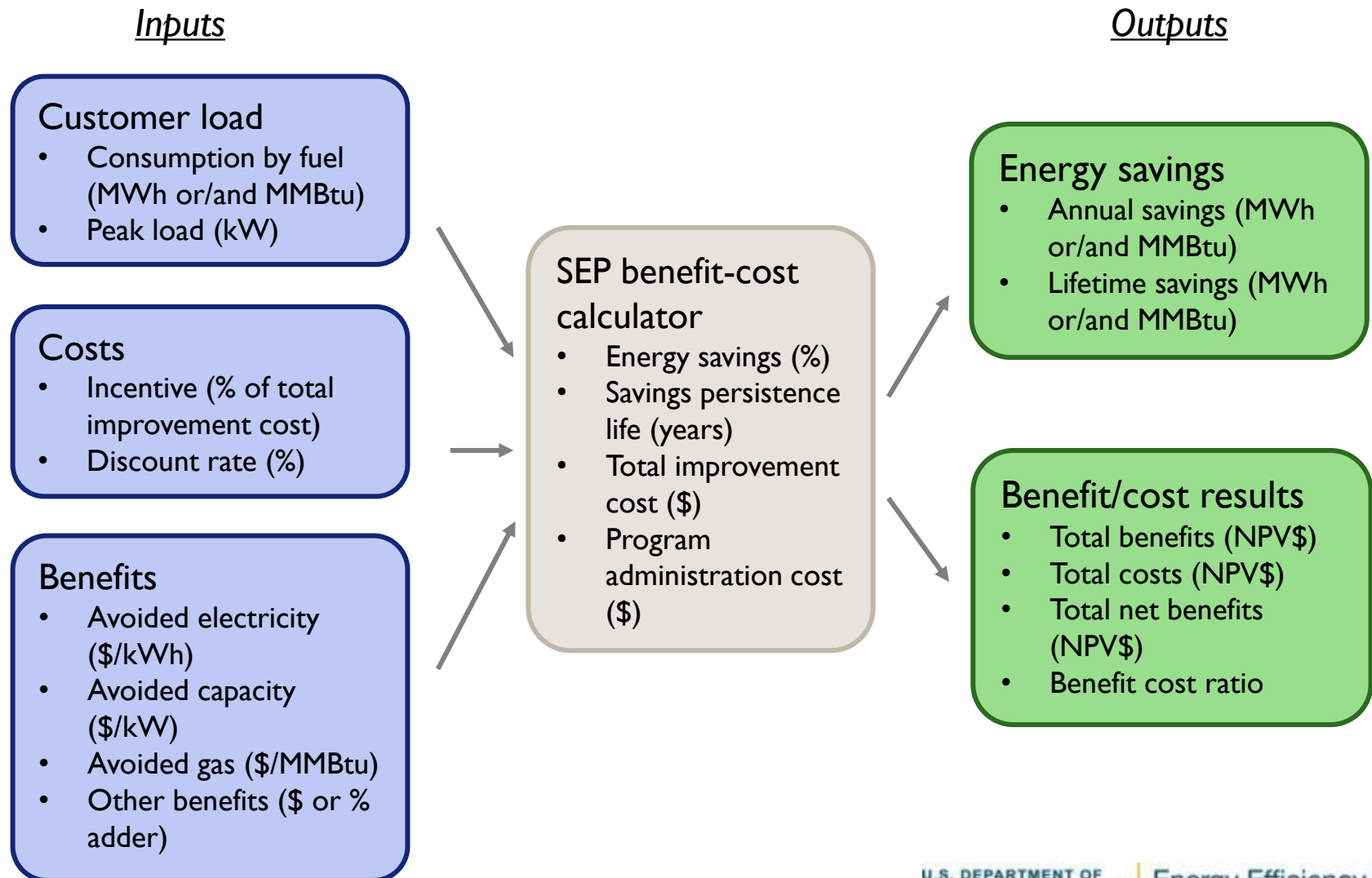
1. Lack of information, and uncertainty concerning the benefits, costs, and risks of energy-efficiency investments
2. Lack of dedicated energy management staff
3. Lack of support/resources from top management
4. Time and effort required to implement EnMS
5. Competing commitments -time and funding
6. Bias toward lower first cost vs operating costs
7. Verified energy performance improvement undervalued

How does SEP help to address these barriers?

Potential Ratepayer Program Offerings to Support SEP Implementation

- ▶ Outreach to build awareness of SEP and benefits of continual energy performance improvement
- ▶ Training and technical assistance
 - understanding and establishing an ISO 50001- conformant EnMS
 - completing Energy Review (e.g., energy audits, system assessments, and engineering studies)
 - meeting ISO 50001 competency requirements and preparing for SEP certification
 - establishing an effective measurement and monitoring program that meets basic SEP requirements
 - developing an action plan, including M&V
- ▶ Financial incentives for implementation of action plan, as needed
- ▶ Complementary programs or offerings can provide incentives for equipment rebates, system energy audits, process audits, metering, and procurement
- ▶ Organize cohort meetings or otherwise facilitate information sharing

SEP Program Cost Effectiveness - Calculator Design



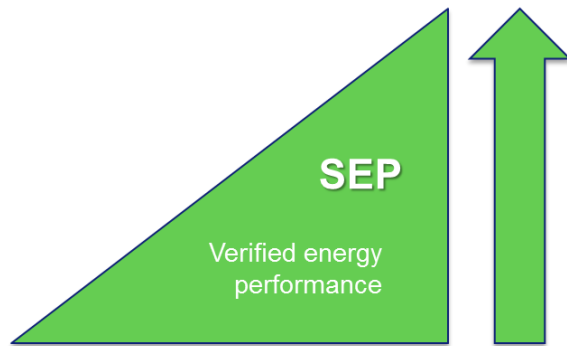
SEP Implementation Costs

Participants' SEP-related costs can be partially or wholly covered by program incentives. These costs include:

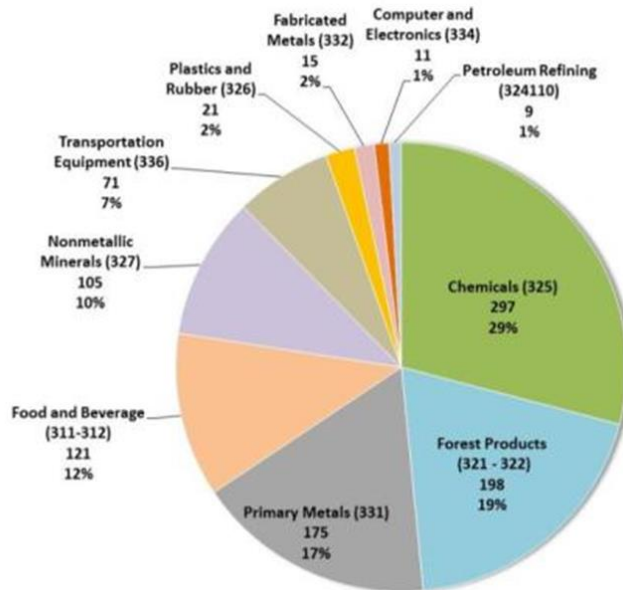
- ▶ Internal staff to implement the EnMS
- ▶ External technical assistance to implement the EnMS
- ▶ External technical assistance to identify energy performance improvement opportunities
- ▶ Metering
- ▶ Executing and evaluating Action Plans (project incentive and/or M&V)
- ▶ Preparation for SEP certification
- ▶ Third-party certification

Ratepayer program costs (marketing, administrative) would be additional

Reaching the SEP Target Market



- ▶ What is target market for SEP certification?
 - Industrial facilities
 - >\$1 million annual energy bill
 - Prior ISO management system certification preferred
 - Strong sustainability program preferred



Sector breakdown of projected SEP certified facilities by 2023

SEP Program Administrator Marketing Strategy

▶ Large customers

- Direct marketing by account executives offers Program Administrators the opportunity to...
 - Promote a dialog about SEP benefits, process, and requirements
 - Support energy managers as they pitch SEP to their corporate officers
 - Assess internal commitment to the process and culture change
 - Initiate discussion of complementary program offerings
 - Build client relationships!

▶ Medium customers

- Direct marketing by account executives, when possible
- Leverage energy service companies and energy management system vendors to target hard-to-reach customers
- Provide education and training in cohorts to reduce costs

▶ DOE SEP informational materials

- Case studies (http://superiorenergyperformance.energy.gov/successes_and_testimonials.html)
- Fact sheet and web site
(http://superiorenergyperformance.energy.gov/intro_resource_energy_management.html)

Alignment with Regulatory Requirements

Ratepayer Challenges in Implementing SEP

- ▶ Demonstrating value to regulators
- ▶ Establishing a new context for program incentives
- ▶ Tailoring implementation strategies for a continual improvement approach
- ▶ Developing messaging and marketing strategies to target a different audience (e.g., corporate executives, EnMS vendors, etc.)
- ▶ Evaluation, monitoring and verification
- ▶ Savings persistence
- ▶ Savings attribution

Determining Program Savings Attribution

- ▶ Traditional approaches
 - Stipulated net-to-gross ratios
 - Self-reporting surveys
 - Enhanced self-reporting surveys
 - Panel of trade allies
 - Large-scale consumption data analysis
 - Cross-sectional studies
 - Top-down evaluations or macro-economic models

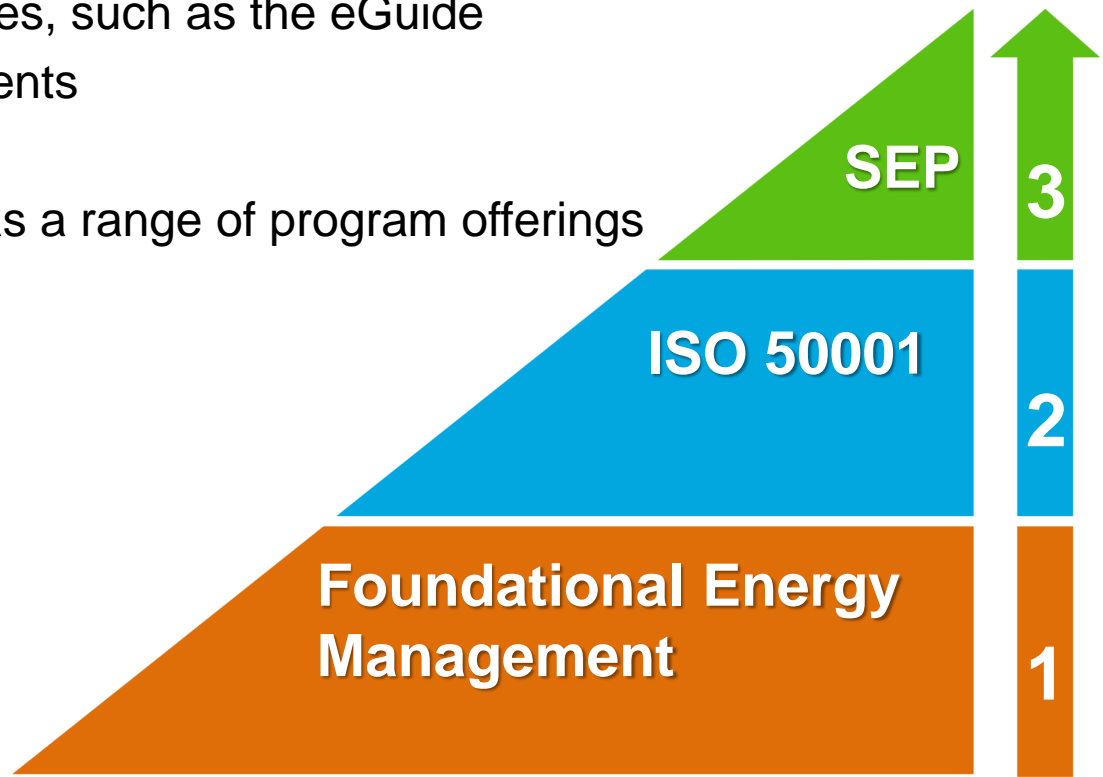
(SEEAAction 2012. “Energy Efficiency Program Impact Evaluation Guide”)
- ▶ SEP approach
 - Ratepayer customer survey at SEP initial training to establish BAU trendline
 - Enhanced self-reporting surveys (post certification)
 - Documentation of pre-SEP practices
 - Documentation of implemented EnMS business processes
 - Third-party verification of facility-wide energy performance improvement

Integrating SEP and Program Administrator EM&V

- ▶ SEP Protocols require “source” energy savings outputs in Btu
 - The EnPI Tool takes site energy savings data and estimates source energy savings in Btu by fuel
- ▶ New features could be added to SEP EnPI tool to produce the outputs typically required for ratepayer-funded energy efficiency programs, including
 - Site electricity savings (MWh)
 - Peak load reduction (kW)
 - Site natural gas savings (therms or MMBtu)
- ▶ Working with the existing EnPI inputs would avoid duplicative data entry

Energy Management Program Offerings Portfolio

- ▶ For facilities not in the target market, what might put them on a path to energy management?
 - ISO 50001 training
 - Use of DOE resources, such as the eGuide
 - CEE minimum elements
 - Energy star
- ▶ Need to be considered as a range of program offerings



Conclusions

- ▶ Based on an internationally-accepted standard, SEP
 - offers facilities a long-term framework for integrating continual energy improvement into business practices
 - ensures that facilities identify and capture operations-related energy savings over time.
- ▶ EnMS and SEP represent a big opportunity for ratepayer-funded program administrators
 - New energy savings opportunities for key customers
 - Large market potential
 - Greater persistence from operational energy savings
 - Access to more complete data to support program actions
 - Many opportunities for program administrators to build awareness and assist facilities with participating in SEP

EXTRA SLIDES

List of SEP Participating Plants

SEP Certified Plant

<i>Company</i>	<i>17 sites</i>		
Olam Spices	Gilroy, CA	3M	Cordova, IL
3M Canada Company	Brockville Ontario, Canada	General Dynamics	Scranton, PA
Bridgestone	Wilson, NC	Volvo Group North America/Mack Trucks	Macungie, PA
Harbec Plastics	Ontario, NY	Nissan	Smyrna, TN
Cooper Tire	Texarkana, AR	Allsteel	Muscataine, IA
Dow Chemical Company (2 plants)	Texas City, TX	Cook Composites and Polymers Co.	Houston, TX
Owens Corning Waxahachie	Waxahachie, TX	Freescale Semiconductor Inc.	Austin, TX
Volvo Trucks North America	Dublin, VA	Cummins	Whitakers, NC

Implementing SEP Certification

<i>Company (Enterprise-Wide Demos, beyond SEP certified or existing site demos)</i>	<i>21 sites</i>
3M	Aberdeen, SD
3M	Decatur, AL
3M	Hutchinson, MN
3M	Cynthiana, KY
3M	Prairie du Chien, WI
Schneider Electric	Clovis, CA
Schneider Electric	Peru, IN
Schneider Electric	Cedar Rapids, IA
Schneider Electric	Columbia, SC
Schneider Electric	Lincoln, NE
Schneider Electric	Seneca, SC
Schneider Electric	Lexington, KY
Volvo Group North America	Hagerstown, MD
Cummins	Columbus, IN
Cummins	Lakewood, NY
Cummins	Minneapolis, MN
General Dynamics	Joplin, MO
General Dynamics	Red Lion, PA
Nissan	Decherd, TN (Forging)
Nissan	Decherd, TN (Machining)
Nissan	Decherd, TN (Casting)

List of SEP Participating Plants (cont.)

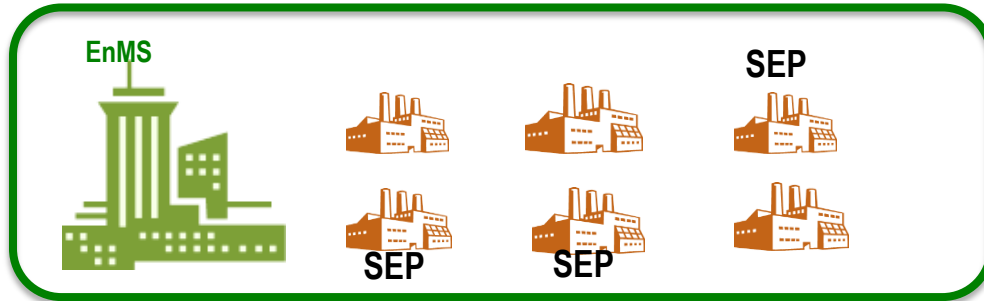
Implementing SEP Certification

<i>Company (Site Demos)</i>	<i>12 sites</i>
Schneider Electric	Smyrna, TN
Lockheed Martin	Sunnyvale, CA
United Technologies	Stratford, CT
Haynes International	Kokomo, IN
Republic Conduit	Louisville, KY
Medimmune	Gaithersburg, MD
Dow Chemical Company	Institute, WV
US Mint	West Point, NY
CocaCola	Dunedin, FL
Curtiss-Wright Flow Control Company	Cheswick, PA
Land O'Lakes	Carlisle, PA
North American Höganäs	Hollsopple, PA

SEP Trained

<i>Company (Demos Assumed Stopped Implementing)</i>	<i>10 sites</i>
Bentley Prince Street	City of Industry, CA
World Kitchen	Charleroi, PA
Eaton	Sumter, SC
Spirax Sarco	Blythewood, SC
Ingersoll Rand	Tyler, TX
Didion Milling, Inc.	Cambria, WI
Neenah Foundry Company	Neenah, WI
Gerdau	Sayerville, NJ
Ascend Performance Materials	Alvin, TX
Dixie Chemical	Pasadena, TX

Scaling Up SEP - Enterprise wide



Goals:

- ▶ Clearly *define the relationship* between ISO 50001 at the corporate or division level and SEP
- ▶ Provide a *continual improvement pathway* across an entire company or division to:
 - Provide an overall structure for expanding the number of SEP certified facilities over time in a flexible manner
 - Create a platform for sharing EnMS and SEP implementation best practices across a company or division
 - Increase efficiencies and economies of scale within a company

Industrial SEP Accelerator, Enterprise-Wide Message-

Start-up Phase: DOE and Partners demonstrate implementing SEP across three or more industrial facilities.

Full Implementation: Industrial SEP Accelerator Partner agrees to:

- **Recruit three or more manufacturing plants** within their company to achieve SEP certification and incur all third-party SEP certification costs.
- **Offer cost-shared SEP training** for corporate and facility energy management teams.
- **Share data from participating facilities**, including SEP cost and benefit data from implementing SEP at the enterprise-wide level.
- Note: DOE to ensure data protection

U.S. Department of Energy Agrees to:

- **Cost-share SEP training** in coordination with participating Partners.
- **Disseminate resources**, including DOE tools such as eGuide and EnPI tools, and best practices on strategies to cost-effectively implement SEP.
- **Provide national recognition** to Partners for achieving SEP Accelerator milestones and goals.
- **Develop case studies** documenting Partner success.

SEP Enterprise-wide Accelerator: 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. manufacturing, 1 US commercial)

- Smyrna, TN
- Decherd, TN machining
- Decherd, TN forging
- Decherd, TN casting
- Franklin, TN (Corp HQ)

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 M&V Protocol Provides Quality Control

Superior Energy Performance: Measurement and Verification Protocol for Industry (Nov. 19 2012)

3.2 Calculating Adjusted Consumption;

3.3 Calculations for a Facility;

3.4 Model Validity for Calculating Adjusted Consumption;

3.6 Using Adjustment Model Application Methods to Determine Energy Performance Improvement Relative to a Baseline;

3.8 Calculating Consumption;

3.9 Data Quality

Evaluation, Measurement, and Verification

Superior Energy Performance: Measurement and Verification Protocol for Industry (Nov. 19 2012)

3.3.3 Totaling Energy Sources;

3.7.1 Conversion of Electricity to Primary Energy

SEP Program Cost Effectiveness – Test Perspective

	Utility Cost Test	Total Resource Cost Test	Societal Cost Test
Program Costs			
Program Administration Costs	Yes	Yes	Yes
SEP Cost: Program Incentive	Yes	Yes	Yes
SEP Cost: Participant Contribution	---	Yes	Yes
Other Program Impacts (participant costs)	---	Yes	Yes
Program Benefits			
Customer Bill Savings	---	---	---
Avoided Energy Costs	Yes	Yes	Yes
Avoided Capacity Costs	Yes	Yes	Yes
Other Benefits			
Avoided T&D costs	Yes	Yes	Yes
Wholesale Market Price Suppression	Yes	Yes	Yes
Avoided Environmental Compliance	Yes	Yes	Yes
Reduced Risk	Yes	Yes	Yes
Other Program Impacts (utility perspective)	Yes	Yes	Yes
Other Program Impacts (participant)	---	Yes	Yes
Other Program Impacts (societal)	---	---	Yes



Better Buildings Industrial SEP Accelerator: Ratepayer-funded Next Steps

Sandy Glatt

Aimee McKane LBNL & Alice Napoleon, Synapse

Regulatory Information Package

Anticipated regulator information needs for the ratepayer-funded program:

- Program description, delivery approach (e.g., technical assistance, audits, equipment direct install or rebates), market barriers, marketing approach, target participants, and projected participation for energy efficiency plan filings
- Program costs by cost type
- Participant costs
- Projected savings: annual energy savings (all fuels), peak load savings, other resource savings, non-energy benefits
- Cost-effectiveness (benefit cost ratio, gross benefit and cost, net benefit) (Calculator to provide benefit cost ratios)
- Evaluation, monitoring and verification plans
- Assumptions and validity of assumptions for savings persistence/measure lives, savings attribution, and net vs. gross

SEP Accelerator Measurement and Verification Approach

Ratepayer Accelerator M&V Activities are designed to:

- Contribute toward full alignment of M&V for SEP and Ratepayer-funded programs
- Support testing of both attribution and persistence to build confidence

General Principles:

- Build on existing ratepayer-funded program M&V approaches that have already received regulatory approval
- Recognize that goals for conducting M&V in support of SEP and ratepayer-funded programs are different
- Alignment of M&V processes to the extent possible is an important objective for the Accelerator
- Work on M&V alignment will be iterative, involve substantial engagement by Program Partners, and require testing

SEP Accelerator M&V Framework

An initial focus on project-level M&V associated with the implementation of ISO 50001 Energy management system Action Plans would have a number of benefits:

- Partner funding of more rigorous ISO 50001 Action Plan evaluation component would be a clear “value add” because it exceeds SEP requirements
- Resulting energy performance improvement could be tied directly to the EnMS implementation (not a free rider)
- A flow of verified project-level energy savings from Action Plans would support Program Partner’s initial technical assistance for implementing ISO 50001 and SEP, which may take several years for the facility to complete
- Industrial facilities would have a consistent approach to project level M&V
- Partner-supported M&V would provide these facilities with excellent documentation for “bottom-up sanity check” required by the SEP to support their claimed energy performance improvement
- Approach builds on existing Program Partner and SEP efforts

Proposed FY14 outputs include an initial implementation strategy, including M&V, persistence, and attribution considerations