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The Business Value of Superior Energy Performance

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The Business Value of Superior Energy Performance

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ABSTRACT

Industrial facilities participating in the U.S. Department of Energy's (US DOE) Superior Energy Performance (SEP) program are finding that it provides them with significant business value. This value starts with the implementation of ISO 50001-Energy management system standard, which provides an internationally-relevant framework for integration of energy management into an organization's business processes. The resulting structure emphasizes effective use of available data and supports continual improvement of energy performance. International relevance is particularly important for companies with a global presence or trading interests, providing them with access to supporting ISO standards and a growing body of certified companies representing the collective knowledge of communities of practice.

This paper examines the business value of SEP, a voluntary program that builds on ISO 50001, inviting industry to demonstrate an even greater commitment through third-party verification of energy performance improvement to a specified level of achievement. Information from 28 facilities that have already achieved SEP certification will illustrate key findings concerning both the value and the challenges from SEP/ISO 50001 implementation. These include the facilities' experience with implementation, internal and external value of third-party verification of energy performance improvement; attractive payback periods and the importance of SEP tools and guidance. US DOE is working to bring the program to scale, including the Enterprise-Wide Accelerator (SEP for multiple facilities in a company), the Ratepayer-Funded Program Accelerator (supporting tools for utilities and program administrators to include SEP in their program offerings), and expansion of the program to other sectors and industry supply chains.

Introduction

Strategic Energy Management (SEM) describes a range of options for applying management system practices to achieve continual improvement in energy performance of an organization over time. SEM options include a variety of US and Canadian federal-, state- and utility-based programs, as well as more structured, third-party certified options. Examples in the latter case include *ISO 50001- Energy management system standard* (ISO 2011) and the additional requirements encompassed in US DOE's Superior Energy Performance® (SEP) (US DOE 2012, 2015). Considerations in selecting from the range of SEM options include the size, complexity, business environment, maturity of current energy management program, prior management system experience, and goals of the organization.

Adopting ISO 50001 offers a number of advantages, including:

- A robust management system structure;
- Global relevance from a broadly-accepted international standard;

- The ability to readily integrate it into existing management system structures, such as ISO 9001 and ISO 14001;
- The demonstrated ability to produce measureable and persistent increases in energy performance, even for companies with very mature energy efficiency programs, and
- Third-party certification.

Participation in ISO 50001 is voluntary, but it is being used by some countries as a mechanism for demonstrating compliance with regulatory requirements.[1] While ISO 50001 requires continual improvement of both the EnMS and energy performance, it does not specify or verify any minimum level of performance improvement.

> *"ISO 50001 is a good standard, but does not require the establishment of energy savings targets. SEP does require the establishment of targets, which then pushed our facility to achieve those targets. SEP shows vendors and customers the exact level of achievement"*
> *—3M Canada, Brockville, Ontario*

Building on the ISO 50001 foundation, SEP adds value through attainment of specified energy performance improvement targets. It also provides transparency through third-party verification of the resulting energy performance improvement. The program is designed to accurately identify, implement and verify energy performance improvement, thus bringing out the business value for program participants. Industry benefits from the energy cost reductions resulting from a more disciplined approach to energy use and consumption. Policy makers and program implementers also benefit from a turn-key industrial energy management program with well-documented and positive outcomes.

Participation in SEP is voluntary, provides a range of options for achieving certification, and is designed to be effective in relatively lightly regulated markets that lack strong external drivers for participation (such as the U.S.). Figure 1 illustrates the relationship between SEM, ISO 50001, and SEP.

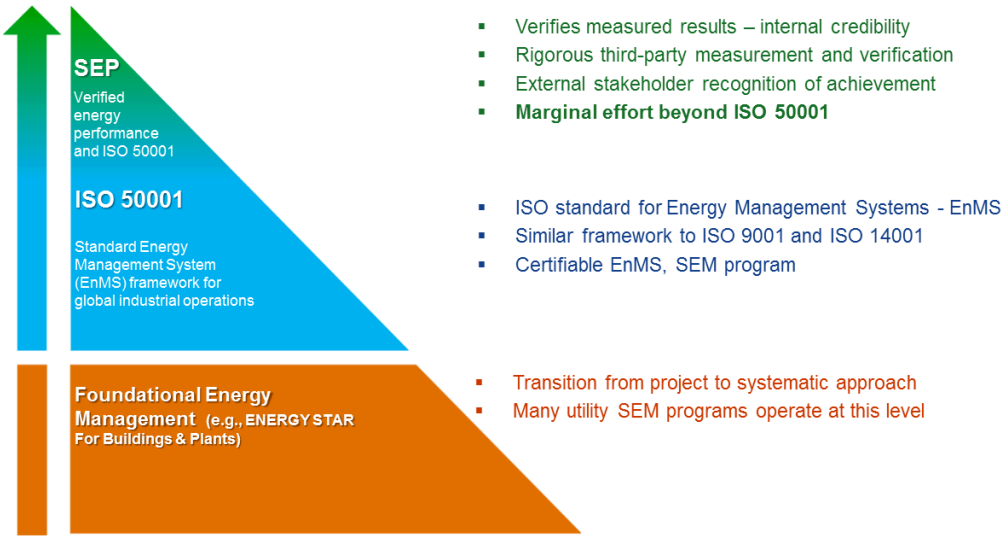

Figure 1 – Strategic Energy Management continuum

[1] http://ec.europa.eu/clima/policies/ets/index_en.htm

SEP Overview

SEP has been thoroughly tested in more than 40 industrial facilities between July 2007 and December 2013. During this demonstration period, DOE worked with the US Council for Energy Efficient Manufacturing and a core team of experts (SEP Core Team) to develop and test the standards and protocols that guide SEP participation, as well as the training and tools that support successful results.[2] Substantial attention was also given to workforce preparation, since both SEP and ISO 50001 require a unique combination of technical and management system skills.

Standards and Protocols

To ensure transparency, accuracy, and global relevance, SEP is based on standards and protocols, as illustrated in Figure 2.

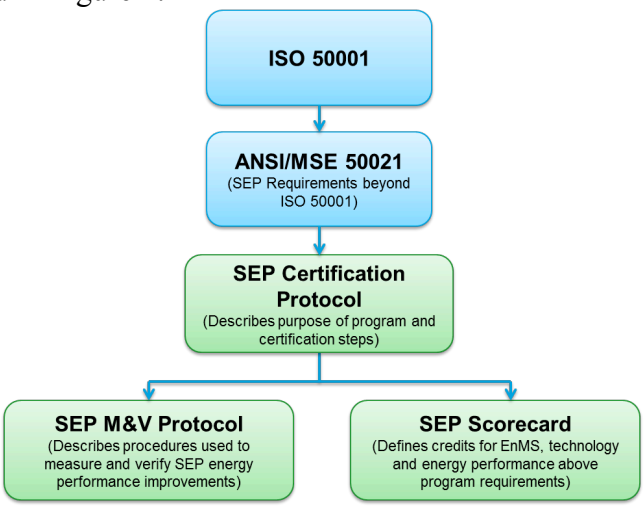

Figure 2: Standards and Protocols for SEP Program Participation

Third-party organizations (SEP Verification Bodies) are used to conduct certification audits for conformance with the relevant standards. These third-party organizations receive their authority to conduct joint ISO 50001/SEP certification audits from accreditation bodies and are subject to ISO and ANSI standards setting forth certification audit requirements (ISO 2014, ANSI 2012).[3] The certification audit team includes, at a minimum, an SEP Lead Auditor and an SEP Performance Verifier, who are certified to a very high level of competence through the Institute for Energy Management Professionals (Siciliano, et al 2015).[4]

While the standards and protocols underlying SEP can appear complex, they all share a common purpose- to create an internationally relevant, transparent mechanism for quantifying, verifying, and reporting on the energy performance improvement that results from the

[2] SEP Core Team: Lawrence Berkeley National Laboratory, Georgia Institute of Technology, KEMA (now DNV-GL and DEKRA), Energetics Incorporated, and Resource Dynamics
[3] ANSI-ASQ National Accreditation Board [ANAB] for ISO 50001 and ANSI for SEP
[4] See SEP professional certifications at http://www.ienmp.org/

implementation and maintenance of a robust EnMS. Feedback from program participants indicates that they place a high value on this robust transparency for business purposes.

"External verification and validation is critical. Certification adds to the confidence in calculations and savings. Verification was sought by top management.
—Nissan, Smyrna, TN

"Because of the SEP verification and certification, Scranton [Pennsylvania facility] is viewed as the leader in energy improvement. This was presented at the corporate office (for all General Dynamics) for program performance. The [U.S. Army] joint munitions command is considering having other ammunition facilities utilize ISO 50001 and SEP certification."
—General Dynamics, Scranton, PA

Performance Levels

The current SEP program allows two pathways to achieve certification- both requiring conformance to ISO 50001. The Energy Performance Pathway is based on the percentage of energy performance improvement over a three-year achievement period, as measured against a baseline year. The Mature Energy Pathway allows the achievement period to be as long as 10 years and uses the SEP Scorecard to earn points for energy management best practices and energy performance improvements beyond the minimum requirements. This second pathway was developed for facilities that have been engaged in energy efficiency activities for some time and places a greater emphasis on enhancing and maintaining a robust EnMS. As shown in Table 1, both pathways offer three levels of achievement- Silver, Gold, and Platinum.

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

Table 1: SEP Performance Levels (current program)

SEP is undergoing a change to streamline performance levels (updated program), while increasing both program flexibility and fairness. The current two pathway approach is being replaced with an integrated scoring system that allows facilities to choose an achievement period between 3 and 10 years and to earn scorecard credits in three categories: energy management, advanced practices, and additional energy performance. Table 2 illustrates this new approach.

The recertification process is also being streamlined so that all applicants for recertification are required to meet a minimum 3% energy performance improvement over the most recent 3 years, with other requirements remaining the same as for initial certification.

All SEP applicants meet minimum % energy performance improvement

Achievement Period	Minimum Energy Performance (EP) Improvement
3 Years	5%
4 Years	7%
5 Years	8%
6 Years	10%
7 Years	12%
8 Years	13%
9 Years	15%
10 Years	16%

Additional requirements for Gold and Platinum performance levels

SEP Scorecard Credits	Gold	Platinum
Energy Management [EM] System Credits	Minimum 20	Minimum 35
Combination of Advanced Practices (AP) credits and Additional Energy Performance (AEP) credits 1 AEP credit given for every verified 1% improvement in energy performance above the required EP improvement threshold; 2 points for each credit	No minimum	Minimum 10
Total minimum SEP qualification points	**40**	**60**

Table 2: Updated SEP Performance Levels

Early feedback from industry indicates that the new design is easier to understand, allows for alignment of SEP baselines with other company initiatives, and better addresses inequities whereby a facility with no prior commitment to energy efficiency can demonstrate a greater level of *energy performance improvement* than one that has been managing their energy for some time.

Business Value to Industry

Successful implementation of ISO 50001 is a process leading to a change in culture as energy management becomes integrated into daily management practices. Companies of any size can benefit from the process of implementing an EnMS, even those making a business decision not to seek certification. Like all successful changes in business culture, the process of establishing an EnMS requires both top management commitment and an investment of staff time to fully implement the necessary business processes. Top management establishes an energy policy, empowers an energy management team to implement the EnMS, provides critical resources, and engages staff across the organization in the effort. Once these processes are established, maintenance of the EnMS provides long term benefits for a relatively modest level of ongoing effort.

With its emphasis on metrics and energy performance outcomes, SEP increases the benefits from implementation of ISO 50001 business processes. Initial analysis of SEP participating facilities conducted in 2013 supported an average verified energy performance improvement of 10% across the entire facility over business as usual levels within the first 18 months (Therkelsen, et al 2013). The average energy cost savings was more than $500,000

annually from low/no cost operational improvements alone, with less than a 2-year payback for facilities with a baseline energy spend of $2 million or more. A more extensive analysis conducted in 2015 attributes 53% of the staff costs associated with SEP implementation to existing staff already engaged in facility energy management activities. Only one company has hired new staff to develop and implement their energy management system; the remaining companies relied on existing staff already employed at their facilities. When only new costs to the facilities associated with SEP implementation are considered, facilities with annual energy spend of greater than $2 million can expect a simple payback period of less than 1.5 years. In addition, the new analysis shows a decline in implementation costs over time, which is expected as program and EnMS implementation processes become more streamlined (Therkelsen, et.al 2015).

SEP participating facilities were able to achieve these results because they were challenged to analyze and truly understand their energy use and consumption. This led to prioritized opportunities for improvement which received management support because they were clearly linked to the pursuit of specific achievement levels.

Verification of energy performance improvement is proving to be an extremely important business value- not only for external recognition, but also in communicating internally with top management. Its use in internal communication is particularly exciting because this addresses a longstanding barrier for technical efforts by facility engineers and energy managers to effectively demonstrate to management decision-makers that energy performance was truly improved and yielded a return on investment (ROI).

"SEP has helped justify expenditures to management. The M&V requirement helps to identify real cost savings, allowing us to reinvest those savings into additional energy projects"
— Cooper Tire, Texarkana, AR

In addition, SEP's greater focus on tracking, measuring and verifying energy performance improvements can help executives make informed and sound decisions to move beyond the "low hanging fruit" and improve business processes and performance. SEP's focus on continual performance improvement should complement industry-accepted programs, such as Six Sigma, that aim to continually reduce costs through structured business processes.

Industry Implementation Experience

To date, the 25 facilities certified to SEP have met the ISO 50001 standard and have improved their energy performance by as much as 30% over three years or as much as 40% over 10 years. Table 3 lists the SEP-certified facilities and their respective achievements as of May 2015.[5] Several facilities have started or completed their recertification process and companies have begun to expand SEP and ISO 50001 across additional facilities upon seeing initial results.

SEP certification is a significant accomplishment and DOE helps to bring attention to these achievements. DOE publicly recognizes SEP-certified facilities at events and conferences and online through its relevant communications channels. Once certified, each facility will receive a DOE certificate, a certification mark, and a package of communications resources to

[5] DOE continually updates the list of SEP certified facilities on its website as new certificates are issued. http://www.energy.gov/eere/amo/certified-facilities

celebrate the accomplishments of its employees and showcase its certification to employees, management, external stakeholders, and customers.

	Company Name	Facility Name	Certified % Improvement	Achievement Period	Certificate Period
PLATINUM	Mack Trucks, Inc.	Macungie Cab & Vehicle Assembly Plant	41.9%	10 years	2013-16
	Schneider Electric	Victoria, British Columbia Plant	30.6%	3 years	2014-17
	Volvo Trucks North America, LLC (recertified)	New River Valley, VA Plant	28.4%	10 years	2015-18
	Volvo Group Trucks (Volvo Powertrain NA)	Hagerstown, MD Plant	20.9%	3 years	2014-17
	Schneider Electric USA, Inc.	Clovis, CA Plant	16.7%	3 years	2014-17
	HARBEC Inc.	Ontario, NY Plant	16.5%	3 years	2013-16
	Schneider Electric USA, Inc.	Seneca, SC Plant	15.6%	3 years	2013-16
	Schneider Electric USA, Inc.	Smyrna, TN Plant	15.3%	3 years	2014-17
	3M Canada	Brockville Tape Plant	15.2%	3 years	2012-15
GOLD	Schneider Electric USA, Inc.	Peru, IN Plant	24.9%	10 years	2014-17
	CCP Composites US LLC (recertified)	Houston, TX Plant	13.0%	3 years	2013-16
	Cummins, Inc.	Rocky Mount Engine Plant	12.6%	3 years	2014-17
	Coca-Cola Refreshments, USA, Inc	Dunedin, FL Plant	12.2%	3 years	2015-18
	General Dynamics Ordnance and Tactical Systems	Scranton Operation Plant	11.9%	3 years	2013-16
	Allsteel Inc.	Muscatine, IA Plant	10.2%	3 years	2012-15
	Schneider Electric USA, Inc.	Columbia, SC Plant	10.2%	3 years	2014-17
	Cooper Tire & Rubber Company	Texarkana, AR Plant	10.1%	3 years	2012-15
SILVER	Bridgestone Americas Tire Organization, LLC	Wilson, NC Plant	16.8%	10 years	2012-15
	Olam Spice and Vegetable Ingredients	Gilroy, CA Plant	9.0%	3 years	2013-16
	Schneider Electric USA, Inc.	Cedar Rapids, IA Plant	8.8%	3 years	2014-17
	MedImmune, LLC	Gaithersburg, MD Campus	8.5%	3 years	2014-17
	Curtiss-Wright EMD	Cheswick, PA Plant	7.6	3 years	2015-18
	Nissan North America Inc	Smyrna, TN Plant	7.2%	3 years	2012-15
	Schneider Electric USA, Inc.	Lexington, KY Plant	6.9%	3 years	2014-17
	Schneider Electric USA, Inc.	Lincoln, NE Plant	6.5%	3 years	2013-16
	Schneider Electric Mexico, S.A. de C.V.	Rojo Gomez, Mexico Plant	5.9%	3 years	2014-17
	Land O'Lakes, Inc.	Carlisle, PA Plant	5.7%	3 years	2015-18
	3M Company	Cordova, IL Plant	5.6%	3 years	2012-15

Table 3. SEP Implementation Results to Date (May 2015)

Implementing an EnMS that both conforms to ISO 50001 and achieves the improvement targets set by SEP requires a planned approach—plus learning and adapting along the way. DOE has worked with industry to develop a suite of tools and resources for facilities of different sizes and levels of experience in managing energy. These resources help a facility reduce internal staff time while developing an EnMS that conforms to ISO 50001, thereby reducing implementation costs for both ISO 50001 and SEP.

eGuide.[6] A cornerstone resource is DOE's eGuide. This comprehensive online guide provides free, step-by-step guidance for three levels of strategic energy management: (a) Foundation, (b) ISO 50001 implementation from start to finish, and the (c) SEP additional requirements above ISO 50001. It includes steps for addressing key parts of the ISO 50001 standard and enables users to dig deeper into each step to learn about relevant activities, timing, forms, checklists, templates and examples.

The eGuide is based on the Plan-Do-Check-Act process of ISO 50001. The eGuide should be used in conjunction with the ISO 50001 standard, not in place of it. This approach

[6] DOE's eGuide is available online: www.energy.gov/eere/amo/articles/doe-eguide

enables the user to review the ISO 50001 requirements from the source document, followed by the eGuide, for step-by-step guidance on implementation strategies and resources.

Certified Practitioner in Energy Management Systems (CP EnMS).[7] The skills needed for ISO 50001 EnMS implementation are unique, since ISO 50001 combines both management systems and energy efficiency. DOE is building workforce capacity through the CP EnMS training and personnel certification. As of May 2015 more than 100 CP EnMS professionals are certified to help companies establish an ISO 50001 energy management system and prepare for SEP certification. These training and certification activities have created a pool of proven, skilled consultants across the country. These resources are valuable to manufacturers and utility and program administrators seeking to build in-house expertise, which can be leveraged to expand EnMS implementation to additional facilities. For example, companies such as 3M, Cummins, Darigold, Ford, Freescale Semiconductor, Johnson Controls, Schneider Electric, and Volvo Trucks have sent staff through the program.

Energy Performance Indicator (EnPI) tool.[8] Accurately measuring the energy performance improvements in a manufacturing environment can be complex with multiple potential variables, statistical modeling approaches, and levels of reporting metrics. To meet this need, DOE created the EnPI software tool, a powerful yet simple-to-use tool to help plant and corporate managers. The tool is based on regression analysis, establishes a baseline of energy consumption, and tracks annual and cumulative energy performance improvements, energy savings, EnPIs, and carbon emissions. It accounts for independent variables that impact energy such as weather, production, and other facility-specific variables.

Facilities can use the EnPI Tool to produce the necessary SEP-specific metrics. Equations built into the tool follow the SEP M&V Protocol and the tool confirms that the model regression statistics align with the SEP requirements. Also, companies can use the tool to aggregate plant-level performance data into a single corporate-wide percentage improvement metric variable. Although the tool has been primarily used in industrial settings by companies such as Nissan, General Dynamics, and Harbec, it is also applicable to companies and facilities of any size and in any industrial and commercial sector.

SEP Case Studies.[9] DOE has conducted in-depth interviews with SEP-certified facilities and analyzed energy data from the EnPI tool to examine the business value of SEP certification, benefits of participation, attendant implementation costs and energy and cost savings (Therkelsen, et al., 2015) and lessons learned. To document and share the findings, DOE has produced a series of SEP case studies and plans to publish new case studies on an ongoing basis.

The case studies highlight benefits such as the significant additional value that SEP provides at the relatively low cost of adding it to ISO 50001. SEP's approach adds more rigor and discipline in analyzing, reducing, and verifying energy use that helps to identify and capture additional cost and energy savings. Other benefits include SEP's data-driven approach to support internal decision-making and the importance of third party verification. In particular, impressive results in SEP facilities, fully backed by internal audit data, help decision-makers evaluate the success of specific measures and inform decisions on next steps for managing energy. Facility personnel, equipped with accurate energy and savings data, are better positioned to encourage investments in other energy-related improvements. Furthermore, third party verification provided credible proof of achievement that was valued both internally and

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[7] www.energy.gov/eere/amo/become-energy-management-professional
[8] www.energy.gov/eere/amo/articles/energy-performance-indicator-tool
[9] http://www.energy.gov/eere/amo/business-case-sep#case-studies

externally across the participating companies. For example, the documentation and verified achievements were helpful to meet corporate sustainability requirements, acquire additional funding for energy projects, and demonstrate leadership and a viable model for achieving energy and carbon reduction goals.

The SEP audit allows us to check that we are not claiming anything that was not actually achieved. The SEP/ISO 50001 audit also gives facility staff more authority when reporting results to superiors."
—CCP, Houston, TX

Market Value to Policy Makers and Program Administrators

In late 2013, DOE also began reaching out to state energy efficiency and utility program administrators (PAs) and their regulators to explore and/or pilot strategies to accelerate the adoption of an EnMS-based continual improvement approach in industry. A particular emphasis was placed on aiding the uptake of ISO 50001 and SEP (*Better Buildings Industrial SEP Accelerator)*. [10] This outreach was undertaken in recognition that:

1. PA-supported technical assistance and project incentives can drive SEP adoption by industry,
2. Deeper and more sustained industrial energy savings associated with SEP will benefit the PA programs and their customers, and
3. Resulting energy cost savings benefit industrial customers.

SEP provides a path for PAs that already have industrial energy efficiency program offerings, including SEM, to bring those offerings to a higher level. It also provides a turnkey opportunity that is well-supported with guidance, training, and tools for PAs that currently offer limited or no industrial programs.

To effectively communicate these benefits to PAs and assist them in deciding whether to seek regulatory approval to offer SEP to their customers, DOE began work with a group of SEP Ratepayer-Funded Accelerator Partners on development of a series of informational products. The four partners actively that are engaged with DOE on developing the informational products are: Bonneville Power Administration, Efficiency Vermont, Northeast Utilities (now Eversource Energy), and Wisconsin Focus on Energy. Informational products developed to date through this collaboration include:

- Presentation materials tailored for use with industrial customers and PA staff;
- SEP Guide for the Development of Energy Efficiency Program Plans, including a program filing template, for use by PAs in developing an SEP program filing with their regulators;
- Cost-effectiveness Screening Tool and Guide for use in determining whether offering SEP would be cost-effective in a specific jurisdiction; and
- Program Transition Tables with information concerning the level of effort required to move from a traditional industrial incentive program to SEM, ISO 50001, and SEP.

These informational products have already been made available to the partners. Once initial testing is completed, DOE intends to make these and other products available to PAs via a

[10] http://www1.eere.energy.gov/buildings/betterbuildings/accelerators/

dedicated SEP webpage. DOE is also working with PAs to support the training and qualification of their technical assistance providers (typically engineering consultants) as CP EnMS.

SEP provides a platform for improving transparency and standardization in industrial M&V practices. Work has begun to develop a more standardized approach for maintaining records of implemented actions to provide a flow of documented energy savings that PAs need to support continued customer technical assistance during SEP implementation. Additionally, research is planned concerning whether standardized energy savings calculation methods might be developed for common industrial energy performance improvement actions of limited to moderate complexity. These methods would better support the application of the SEP M&V Protocol, as well as streamline the PA approval process, if incentives are sought for these improvements.

SEP also creates opportunities to link the energy savings resulting from SEP certification or recertification to greenhouse gas reduction (GHG) accounting methods. Because energy consumption is the greatest contributor to GHG emissions, industrial facilities participating in SEP already have a valuable foundation for addressing GHG mitigation: their commitment to continual improvement in energy performance and third-party verification of results. Further, use of the EnPI Tool provides a mechanism for industrial facilities to calculate their energy savings and CO_2 emission reductions.

Looking Ahead

In addition to efforts to accelerate the uptake of SEP through partnerships with state energy efficiency and utility program administrators, DOE initiated the *SEP Enterprise-Wide Accelerator* (EWA) in late 2013 at a White House launch. The purpose is to demonstrate cost savings by working with EWA Partner companies to more efficiently implement ISO 50001 and SEP across a corporation, business unit, or multiple plants. This initiative resulted from an industry consultation of SEP-participating companies earlier in 2013 to discuss how such a program might be structured.

There are currently five companies participating in the EWA, including 3M, Cummins, General Dynamics, Nissan North America, and Schneider Electric. A total of 30 facilities are seeking SEP certification.

As part of this demonstration, the SEP Core Team is working with ANSI, ANAB and the EWA Partners to audit the enterprise-level EnMS processes and to develop and implement strategies for auditing these processes at a sampling of industrial facilities across each enterprise. Work has also been initiated to test the potential for sampling energy performance across similar facilities in combination with a very rigorous enterprise-level EnMS. The end result is expected to provide a mechanism for companies to more cost-effectively conduct ISO 50001 and SEP certification audits, and flexibility to add SEP facilities to their enterprise-wide ISO 50001 certification over time.

Markets for SEP implementation are anticipated to expand within the next year to include large energy-consuming sectors such as: water and wastewater facilities, university campuses, and hospitality facilities. The connection between SEP and industrial supply chains (especially original equipment manufacturers and public sector institutional purchasing) is also expected to strengthen.

Interest in SEP is rising internationally. There are already two SEP-certified facilities in Canada and one in Mexico. These industry-driven certifications are providing a strong basis for

North American collaboration among the US, Canadian, and Mexican governments. In addition, Korea has adapted much of the SEP program for a new national program offering.

Finally, because SEP applies best international practices for the reported energy performance improvement, SEP is expected to attract greater attention as a foundation for future quantification of energy-related CO_2 emission reductions.

Conclusion

After years of development and testing, SEP is proving its value to US industry in a number of ways, not all of which were fully appreciated when the program was originally conceived. With its emphasis on metrics and energy performance outcomes, SEP demonstrably increases the benefits from implementing ISO 50001 business processes. As businesses take on more sustainability accountability, energy is rising to the top of their list of sustainability issues (Deloitte 2014). Verification of energy performance improvement is proving to be an extremely important business value- not only for external recognition, but also in communicating internally with top management. Its use in internal communication is particularly exciting because SEP addresses a longstanding barrier for technical efforts by facility engineers and energy managers to effectively demonstrate to management decision-makers that energy performance was truly improved and yielded a return on investment (ROI).

Because of SEP, management will have higher confidence levels for future investments in terms of expected savings and return on investment
—3M, Cordova, IL

A major public benefit is the measureable and verifiable improvement in energy performance, even for companies with very mature energy efficiency programs along with the demonstrated persistence of energy performance improvements (including operational ones).

Finally, the framework of standards and protocols provides SEP with international relevance, transparency, and third-party verified results, resulting in a scalable program that can work well across international boundaries.

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References

ANSI. 2013. *ANSI MSE 50021 Superior Energy Performance- Additional Requirements for Energy. Management Systems.* American National Standards Institute Washington, DC http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fMSE+50021-2013

ANSI. 2012. *ANSI MSE 50028 Superior Energy Performance- Requirements for verification bodies for use in accreditation or other forms of recognition*. American National Standards Institute Washington, DC

http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2FMSE+50028-2012

Deloitte. 2014. *CFOs and Sustainability: Shaping Their Roles in an Evolving Environment*. http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Risk/dttl-risk-Deloitte-CFOs_and_Sustainability-2014.pdf

ISO. 2014. *ISO 50003 Energy management systems- Requirements for bodies providing audit and certification of energy management systems.* International Organization for Standardization. Geneva, Switzerland. http://www.iso.org/iso/catalogue_detail.htm?csnumber=60089

ISO. 2011. *ISO 50001 Energy management systems* -- Requirements with guidance for use. International Organization for Standardization. Geneva, Switzerland. http://www.iso.org/iso/catalogue_detail?csnumber=51297.

Siciliano, G., A.McKane, and P. Reyes. 2015. *Promoting Strong ISO 50001 Outcomes with Supportive National Infrastructure* to be published in the proceedings of ACEEE Summer Study on Energy Efficiency in Industry. Buffalo, NY

Therkelsen, P., Y. Tamm, R. Sabouni, P. Scheihing, and A. McKane. 2015. *Development of an Enhanced Payback Function for the Superior Energy Performance Program,* to be published in the proceedings of ACEEE Summer Study on Energy Efficiency in Industry. Buffalo, NY,

Therkelsen, P., A. McKane, R.Sabouni, T. Evans and P. Scheihing. 2013. *Assessing the Costs and Benefits of the Superior Energy Performance Program*, proceedings of ACEEE Summer Study on Energy Efficiency in Industry. Niagara Falls, NY

US DOE. 2015. Superior Energy Performance® website, US Department of Energy. Washington, DC http://energy.gov/eere/amo/superior-energy-performance

US DOE. 2012. Superior Energy Performance® Certification Protocol, US Department of Energy. Washington, DC http://energy.gov/sites/prod/files/2014/07/f17/sep_cert_protocol.pdf