

Superior Energy Performance^{cm}: A Roadmap for Continual Improvement in Energy Efficiency

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ABSTRACT

Superior Energy Performance^{cm} is a forthcoming voluntary certification program that will move industrial and commercial facilities onto a path of continuous energy performance improvement—while maintaining competitiveness. This paper describes the certification program for U.S. industry, as well as benefits to collaboration partners that deliver the program, such as state programs, utilities, and supply chain partners. Superior Energy Performance certification requires facilities to meet all requirements of ISO 50001, the first global energy management standard. In addition, facilities must demonstrate improved energy performance using the program's transparent, globally accepted system for validating energy management improvements. Superior Energy Performance is envisioned to foster market demand for verified, sustained improvements in energy performance and to increase adoption of the ISO 50001 standard. The standard, which was developed with input from representatives from more than 50 countries, is broadly applicable to various sectors of national economies and could influence as much as 60 percent of the world's energy demand (EIA 2007). At the international level, the Global Superior Energy Performance partnership is working to harmonize a range of nationally accredited energy performance certification programs that reward strategic energy management and third-party-verified energy reductions.

Introduction

The Superior Energy Performance^{cm} certification program applies to the certification of industrial or commercial facilities that conform to the ISO 50001 international energy management standard and demonstrate improved energy performance (e.g., reduced energy intensity, British thermal units [Btu] per unit of product manufactured, Btu per square foot on building, etc.) that can be verified by a third party. It is a voluntary program that provides industrial and commercial facilities with a roadmap for achieving continual improvement in energy performance while maintaining competitiveness (Scheihing et al. 2009).

A central element of Superior Energy Performance is the implementation of the ISO 50001 global energy management standard. The program includes additional requirements for achieving and documenting energy performance improvements. The program will provide companies with a framework that fosters energy efficiency at the facility level and a methodology for measuring and validating energy performance improvements.

The U.S. Department of Energy (DOE) partnered with the U.S. Council for Energy-Efficient Manufacturing (U.S. CEEM) to develop the Superior Energy Performance program for industry, which will launch nationwide in 2012. The partnership brings together the respective strengths of industry, standards-making bodies, federal agencies, national laboratories, universities, and technical experts.

DOE owns the Superior Energy Performance certification mark and will license the use of the mark accordingly to facilitate delivery through private-sector organizations. Although federal funds supported the development of the Superior Energy Performance program, it is designed as a nongovernmental program that will transition to a self-administered, fee-based entity in 2014. Superior Energy Performance supports attainment of the 2015 goals that the DOE Industrial Technologies Program (ITP) seeks to achieve in partnerships with stakeholders:

- Save over 400 trillion Btu annually industry-wide
- Influence 35 percent of manufacturing energy end use
- Engage 10,000 plants (5,000 through supply chain initiatives) to continuously improve energy management
- Certify 750 industrial plants through the Superior Energy Performance program

Superior Energy Performance is accredited by the American National Standards Institute (ANSI) and the ANSI-American Society of Quality (ANSI-ASQ) National Accreditation Board (ANAB). The Global Superior Energy Performance program and Superior Energy Performance program for commercial buildings will launch later, as these programs are still under development.

Requirements for Certification

Superior Energy Performance is designed to encourage participation among facilities of all sizes and levels of experience in managing energy. The program offers two methods of verifying results, depending on the degree of data validation desired by a facility. Facilities will apply to become “Partners” or “Certified Partners,” depending on the value they perceive for verification or certification of savings and management practices (see Table 1).

All facilities applying to Superior Energy Performance must conform to the ISO 50001 energy management standard and the forthcoming MSE 50021 standard, which requires a demonstrated improvement in energy performance. Because ISO 50001 does not prescribe specific performance criteria or results with respect to energy performance, the MSE 50021 standard will specify the Superior Energy Performance program performance tiers and requirements beyond ISO 50001. The MSE 50021 standard is currently in development by the Georgia Tech Energy & Environmental Center (GTEEMC), an ANSI-accredited standards developer, and will be proposed to ANSI for approval as an American National Standard.

Table 1. Superior Energy Performance: Tiers and Summary of Requirements

	Partner	Certified Partner
Criteria	<ul style="list-style-type: none"> • Conformance with ISO 50001 • Measure and audit energy performance improvement 	<ul style="list-style-type: none"> • Conformance with ISO 50001 • Measure, verify, and certify energy performance improvement
Performance Levels	<ul style="list-style-type: none"> • Energy performance improvement required 	<ul style="list-style-type: none"> • Energy intensity improvement required, minimum levels set by program • Two pathways available; Energy Performance or Mature Energy
Method of Verifying Results	<ul style="list-style-type: none"> • Self declaration 	<ul style="list-style-type: none"> • ANSI/ANAB-accredited certification with onsite visit by third-party Verification Body

Conformance with the ISO 50001 Energy Management Standard

Superior Energy Performance requires that a facility's energy management system conform to ISO 50001, the first global energy management standard. ISO 50001 is expected to be ready for publication by August 2011 and is being crafted for compatibility with widely used management system standards such as ISO 9001 and ISO 14001. Conformance to the standard demonstrates that a facility has sustainable energy management systems in place, has completed an energy use baseline, and has made a commitment to continuous improvement in energy performance.

Implementing an energy management system will enable facilities to realize greater persistence in energy savings and higher returns on energy efficiency investments. It is anticipated that corporations, supply chain partnerships, utilities, and energy service companies will use ISO 50001 as a tool to improve energy performance and reduce carbon emissions in their own facilities as well as those belonging to their customers or suppliers. The standard does not prescribe specific performance criteria or results with respect to energy.

Demonstration of Energy Performance Improvement

All facilities applying to Superior Energy Performance must demonstrate improved energy performance, as outlined in MSE 50021 and its normative references, which include the Superior Energy Performance Measurement and Verification (M&V) Protocol. To encourage facilities to achieve greater energy performance levels, Certified Partners can qualify for Silver, Gold, or Platinum status, based on their demonstrated energy performance.

The program provides two pathways for achieving a Certified Partner designation: the "Energy Performance Pathway" and the "Mature Energy Pathway." Most facilities will qualify through the Energy Performance Pathway, which requires facilities to achieve a certain percentage of improvement in energy performance. However, it is recognized that facilities that have mature energy management programs in place and have already identified and implemented efficiency improvements for the last decade or more may face greater challenges in achieving high percentages of further improvement in energy performance. The Mature Energy Pathway offers these facilities an alternate pathway that takes into account the maturity of a facility's energy management system, improved energy performance, and continued efforts to institutionalize performance best practices.

Facilities participating through the Mature Energy Pathway will use the Superior Energy Performance Best Practice Scorecard to assess the maturity of their facility's energy management system to qualify for certification. The Best Practice Scorecard offers credits for energy management system activities, processes, or procedures that are exhibited by "best in class" companies. The guidance in the Best Practice Scorecard provides details about the credits and approaches that can be implemented to achieve them. The Best Practice Scorecard also lists measurement and verification activities that an auditor may use to validate each credit (U.S. CEEM 2011).

Verification

All participating facilities are required to verify conformance to the energy management standard and achievement of an energy performance improvement using the Superior Energy Performance Measurement and Verification (M&V) Protocol. Two methods for verifying results are offered:

- Self-declaration: Facilities applying to become Superior Energy Performance Partners will self-declare their conformance to the program requirements. Self-declaration may include audits conducted by team members within the plant or by off-site corporate representatives.
- ANSI/ANAB-accredited certification: Facilities applying to become Superior Energy Performance Certified Partners will submit required material to an ANSI/ANAB-accredited Verification Body. The Verification Body will send qualified auditors to conduct an on-site audit.

Superior Energy Performance Industrial Measurement and Verification Protocol

All participating facilities are required to verify conformance to ISO 50001 and achievement of an energy performance improvement using the Superior Energy Performance Measurement and Verification (M&V) Protocol. The M&V Protocol will offer a best practice methodology to (1) verify the impacts of a facility's implementation of the energy management standard, (2) track the extent to which the facility's energy performance changes over time, and (3) document normalized energy performance. The M&V Protocol has been designed to document relevant energy performance indicators, such as Btu/pound of product, and to validate energy performance and savings so that reported energy savings can be used to determine carbon impacts.

The M&V Protocol is intended to emphasize reliability in the consistency of reporting, sustainability of results, and credibility of assertions. A range of stakeholders has helped to develop the protocol, including industrial end users, utilities, regulators, energy efficiency organizations, and the M&V community. However, facilities wishing to use their energy performance achievements to qualify for third-party incentives or recognition by outside programs may need to satisfy additional requirements, as may be specified by those programs.

Superior Energy Performance Verification Bodies

ANSI/ANAB-accredited Verification Bodies will assign qualified auditors to conduct on-site audits to determine whether facilities have met Superior Energy Performance requirements and are thus eligible for certification. To issue Superior Energy Performance certification, Verification Bodies are legally required to hold ANSI/ANAB accreditation. ANSI/ANAB will be the only recognized Superior Energy Performance accreditation body. Forthcoming American National Standard MSE 50028 will define the requirements for ANSI/ANAB to use in accrediting Verification Bodies for Superior Energy Performance. It is estimated that MSE 50028 will be published by October 2011. Until then, ANSI/ANAB will use ISO 14065 to accredit Verification Bodies for Superior Energy Performance.

Certified Practitioners for M&V: SEP Lead Auditors and Performance Verifiers

ANSI-accredited SEP Lead Auditors and Performance Verifiers will serve as third-party auditors to verify that a facility meets Superior Energy Performance requirements.

- SEP Lead Auditors will assess a manufacturing facility's energy management system conformance to ISO 50001 and additional Superior Energy Performance requirements.
- SEP Performance Verifiers will assess a manufacturing facility's conformance to (1) the M&V Protocol and (2) energy performance improvement levels as defined by the Superior Energy Performance program.

The Superior Energy Performance program will help to build the expertise required to fill these auditor positions by developing ANSI-accredited certified practitioner credentialing programs. SEP Lead Auditors and Performance Verifiers will be subject to a rigorous qualification exam and, once certified, periodic professional enrichment requirements. The exam, training curriculum, and educational and experience requirements are under development.

Elective Resources to *Prepare Facilities for Certification*

Specialized resources are either currently available or in development to help facilities implement an energy management system and achieve results for participation in the Superior Energy Performance program.

System Assessment Standards

ASME has developed standards for conducting assessments of several types of energy systems that are widely deployed in industrial facilities: process heating, pump, steam, and compressed air systems. These standards provide a basis for facility operators to measure energy efficiencies, optimize fuel utilization, and improve environmental performance. The standards set the requirements that need to be performed during the assessment, but do not provide guidance on how to perform a system assessment.

Accompanying guidance documents assist users in applying the standards. The guidance documents provide the rationale for the technical requirements; technical guidance; application notes; and alternative approaches, tips, techniques, and rules of thumb. Guidance documents do not set any new requirements, and the standards may be used with or without the guidance documents.

These assessment standards and guidance documents are not required for Superior Energy Performance; however, they define a clear pathway for participants to quickly achieve energy savings. The standards and guidance documents are available for purchase on the ASME website (ASME 2011).

Certified Practitioners for Managing Energy and Assessing Energy Efficiency Opportunities

Personnel with significant training and skill will be required to appropriately apply the ISO 50001 and ASME system assessment standards in industrial facilities that wish to pursue Superior Energy Performance certification. Superior Energy Performance plans to help build this expertise in the workforce by developing two Certified Practitioner credentialing programs:

- Certified Practitioners in Energy Management Systems will assist facilities in implementing the ISO 50001 energy management standard.
- Certified Practitioners in [Specific System Type] will assist facilities in conducting energy system-specific assessments (conducted in accordance with ASME system assessment standards) and establishing procedures for continuously improving that system's energy performance.

These practitioners will be facility personnel, consulting professionals, or service providers with the appropriate technical expertise in industrial and commercial energy systems. The Certified Practitioner credentials will establish the credibility of professionals performing these services and help ensure proper applications of the standards. The credentialing programs will also help potential users of these services to locate a qualified Certified Practitioner

A company or facility may use the energy management standards or system assessment standards without engaging a Certified Practitioner. However, using a qualified individual adds a level of assurance that the standards will be properly applied.

Energy Management Tools

ITP offers free software tools, training, and technical information for continually improving industrial energy performance. ITP's online Energy Management Portal, which will soon be accessible through the ITP website, will feature an Energy Management Tool Suite with resources to help companies implement energy management systems consistent with ISO 50001. The site will provide downloadable software tools organized by energy management activities at the project, facility, and corporate level. The portal will also provide information on standards and protocols, and online training to help facilities meet Superior Energy Performance requirements. Facilities seeking Superior Energy Performance certification will also have access to web-enabled versions of software tools with the option to store facility data in a secure area for future updating or use in other tools.

Stakeholder Participation and Opportunities

The benefits of Superior Energy Performance benefit industrial facilities and other collaboration partners—including state and local programs, utilities, and supply chain partners—who work with industry to promote progressive energy efficiency improvements and sustain the benefits of energy efficiency projects over time. Superior Energy Performance provides a strategic, transparent framework with third-party validation for continual improvements in energy performance. The program's data-driven approach supports systematic decision-making and project prioritization, thus enabling identification and implementation of a broader range of

projects. Implementation of an energy management system leads to greater persistence of energy savings and encourages operational changes that generate additional energy savings beyond capital projects.

Industrial Facilities

Facilities will have a variety of motivations to pursue Superior Energy Performance certification. Clear enticements include the potential to achieve energy cost savings, enhance corporate reputations, and qualify for incentives in the marketplace. Companies that use international management standards could view ISO 50001 as an asset to internal management systems and Superior Energy Performance as a mechanism for recognition. It is also anticipated that ISO 50001 will become widely recognized in the market by companies that are proactive in environmental activities. Superior Energy Performance certification provides third-party validation of energy management and performance improvements that will help facilities stand out among the competition in business-to-consumer as well as business-to-business markets. In the future, Superior Energy Performance certification may position facilities to qualify for incentives and potentially establish a foundation for future potential carbon credits.

Texas pilot projects (2008–2010). As of April 2011, five facilities have qualified for Superior Energy Performance certification through a pilot program in Texas, achieving certified energy performance of 6.5% to 17.5% over a period of two to three years (see Table 2). A diverse group of manufacturing facilities tested the elements of the Superior Energy Performance program starting in 2008 to verify that the program was practical and achievable; benefitted participating facilities; and demonstrated that certification criteria can be met. These facilities represented a range of industrial sectors, size, and experience in energy management. Because ISO 50001 was still in the early stages of development at the start of this pilot project, the Texas Pilot Project facilities met Superior Energy Performance requirements by conforming to the American National Standard for Energy Management, ANSI MSE 2000:2008.

Table 2. First Facilities Certified to Superior Energy Performance through Texas Pilot Projects

Facility Name and Location	Superior Energy Performance Certification Level
Cook Composites and Polymers Co. – Houston, Texas	Gold
Freescale Semiconductor, Inc. – West Austin, Texas	Silver
Owens Corning – Waxahachie, Texas	Silver
Dow Chemical Co. – Texas City, Texas (manufacturing facility)	Platinum
Dow Chemical Co. – Texas City, Texas (energy systems facility)	Silver

Current activities. Twenty-five additional facilities are progressing toward meeting Superior Energy Performance requirements through DOE Energy Management Demonstration Projects that started in October 2009.

States

Decisions to engage in energy efficiency activities and projects are closely tied to local factors, including energy price structures, local public policies (both legislative and regulatory),

types of manufacturing concentrations in the region, and economic and development issues. Superior Energy Performance can help state and regional programs build energy management expertise.

On a policy level, states can advance programs and policies that are supportive of industrial efficiency at state and local levels. Establishing a preferred supplier status for state procurement that encourages or requires Superior Energy Performance certification could build the market for Superior Energy Performance while helping the state to identify suppliers that are committed to energy management and energy efficiency. In addition, states can advocate for the program on the electric utility regulatory side.

Existing federal and regional resources can support state program efforts to deliver resources to industrial customers. For example, state programs can work with DOE to cosponsor workshops and training on industrial energy systems. State industrial efficiency programs that have limited budgets can focus on recognition opportunities for companies that become Superior Energy Performance certified. Recognition by the state could potentially bolster a plant manager's status within the company and help the manager obtain funding or other resources from management for energy projects.

Current activities. DOE is partnering with the U.S. CEEM, states, and regional teams to conduct DOE Energy Management Demonstration Projects. Companies participating in the demonstrations test the elements of Superior Energy Performance and receive training and coaching from the state and regional teams to implement an energy management system.

The state and regional teams have recruited consultants who will begin to build local capacity to engage manufacturing facilities on energy management. These consultants will be trained on how to implement the ISO 50001 international standard and will have the opportunity to pursue professional certification for proficiency in implementing an energy management system.

Utilities

Some manufacturing facilities view their utility as the prime source for energy efficiency information. Electric and gas utilities can use the Superior Energy Performance program as a means to strengthen their technical assistance and incentive programs for industrial customers. Superior Energy Performance is a turnkey solution that can enable utilities to deliver energy efficiency resources without adding infrastructure. By working with customers to qualify for Superior Energy Performance, utilities will be able to reward customers for their overall facility energy efficiency gains and thus create longer-term partnerships that stimulate more sustainable and continuous energy savings.

Examples of the most effective utility programs include prescriptive incentive programs; custom incentive programs; training/education/outreach services, including energy management support; technical assistance and energy auditing services; and self-direction programs. Prescriptive incentives target investments in specific types of energy efficiency equipment deemed worthy of rebate by the utility (Kowley and Chittum 2011). Custom incentives cover other types of energy efficiency investments not covered by prescriptive programs and enable the system-wide approach to energy management that is central to Superior Energy Performance. Offering both prescriptive and custom incentives will provide industrial customers with flexible options for implementing Superior Energy Performance.

Technical assistance and continued guidance on energy projects are also key components of effective utility industrial energy efficiency programs. Utility representatives can seek Superior Energy Performance Certified Practitioner credentialing as an opportunity to increase energy efficiency expertise among their personnel. Utilities will be prepared to respond to their customers' growing interest in energy management and provide support to help them meet Superior Energy Performance requirements.

Self-direction programs offered by many utilities grant credits to large customers that make investments in energy efficiency without outside assistance. Self-direction enables companies to apply part of their electricity charges to internal energy efficiency projects. The utility then evaluates these projects and counts the energy savings toward the utility's energy savings goals or requirements (Ibid.). The rigor of the Superior Energy Performance M&V Protocol can provide utility regulators with a greater level of confidence that utility incentives are returning high energy savings from ratepayer funds. Third-party verification of energy performance improvements through Superior Energy Performance can support a more flexible approach by public utility commissions in validating expenditure of ratepayer funds (McKane 2011).

Current activities. As part of the DOE Energy Management Demonstration Projects, utilities and utility program administrators in California, Wisconsin, the Northwest, and other areas are advancing Superior Energy Performance through their existing Continuous Energy Improvement programs. These utilities are working with their state/regional teams and DOE to pilot Superior Energy Performance in industrial facilities. The utilities are engaging the facilities by providing technical expertise, cost-sharing, and incentives.

Supply Chain

Superior Energy Performance may be useful to major original equipment manufacturers and retailers that are moving their supply chains toward sustainable energy and shifting strategies to reduce energy and other embedded costs. Companies could incorporate Superior Energy Performance as one of the criteria to qualify for preferred supplier status. Superior Energy Performance is a framework that can be used to ensure a high level of quality in how suppliers manage energy and achieve energy cost reductions. Potentially, facilities that are certified by Superior Energy Performance could receive preferred supplier status with their customers.

Conclusion

Superior Energy Performance will provide facilities with an opportunity to improve their energy performance and validate their improvements through an ANSI/ANAB-accredited process. The program encourages participation by facilities of all sizes and levels of experience by providing a tiered approach, and it mobilizes resources from states and utilities to assist facilities. The DOE and U.S. CEEM are providing leadership to launch the Superior Energy Performance program. Standards, protocols, and third-party verification will enable companies to achieve energy savings and carbon emission reductions with potential market value that could be recognized both nationally and internationally.

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