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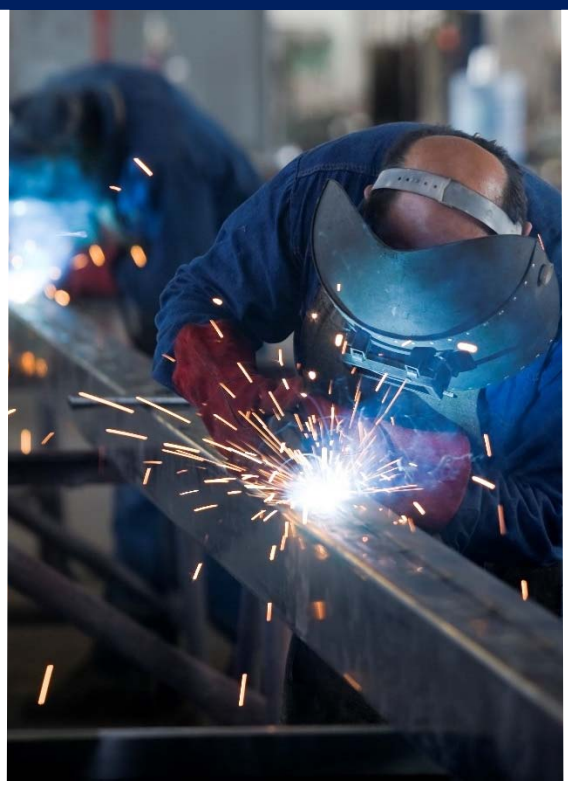
Securing Greenhouse Gas Reductions Through Private-Sector Delivered Industrial Energy Efficiency under EPA's Clean Power Plan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Executive Summary

The industrial sector, which includes manufacturing, mining, construction and agriculture, accounts for roughly one-third of all end-use energy demand in the United States and remains the largest energy user in the U.S. economy. Studies have estimated that there is the potential to cost effectively save 18 to 20% of industrial energy use. These potential savings, whether delivered through ratepayer programs or through private-sector initiatives, create an enormous opportunity to contribute to state compliance with the Clean Power Plan.

There are successful industrial efficiency rate-payer programs today that are utilized by industry. However, these programs are typically focused on equipment and do not address the broader industrial energy efficiency (IEE) opportunities available through continuous improvements in process and site management. If states want to drive deep sustainable energy efficiency in the industrial sector to help satisfy compliance with the Clean Power Plan, EPA must provide clear guidance that private-sector delivered IEE, subject to appropriate measurement and verification (M&V), should be considered an eligible compliance option. IEE, delivered through the Department of Energy's Superior Energy Performance program, is one documented and ideal method to qualify private-sector delivered IEE savings. Organizations that implement and certify their facilities under this program will meet the target-setting, reporting, monitoring and verification requirements for an approvable compliance pathway.

Savings associated with private-sector delivered IEE can provide benefits under any approach adopted by states, significantly reduce emissions of greenhouse gases and criteria pollutants, and provide states with low-cost compliance options that can contribute in a meaningful way to compliance with 111(d) goals. By supporting the inclusion of private-sector delivered IEE in state compliance plans, EPA could significantly accelerate growth in the demand for IEE. In turn, that would result in more rapid reductions of greenhouse gas emissions than would have otherwise occurred without inclusion of IEE in state plans.

The Clean Power Plan has the potential to unlock IEE opportunities if EPA:

- Clarifies that states may include private-sector delivered IEE in their 111(d) compliance plans;
- Describes how to include IEE as an element of a robust portfolio of energy efficiency measures in an approvable state plan;
- Provides states with guidance on how to aggregate data from private-sector delivered IEE;
- Identifies approvable M&V approaches for inclusion of IEE project-related emission reductions in state plans;
- Determines that electricity savings that persist into the compliance period, and can be validated by an approved M&V approach, are eligible for compliance regardless of when the measure was installed;
- Provides states with flexibility to take credit for actions taken after the Clean Power Plan was proposed and before the interim compliance period begins (2020) and count that credit toward achievement of the state's compliance obligation;
- Resolves the energy efficiency penalty created when energy efficiency projects are implemented in electricity-importing states; and
- Supports the development and use of single-state and multi-state emission credit trading programs and other market-based systems.

Industrial Energy Efficiency Overview

The industrial sector, which includes manufacturing, mining, construction and agriculture, accounts for roughly one-third of all end-use energy demand in the United States and remains the largest energy user in the U.S. economy. This level of energy consumption provides vast opportunities for successful deployment of industrial energy efficiency (IEE). Although industry has significantly increased its energy efficiency (EE) and manufacturing energy intensity has declined in recent years, industry is still projected to consume 34.8 quads of primary energy in 2020.[1] Estimates of the potential to reduce industrial energy consumption through efficiency measures by 2020 are as high as 18%.[2] Beyond the local and national policy benefits of improved EE, it is also a key tool in helping U.S. manufacturers reduce their costs and increase competitiveness. To help meet their EE policy goals, states are increasingly looking to tap the large and cost-effective resource potential in U.S. industry.

Implementing EE in the U.S. manufacturing sector supports the wider goal of increasing industrial competitiveness, productivity, and innovation. Converting to more efficient processes and equipment will help companies maintain competitiveness when energy supply and prices are volatile. Even in a low natural gas price environment, investments in more efficiency systems lowers operating costs and uses our domestic energy resource wisely and efficiently.

As U.S. manufacturers face an increasingly competitive environment, they look for opportunities to reduce operating costs while constantly striving to improve production processes and product quality. EE reduces costs and increases manufacturers' operational efficiency and productivity. It also often results in a number of co-benefits such as reduced material loss and waste streams, improved product quality, reduced maintenance needs, and lower emissions. Not surprisingly, EE initiatives are a core element of many corporate sustainability initiatives. Facilities that focus on achieving IEE savings reduce their exposure to energy market volatility, while lowering their operating costs.

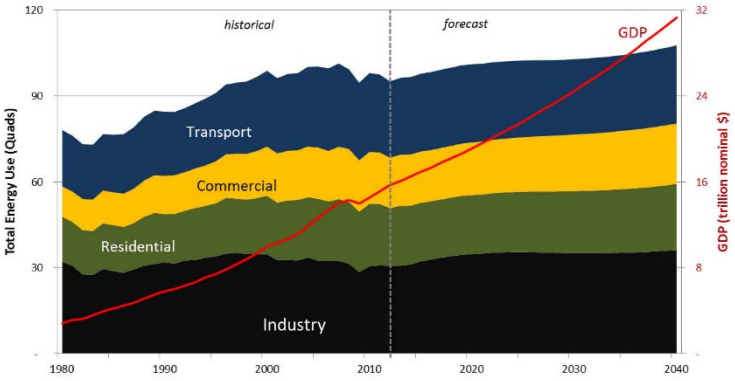
> "By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to promote American manufacturing by helping to facilitate investments in energy efficiency at industrial facilities, it is hereby ordered as follows…"
> *—Executive Order 13624 on Accelerating Investment in Industrial Energy Efficiency (August 30, 2012)*

States are actively working to assist industry to reduce their energy consumption. State IEE programs can be administered by utilities, program administrators, or state energy offices. The most common are ratepayer-funded energy efficiency programs administrated by utilities and program administrators.[3] States also have programs usually administered by State Energy Offices (SEOs) targeting manufacturers and the industrial sector through loan programs, incentives and grants coupled with technical assistance, project management support, and free or subsidized audits and assessments.

[1] Energy Information Administration. "Annual Energy Outlook", 2013.
[2] McKinsey & Company, "Unlocking Energy Efficiency in the U.S. Economy". July 2009.
[3] In a study of electric IEE program spending in 2010, the bulk of the spending (84%) came from ratepayer-funded utility program budgets; the remainder of the funding came from state or federal budgets, universities, nonprofit organizations, and other groups (Chittum and Nowak 2012).

As of November 2014, 26 states have policies in place that establish specific energy savings targets, through resource or portfolio standards, or specific utility goals and 41 states now require utility ratepayers to contribute to supporting EE programs. More than 35 SEOs administer voluntary energy programs targeting manufacturers and the industrial sector.[4]

Figure 1: U.S Energy Use by Sector



Source: EIA, 2013. *Monthly Energy Review;* EIA, 2013. *Annual Energy Outlook 2013;* BEA, 2013.

Despite the existence of ratepayer programs in over 40 states, these programs are not fully capitalizing on industrial energy efficiency. According to Energy Information Administration (EIA) Form 861 data, only 54 percent of electric efficiency and load management programs included industry-specific initiatives in 2012. The portfolios likely reach some industrial companies through commercial and industrial (C&I) incentives for energy efficient equipment, yet because of the large differences in energy use patterns between the commercial and industrial sectors, such programs do not capture IEE potential or meet the special needs and characteristics of manufacturers. An additional challenge is a growing trend for industrial opt-out in many states where industrial companies do not participate in system-wide efforts to procure least-cost energy resources.

Industrial Energy Efficiency Will Increase Total Energy Efficiency Delivered Under the Clean Power Plan

Industrial EE can be the cornerstone of an effective carbon mitigation strategy and is consistent with the requirements of Clean Air Act (CAA) section 111(d). Savings associated with IEE can significantly reduce emissions of greenhouse gases and criteria pollutants, and provide states with low-cost compliance options that can contribute in a meaningful way to compliance with section 111(d) goals. An effective Clean Power Plan (CPP) should capture the benefits of cost-effective, private-sector delivered IEE.

DOE's Superior Energy Performance program uses the acronym "SEP". SEP is also an abbreviation used by many states to describe their state energy programs. In this paper, SEP refers to the Superior Energy Performance program and not state energy programs.

The opportunities to achieve significant EE savings are strong given the large energy consumption by America's industry and the estimates of potential energy efficiency gains in this sector.[5] IEE has been achieved through ratepayer-funded EE programs (e.g. prescriptive incentives or custom programs), state technical assistance programs, federal programs such as the Superior Energy Performance program (SEP), and individual corporate energy saving programs. Despite the myriad benefits of reducing energy consumption and energy costs, there are challenges to capitalizing on these opportunities, which energy management systems (EnMS) such as International Organization for Standardization (ISO) 50001 and programs such as SEP can overcome. Recognition of greenhouse gas (GHG) reductions associated with IEE savings in the CPP will increase the likelihood that states will be willing and able to utilize IEE as part of their CPP compliance.

By supporting the inclusion of IEE projects delivered by the private sector to satisfy state

[4] NASEO, "State and Industry Partnerships: Advancing U.S. Industrial Competitiveness through Energy Efficiency and Advanced Energy Technology Investments". January 2012.

[5] McKinsey, 2009.

compliance requirements under the CPP, EPA could significantly accelerate growth in the demand for IEE. In turn, that would result in more rapid reductions of GHG emissions than would have otherwise occurred without inclusion of IEE in state plans. Greater reliance on the GHG savings delivered through IEE would often delay, or entirely displace, the need for some of the most expensive 111(d) compliance actions by utility generators and reduce the overall costs of implementation. As an example, utilizing reductions from IEE could enable a utility to avoid expensive upgrades on a coal-fired power plant that is slated for closure but still meet its GHG reduction targets.

By taking the actions discussed in this paper, EPA would facilitate an increase in the adoption of both IEE measures and energy management strategies, the benefits of which would be realized under the CPP. Companies having one or more plants that have conformed to ISO 50001 and have been certified to the U.S. Department of Energy's (DOE) SEP program will see the benefit of expanding the program across the enterprise. This is consistent with the goal of DOE's SEP Enterprise Accelerator initiative, which seeks to increase the uptake of SEP at more than one facility per company. SEP also has a Utility Accelerator initiative that is designed to integrate strategic energy management through SEP as an effective ratepayer program oriented toward industrial customers. In addition, as increased benefits accrue to those SEP participants, competitors may seek to level the playing field by participating in the same programs. As a result, facilities that have not begun to utilize IEE programs or protocols will be motivated by the CPP to seek greater energy savings and GHG reductions.

The Role of Energy Management Systems in Industrial Energy Efficiency[6]

Traditionally, utility or state-based EE programs have generally promoted discrete EE technologies and supported the installation of new, more efficient equipment or processes. In contrast, EnMS seek to promote operational, organizational, and behavioral changes that result in greater efficiency gains on a continuing basis. Although technology-based programs typically involve energy assessments to identify specific efficiency opportunities, many barriers prevent cost-effective measures from being implemented. Programs implementing energy management systems focus on establishing the framework and internal management processes for managing energy use, as well as for implementing capital projects.

Encouraging the use of an EnMS will contribute to sustained and continual improvements in energy performance in the industrial sector. Energy savings generated by establishing an EnMS, whether it is ISO 50001 energy management standard or similar energy management approaches, are increasingly recognized as an effective means to overcome key market barriers to IEE. Energy management can most readily help overcome information barriers, which are more significant for organizations with little energy efficiency experience or capacity.

> "We would be using 50 percent more energy today if we had not made energy efficiency improvements over the last 40 years and now we have to get the next factor of two,"
> *—Energy Secretary Ernest J. Moniz at the American Energy and Manufacturing Competitiveness Summit, Sept. 17, 2014*

Good energy management systems integrate energy efficiency into the management structures of organizations. This facilitates development of an organizational culture that values energy efficiency by helping an organization develop the policies, procedures, and tools necessary to systematically track, analyze, and improve EE. Such energy management systems address senior management commitment, energy team selection, data collection and communication protocols, EE implementation practices, operational controls, and the design and procurement of renovated, modified, and new equipment, systems, processes and facilities.

[6] The term "energy management systems" or "EnMS" in this paper refers to human, programmatic, technical and administrative infrastructure and procedures that enable an organization to manage energy.

An EnMS approach based on ISO 50001 seeks to apply to energy use the same culture of continual improvement that has been successfully used by industrial firms to improve quality and safety practices. These systems enable companies to better manage energy use, thus creating immediate and lasting energy use reduction through changes in operational practices, as well creating a favorable environment for adoption of more capital-intensive EE measures and technologies.

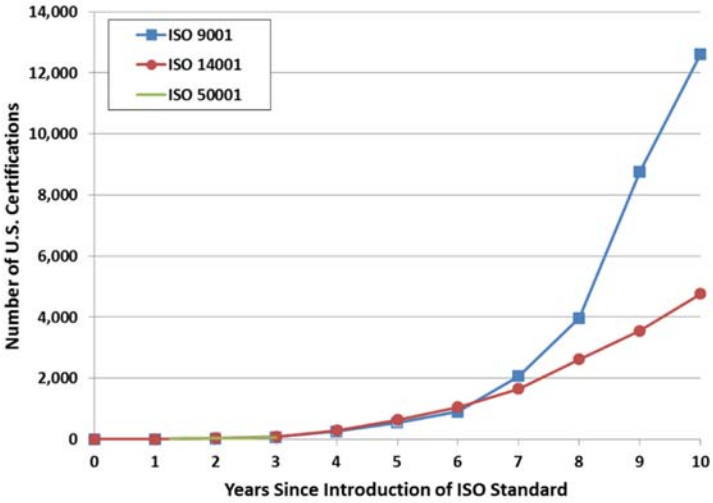
What is ISO 50001?

In June 2011, the International Organization for Standardization published ISO 50001 – Energy Management. ISO 50001 is an international standard that provides a framework for the implementation of an EnMS for the purpose of continuously improving energy performance.[7] ISO is the world's largest developer and publisher of international standards. The ISO 50001 standard addresses the following:

- Energy use and consumption
- Measurement, documentation, and reporting of energy use and consumption
- Design and procurement practices for energy-using equipment, systems, and processes
- All variables affecting energy performance that can be monitored and influenced by the organization

With ISO 50001, energy management is integrated into the management structure and normal business processes while engaging employees across the organization. It specifies requirements for establishing, implementing, maintaining, and improving an EnMS. ISO 50001 is based on the Plan-Do-Check-Act structure to continual improvement held in common with the ISO 9001 (quality management), ISO 14001 (environmental management), and guidance from the EPA's Energy Star for Industry program. ISO 50001 is designed to be compatible with these management systems. The standard does not prescribe minimum performance criteria, energy reductions, or targets. Rather, it requires an organization and facility to demonstrate continual energy performance improvement.

Figure 2: U.S. Participation in ISO Certification Programs



Source: U.S. DOE

Factors expected to drive broad adoption of ISO 50001 include the growth of corporate sustainability programs, regulatory support, international climate agreements, and demand created along the manufacturing supply chain. Companies may also be able to earn emission reduction credits from the resulting reductions in electricity consumption and related GHG emissions. These will have financial value to industrial companies under state policies to implement section 111(d).

What is Superior Energy Performance?

Superior Energy Performance is an ANSI-accredited, plant-level, federal program that uses the ISO 50001 Energy Management Standard as a foundation and certifies a plant's energy savings using a regression-based M&V protocol. The program also develops a workforce of Certified Practitioners to help guide and evaluate conformance with the program's requirements. This guidance implements ISO 50001, procures energy assessments, establishes relevant metrics, and uses a regression tool to analyze energy efficiency implementation. Together, these

[7] International Organization for Standardization, "ISO 50001: Energy Management", June 2011.

elements create a roadmap to guide an industrial facility toward the energy savings that result in certification.

The SEP program was designed to drive transparent and verified energy performance improvement across the U.S. manufacturing sector—significantly reducing energy use and carbon emissions. It was developed with active participation from a coalition of energy manufacturers from the leading U.S. manufacturers that are members of the U.S. Council for Energy-Efficient Manufacturing (U.S. CEEM) and is currently administered by DOE. Participation in the SEP program requires implementation of and certification to ISO 50001 and achievement of specific energy performance improvement targets as verified by an accredited verification body. Originally conceived for manufacturers, SEP is now branching out to other more industrial-scale sectors such as water supply and wastewater treatment plants and may become available for large buildings, data centers and laboratory/clean room facilities.

SEP provides guidance, tools, and protocols to drive deeper, more sustained savings from ISO 50001. To become certified, facilities must (1) conform to both the ISO 50001 energy management standard and ANSI/MSE 50021, which specifies energy performance criteria and additional requirements for the energy management system; (2) improve energy performance; and (3) undergo a SEP audit from an independent ANSI-ANAB (ANSI National Accreditation Board- American Society for Quality National Accreditation Board) accredited SEP Verification Body. An independent third party audits each facility to verify achievements and qualify it at the Silver, Gold, or Platinum level, based on energy performance improvement. Most facilities will qualify by improving their energy performance by at least 5% (Silver), 10% (Gold), or 15% (Platinum) over two to three years, relative to a baseline that is calculated using the SEP Energy Performance Indicator (EnPI) tool. This certification emphasizes measureable savings through a transparent process.

Verification is similar for ISO 50001 and SEP, except that SEP requirements beyond the EnMS standard are also audited. For SEP certification, only ANSI-ANAB accredited SEP Verification Bodies can certify facilities to SEP using a SEP Lead Auditor and SEP Performance Verifier during the audit. The SEP Verification Body selects the audit team—which includes a certified SEP Lead Auditor and a Performance Verifier—to conduct the two-stage audit. To minimize costs and delays, the Stage 1 audit, also known as the "readiness review," confirms that a facility is prepared for the Stage 2 audit. This can be done on-site or remotely. During the Stage 2 audit, a SEP Lead Auditor and SEP Performance Verifier(s) will visit a facility to determine whether the facility conforms to ISO 50001 and ANSI/MSE 50021 and to verify energy performance improvement using the SEP M&V Protocol for Industry.

"SEP builds on ISO 50001 and creates a roadmap that can guide industrial facilities in the right approach for analyzing energy consumption, prioritizing improvements, and tracking progress with energy performance metrics." *– U.S. DOE*

Measuring and verifying the energy performance improvement under SEP is accomplished by using the EnPI tool. EnPI is a regression analysis based tool developed by DOE to help plant and corporate managers establish a normalized baseline of energy consumption, and track annual progress of intensity improvements, energy savings, and GHG reductions. Regression is commonly used for estimating energy savings through the measurement and verification of energy projects and programs, and has proven to be reliable when the input data covers the full annual variation in operating conditions. Within the context of the CAA, SEP offers the ability for validated energy savings to be used toward section 111(d) compliance.

After a successful audit, the SEP Verification Body will issue the SEP and ISO 50001 certificates to a facility. If the Verification Body finds that a facility does not conform to the requirements, it will issue corrective actions that the facility must complete before receiving SEP certification. SEP certification is valid for three years, as long as the facility completes the annual surveillance audits to confirm continued

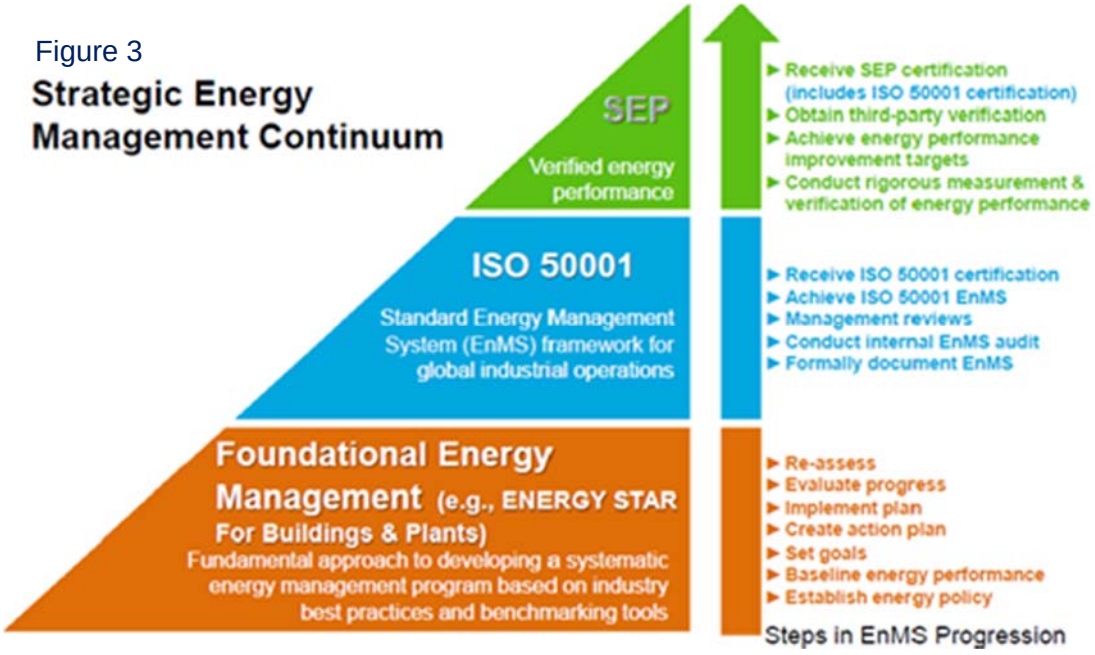
maintenance of the EnMS (a requirement of ISO 50001).

To continue SEP certification beyond three years, a facility must apply for recertification. The recertification audit may not require a Stage 1 audit unless significant changes occurred since the previous certification. To recertify, a facility must submit the SEP application six months prior to the expiration of the current SEP certificate to avoid any lapse in certification.

According to DOE, facilities certified to SEP are leaders in energy management and productivity improvement. The facilities in SEP have met the ISO 50001 standard and have improved their energy performance (defined as energy intensity) up to 25% over three years or up to 40% over 10 years.[8] SEP-certified facilities note that investing the extra effort in SEP—beyond ISO 50001—is clearly worth it. Cost-benefit assessments find that SEP helps facilities in a wide range of industries and large energy users. Results to date:

- Annual savings of $87,000 to $984,000 using no-cost or low-cost operational measures ;
- 10% average reduction in energy costs within 18 months of SEP implementation;
- 6% to 25% improvement in energy performance over three years;
- Paybacks of less than two years (in facilities with energy costs > $1.5 million annually).

Figure 3



[8] Within the SEP program there are two pathways: the Performance Pathway and Mature Pathway. Plants seeking SEP certification in the Performance Pathway are required to undertake measures post-baseline to achieve percentage improvements in energy intensity such as the silver, gold, and platinum certification levels of 5%, 10%, and 15%, respectively. The Mature Pathway is designed for plants that have achieved significant energy savings over a long period of time (e.g., 10 years) prior to the decision to implement SEP and for which achieving the improvements under the Performance Pathway are not realistic or cost-effective. The Mature Energy Pathway requires a minimum 15% energy performance improvement, retrospectively, over a 5- to 10-year period and can credit up to 40% improvement over the 10 years prior to the year in which the baseline was established.

Benefits of Including Industrial Energy Efficiency Projects in the Clean Power Plan

Primary Benefits of Industrial Energy Efficiency in 111(d) Programs

Industrial Energy Efficiency Improvements Are Consistent with the CPP Goals

EPA's proposed CPP creates a flexible design that will enable states and electric generating unit (EGU) owners the most cost-effective options to reduce GHG emissions from the nation's power generation sector. IEE projects complement and support the objectives of the CPP by reducing electricity demand. Energy savings delivered through private-sector IEE already help states achieve energy savings, reduce the environmental impacts (including CO_2 emissions) of meeting energy needs, save money for taxpayers and energy consumers, and provide a significant resource for meeting power system capacity requirements.

The standard protocols currently in use in IEE performance, including the SEP certification process, already accurately measure and verify savings and can be easily extended to measure CO_2 savings. The high level of rigor associated with M&V under the SEP program makes IEE a desirable and complementary tool to achieve the EE savings sought by the CPP. Thus, facilities implementing ISO 50001 with SEP and can deliver low-cost, rigorous project-based EE.

Industrial Energy Efficiency Improvements Complement All State Plan Approaches

Emission reductions generated by IEE can be used in every state, and by nearly any EGU, to achieve GHG reductions with rigorous verification. EE savings and GHG reductions achieved by IEE projects can be universally incorporated into all four of the likely state plan pathways identified by the EPA:

- **Rate-Based Emission Limits**: The avoided generation and emissions resulting from IEE projects could be used to adjust the CO_2 emission rate of affected EGUs. The adjustments would be based upon protocols either pre-approved by EPA or reviewed by the Agency as part of its consideration of a state's proposed plan. The rigorous M&V will provide enforcement agencies with high quality data to assess generation and emissions outcomes.
- **Mass-Based Emission Limits:** IEE projects fit EPA's concept of complementary measures that can help states meet a mass emission limit at lower cost.
- **State-Driven Portfolio Approach:** IEE projects could receive financial support, be tracked by a designated state agency and generate emission reduction credits for use by the state meeting emission reduction obligations assigned to the state. A state could also utilize project data provided to a state, regional or national project registry.
- **Utility-Driven Portfolio Approach:** Public utility commissions could authorize regulated EGUs to incentivize IEE savings and thereby acquire emission reduction credits to demonstrate section 111(d) compliance. Alternatively EGUs could purchase emission reduction credits generated by private sector delivered IEE with appropriate M&V.

Greenhouse Gas Benefits Resulting from Industrial Energy Efficiency Projects

The GHG benefits from IEE initiatives undertaken by industrial facility owners are identical to the GHG benefits of utility EE programs described by EPA in the CPP. Namely, those benefits are "reducing emissions from affected EGUs in the amount that results from the use of demand-side EE that reduces that amount of generation

required."[9] Investment in IEE within the context of SEP certification has delivered low-cost, rigorously measured and verified energy savings leading to large scale greenhouse gas reductions from the electric power sector (in addition to GHG savings from outside the power sector). IEE can achieve substantial GHG emission reductions given the growth potential for cost-effective IEE.

Rigor of Measurement & Verification

In its Notice of Proposed Rulemaking (NOPR) for the CPP, EPA raised appropriate questions regarding the rigor of measuring the GHG impact of EE projects. IEE initiatives that conform to ISO 50001 and SEP are ideally suited to produce the necessary M&V rigor to demonstrate CO_2 savings that can contribute to state compliance with 111(d) emission guidelines. In fact, in its Technical Support Document on State Plan Consideration, EPA recognizes the Superior Energy Performance Measurement and Verification Protocol for Industry[10], which is used by companies that participate in the DOE's SEP program.

The elements described in EPA's "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans"[11] provide a precedent for what EPA would consider an acceptable level of M&V under the CAA. A small number of EE measures have been incorporated into approved state implementation plans (SIPs), confirming the ability of EE to facilitate compliance with the CAA. If included in state CPP projections, calculating both the CO_2 and the criteria pollutant emission reductions could easily become standard practice for IEE M&V activities. Therefore, IEE initiatives incorporating appropriate M&V protocols should be acceptable as an element of an approvable state plan under 111(d). State plans can easily utilize the DOE SEP program or other frameworks to facilitate compliance and ensure that all GHG savings associated with delivered IEE resources using appropriate M&V are quantifiable, non-duplicative, permanent, verifiable, and enforceable.

Industrial Energy Efficiency is a Low Cost Greenhouse Gas Mitigation Tool

IEE initiatives that utilize energy management systems with appropriate M&V, such as ISO 50001 and SEP, yield low-cost energy savings that directly impact the bottom line. Analysis by DOE across nine SEP certified facilities revealed significant savings. In a report[12] entitled "Assessing the Costs and Benefits of the Superior Energy Performance Program," Lawrence Berkley National Laboratory (LBNL) developed a methodology to quantify the costs and benefits of participation in the SEP program. Energy consumption, cost, and saving data were gathered from nine U.S. facilities that operate in different industrial sectors and have annual baseline source energy consumptions ranging from 0.075 to 3.380 TBtu. Analysis of the data showed that all nine facilities achieved greater energy savings percentages during participation in the SEP program than beforehand.

The implementation of ISO 50001 coupled with SEP energy performance targets results in quantifiable and significant energy (0.174 TBtu per year, on average) and energy cost savings ($503,000 annual average) for the nine facilities. In all, these facilities achieved:

- 10% average reduction in energy costs within 18 months of SEP implementation;
- Annual savings of $87,000 to $984,000 using no-cost or low-cost operational measures;
- Paybacks of one year or less in facilities with energy costs > $3 million annually (less

[9] EPA, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, Proposed Rule, June 18, 2014, p.34836.
[10] U.S. EPA, Technical Support Document on State Plan Considerations, June 2014, p. 43.
[11] "Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans" available at http://www.epa.gov/airquality/eere/manual.html.
[12] Therkelsen, McKane, et al. "Assessing the Costs and Benefits of the Superior Energy Performance Program", Lawrence Berkley National Laboratory, July 2013.

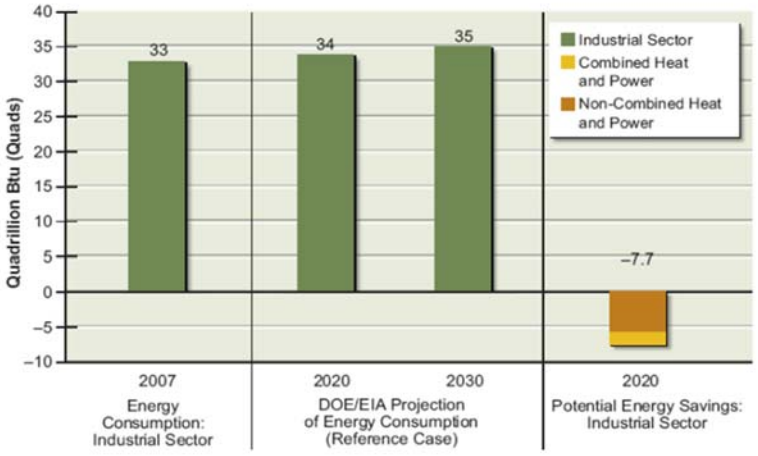
than two years for those with energy costs of $1.5 - $3 million per year).

Potential Industrial Energy Efficiency Contribution to 111(d) Compliance

Facilities certified under DOE's SEP Program have conformed with the ISO 50001 standard and have improved their energy performance up to 25% over three years or up to 40% over 10 years. Estimates have shown that there are more than 30,000 facilities with energy spending greater than $1 million annually, and more than 3,000 facilities with energy spending greater than $5 million, which is a large universe of facilities that can implement IEE with short payback opportunities.

If the adoption rate of ISO 50001 (currently in its third year) mirrors the adoption rates of ISO 9001 and ISO 14001, it is expected that the number of companies that will adopt ISO 50001 will increase rapidly in the next 5-8 years (see Figure 2). If IEE resources are adopted as part of state 111(d) plans and receive financial incentives and other policy support from states, it is likely that many ISO

Figure 4: U.S. Industry EE Savings Potential



Source: National Research Council 2010.

50001 facilities will seek SEP certification. Since SEP facilities have demonstrated 6% to 25% improvement in energy performance over three years, the potential savings from IEE is significant. The SEP performance improvements can be converted into absolute kWh savings. The EnPI tool can break out plant energy performance and energy use reduction by fuel/energy source. In addition, the EnPI tool includes a GHG calculator that computes reductions in GHG emissions based on the validated energy savings. Therefore, the potential EE savings from the industrial sector can play a very significant role in helping states comply with section 111(d) goals.

Surplus

GHG reductions from IEE are surplus emissions reductions under section 111(d) of the CAA. These emission reductions are not mandated by, or credited in, any other CAA program and are, therefore, entirely additional in the context of CAA compliance. EPA should treat IEE-derived GHG reductions in the same manner that EPA proposes to treat GHG reductions created by utility-scale renewable energy (RE) generation. Many RE projects were built prior to EPA's proposed CPP was made public, and many more will be built and installed going forward. Multiple market factors will influence the timing, size and location of both additional RE and IEE projects. All installed IEE projects, once operational, will contribute verifiable reductions attributable to reduced demand for fossil powered electricity generation. There is no basis for EPA to treat RE- and IEE- related GHG emission reductions differently.

Additional Benefits of Industrial Energy Efficiency in 111(d) Programs

Private-sector delivered industrial EE is a beneficial and cost–effective way to address the challenges of high energy prices, energy security and independence, air pollution, and global climate change. Examples of additional benefits include substantial reductions in GHG emissions from fossil fuel use at facilities, avoiding or deferring costly transmission and distribution upgrades, avoiding the electricity losses associated with transmission and distribution, comfort, health, productivity, energy security, limiting water use associated with electricity generation, lowering baseload and peak demand, and reducing the need for additional generation and transmission assets. IEE projects, in particular, benefit manufacturers by improving quality, reducing waste, increasing productivity and

competitiveness, and hedging against energy price spikes and volatility.

Criteria Pollutant Emission Reductions

Private-sector delivered EE projects produce significant non-GHG air quality benefits by reducing the level of needed electric generation and, therefore, the associated emission of criteria pollutants. EPA has identified EE as an eligible tool to be used in SIPs to comply with National Ambient Air Quality Standards (NAAQS). As NAAQS are tightened in future years, and more areas are placed in nonattainment areas, the co-benefit of reducing criteria pollutants through EE will be highly valued. Whether projects are pursued for cost savings, GHG reductions, or energy savings, the benefits of reducing criteria pollutants are always present.

Job Creation

Manufacturing is often the key economic engine for local economies, so to the extent that energy efficiency investments help these facilities survive and grow, they support job retention and job growth within local areas.

U.S. manufacturing and its associated jobs have been steadily increasing since 2010**.** According to President Obama's 2014 State of the Union speech, the U.S. economy added 568,000 new manufacturing sector jobs between January 2010 and December 2013. The capital investment accompanying the recent manufacturing sector resurgence provides a unique opportunity for all manufacturing subsectors to increase competitiveness, jobs, and production while reducing costs and environmental impacts.

A report[13] published by the World Resources Institute (WRI) illustrates the positive jobs impact of IEE. In a facility-level study of Midwest pulp and paper mills, WRI found that facilities could save $240 million per year in total energy costs by improving their performance to existing, ENERGY STAR® levels. These efficiency-derived savings could help preserve the 370,000 jobs associated with Midwest pulp and paper mills.

In addition to creating and preserving jobs in specific facilities, IEE generates broader positive job impacts by supporting industries that manufacture, transport, and install new equipment. Participation in the SEP program also supports professionals that are certified to perform M&V (See Appendix E).

Onsite Fossil Fuel and Water Savings

While 111(d) values the GHG reductions associated with avoided electricity consumption, most IEE projects include other benefits, including on-site fossil fuel savings and reduction in water consumption. By increasing the market signal for electricity avoidance, states will gain the environmental (including CO_2) benefits of non-electricity savings for no additional cost.

IEE projects often reduce the consumption of water significantly below the consumption levels existing before the conservation measures are installed. This results in quantifiable, environmentally- and economically-valuable reductions in water consumption. Since the movement of water is highly energy intensive, the water savings enabled by IEE projects create additional, ancillary GHG reductions by avoiding the energy consumption that would otherwise be needed to transport that water.

State 111(d) Compliance Flexibility

Private-sector delivered EE, such as IEE projects, is a potentially powerful tool that states can use to achieve compliance with their section 111(d) interim and final goals. Since EPA used utility EE programs (and not private-sector delivered IEE projects) as the basis for establishing the best system of emission reduction (BSER), any GHG reductions achieved through IEE can provide states with another strong compliance option that reduces the pressure to meet the standard using other more expensive emission reduction measures. For instance, a state can use EE savings

[13] Aden, Bradbury, Tomkins, "Energy Efficiency in U.S. Manufacturing: The Case of Midwest Pulp and Paper Mills", July 2013.

generated through IEE measures to mitigate the need to reduce utilization of coal units or construction of new gas powered generation. Private sector IEE can also be a contingency or corrective measure that makes up shortfalls from other compliance strategies. This will prove valuable in states that have economic or political challenges associated implementing other building blocks, such as coal-fired power plant restrictions or renewable energy mandates.

States should view private-sector delivered EE as "purchasable compliance" with the 111(d) goals. States or EGUs can "pay for savings", i.e. secure access to or use of the GHG emissions reductions delivered by IEE in a number of ways (discussed further in the next section):

1. Through traditional ratepayer offerings (prescriptive incentives, custom incentives, etc.)
2. Through binding contracts with parties participating in the IEE initiative (at a whole-facility level where multiple capital projects and operational improvements within a facility can be bundled together)
3. Through the purchase of emission reductions credits in a GHG market

Greater amounts of IEE included in a state plan lead directly to more flexibility in that state to utilize the other building blocks in the most sensible and cost-effective manner. In addition, IEE can serve as an easily implementable EE mechanism in states that do not yet have robust ratepayer-based EE programs. Private sector delivered IEE provides an established infrastructure in every state and can gear up immediately to meet CPP needs.

EPA Actions Needed for Industrial Energy Efficiency to Contribute to 111(d)

Overview

The CPP recognizes end-use EE savings and distributed RE as a means to reduce GHGs from the power sector. The CPP can unleash substantial additional GHG savings delivered through industrial EE projects if they are explicitly identified as an acceptable compliance mechanism in the final rule and if states are provided sufficient guidance on how to incorporate IEE in their state plans. Integrating the GHG reductions generated through IEE as a means of compliance will provide states enhanced flexibility and dramatically lower the costs of this regulation both for regulated entities and consumers.

EPA and the states face substantial challenges in developing a cost-effective CO_2 regulatory program for existing EGUs under the CAA. Tapping into the vast potential of investments in end-use energy efficiency will provide low-cost emission reductions. EPA's proposed rule provides states with a variety of compliance options that each can use to build state plans tailored to its specific needs. End-use EE is one of the least-cost compliance options and industrial EE is the lowest-cost EE resource. IEE can play a critical role in helping the United States meet its climate policy objectives.

EPA and the states have already done important work (e.g., through the *EPA Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans*) in opening the door for EE as a CAA compliance mechanism. The CPP recognizes the positive impacts EE has made to reduce GHGs and allows states to use EE, which will change the way our nation generates and consumes electricity. Including EE as a compliance mechanism can reduce the disparity in available and cost-effective compliance tools across regions. In addition, EE provides significant environmental benefits.

While the CPP clearly identifies EE savings delivered via utility-and state-run programs as a central element of both establishing and complying with the goals, it is virtually silent on the important contribution of private-sector delivered projects to EE savings and how they can be incorporated into approvable state plans. The energy savings achieved by IEE projects can provide a significant amount of efficiency not captured in either current utility offerings or state-run efficiency programs. If such private sector investments are clearly recognized in the section 111(d) compliance regime, it will give states the most robust set of compliance options and set a market signal for greater efficiency gains. The CPP will be most successful if states have a wide range of compliance options and IEE projects can be a valuable, low-cost compliance tool for states.

"While the CPP clearly identifies EE savings delivered via utility- and state-run programs as a central element of both establishing and complying with the goals, it is virtually silent on the important contribution of private-sector delivered projects to EE savings and how they can be incorporated into approvable state plans."

Need for EPA Action

If the CPP encourages states to incorporate IEE projects into their plans, it is likely to significantly expand the GHG reductions delivered by the industrial sector. The policies that will be put into place by states to implement the CPP and drive deployment of GHG reducing technologies will have a profound effect on the market for delivering EE, including the IEE sector.

Significant opportunities remain to increase EE delivered by IEE. A 111(d) program that

recognizes the benefits of IEE as a compliance option for states will lead to state policies and market demand that could lower or remove remaining barriers and capture latent EE opportunities in all market segments.

Multiple GHG Benefits of Industrial Energy Efficiency

IEE projects often implement a variety of process changes and equipment upgrades that achieve significant emission reductions. IEE measures range from simple technology retrofits to corporate behavioral changes supported by EnMS that result in continuous energy improvement. Adopting an EnMS can help facilities make a range of operational improvements and could lead to savings of 10%–30% of their annual energy use. Systems optimization means going beyond component replacement toward integrated system design and operation. Although energy-efficient components can provide efficiency gains of 2%–5%, optimizing energy use at the systems level can deliver average efficiency gains of 20%–30% within a payback period of two years or less. IEE projects can also include construction and operation of combined heat and power systems, and construction and/or modernization of more traditional fossil-based generation systems.

In all cases, these IEE project activities result in quantifiable, additional GHG emission reductions that can contribute to 111(d) compliance. Should EPA incorporate methods of accounting for emission reductions from these measures, these methodologies can be applied appropriately within IEE projects to allow GHG benefits to be used by the state for compliance purposes.

Appropriate M&V Enables Industrial Energy Efficiency to Contribute to State Compliance

States will be more likely to include IEE projects as part of a state plan if EPA clarifies that GHG emission reductions achieved as a result of private-sector delivered IEE with appropriate M&V is allowed to be used for CPP compliance activities. The SEP M&V Protocol for Industry and International Performance Measurement and Verification Protocol (IPMVP) Option C are examples of an appropriate M&V protocol that establishes the electricity savings and GHG reductions from individual IEE measures as well as at the whole-facility level leveraging the EnPI tool. The level of rigor provided by an IEE project using such an M&V approach is sufficient to enable GHG emission reductions from IEE projects to be considered an appropriate form of CPP compliance.

Actions to Facilitate Use of Industrial Energy Efficiency Resources

Identify Approvable Pathway. Without limiting state flexibility, EPA can articulate in the final rule and technical support documents what will constitute an approvable pathway for states to include available IEE project-related emission reductions in their 111(d) compliance plans. This is consistent with EPA's intent to provide states as much flexibility as possible. Since 111(d) planning will require air regulators, utility regulators, energy officers and other state officials to coordinate state-wide efforts to reduce GHG emissions from affected EGUs, states will benefit from EPA guidance on what will constitute an approvable state plan with respect to IEE projects.

Targeting Sources of Energy Savings. EPA can enhance IEE uptake if it clarifies how the state plan requirement to identify affected entities applies to IEE resources. States should leverage all their EE resources as compliance options. Private-sector delivered IEE can offer a large source of low-cost EE compliance outside of ratepayer programs, especially considering that these IEE savings can come from multiple projects and facilities. To the extent that a state has confidence that future IEE projects will be implemented (through supportive policies, collaboration with in-state industrial facilities, etc.), a state may include a conservative forecast of IEE project-related savings in its plan. Any EE savings or GHG reductions documented by IEE projects using appropriate M&V can be used to demonstrate compliance with state goals.

Aggregation of GHG Reductions from IEE Projects. States will need guidance from EPA on how to aggregate data from private-sector

delivered EE, such as IEE, to be counted as a compliance mechanism. A national registry could be created for this purpose, as it would be the most efficient approach with the greatest degree of consistency in all aspects of including project-related GHG reductions in 111(d) compliance. Alternately, a SEO (or another designated Agency) can aggregate (directly or via a third party) data from all IEE projects in the state and determine the avoided emissions achieved. In addition, a state could choose to have a state-run or utility-run EE program aggregate data from IEE savings. In such states, the state-run or utility-run program could choose to direct additional incentives to IEE projects to increase the quantity of cost-effective EE delivered.

A national registry would be useful in eliminating any double-counting of GHG emission reductions from EE projects. By identifying those measures or projects that benefited from a utility rate subsidy or other incentive, aggregators can ensure that GHG reductions are claimed only under the appropriate EE program for compliance purposes. Also, by using a national registry, EPA could ensure uniformity of EE-derived GHG benefits – which would allow EE credit to be applied anywhere within a regional electric grid without creating a concern about double-counting of GHG reductions. This approach would eliminate the need for the EE penalty for importing states discussed later in this section.

A national or state-based registry function for IEE projects through 111(d) will help EPA establish a set of 111(d) compliance tools that will work in either a state-driven portfolio approach or an EGU-obligated compliance approach.

Clarify Approvable Approach for Key Compliance Criteria. EPA can assist states by identifying approvable M&V approaches for inclusion of IEE project-related emission reductions in state plans. In its NOPR, EPA clearly indicated it is aware of the need to establish a balanced approach to evaluation, measurement and verification (EM&V) that cost-effectively provides appropriate rigor. IEE projects that utilize an M&V approach identified by EPA, such as the SEP M&V Protocol for Industry, should be eligible for use as a compliance option. The most effective manner in which to clarify this would be through EM&V guidance, which will assist states in developing EM&V plans for EE within their overall state plans.

Existing Facilities/Installations. EPA proposed that RE projects constructed prior to the 111(d) proposal and implementation be eligible to contribute to 111(d) compliance despite the fact that these projects were not purpose-built for 111(d) compliance. EE savings from IEE projects should be regarded the same way in terms of the contribution to 111(d) compliance made by the continued M&V of electricity savings in the compliance period. If the electricity savings of an IEE project persist into the compliance period, and can be validated by an approved M&V approach, those savings should be eligible for compliance regardless of when the measure was installed.

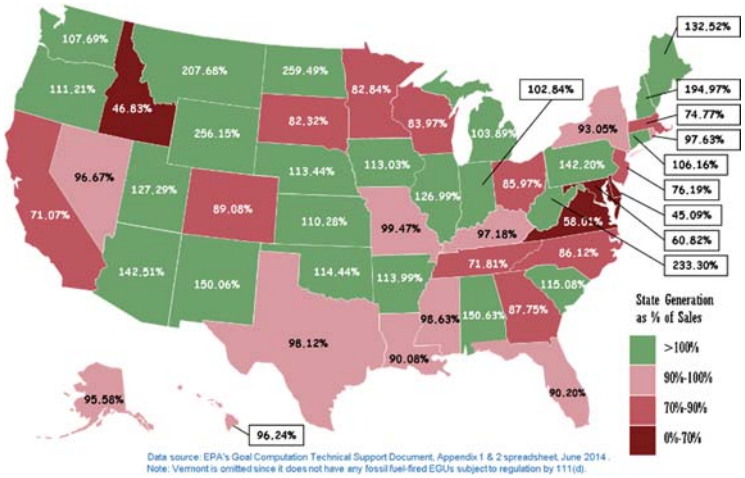
Create Incentives for Immediate Action to Reduce Emissions. EPA should provide states with flexibility to take credit for actions taken after the NOPR was issued and before the interim compliance period begins (2020) and count that credit toward achievement of the state's compliance obligation. This early-action provision would help ensure that the states have an incentive to reduce GHGs prior to 2020. It would also help prevent a dip in market activity in the EE and RE sectors, as obligated parties otherwise may delay projects until after the compliance period begins. One potential option for ensuring that states are given an opportunity to begin compliance earlier than 2020 is to give states the option to bank credits from 2014 to 2020 for use in the 2020-2029 interim compliance period.

Identify Remedies for the 111(d) State EE Penalty. In setting the interim and final goals, EPA only permits each state to take credit for the percentage of EE savings achieved in the state equal to the percentage of state electricity consumption that is generated in the state (capped at 100%). Stated simply, when submitting single-state plans, states that import electricity may not take full credit for the EE savings achieved in their state, creating a penalty for EE relative to other compliance options. The extent of the penalty is in exact proportion to the amount of electricity that

the state imports. This penalty makes the need for a clear path toward approvable interstate approaches more significant. EPA needs to ensure it provides a means for states to account for the full value of EE savings in either a single-state or multi-state plan. If left unresolved, this penalty puts EE at a competitive disadvantage compared to other 111(d) compliance mechanisms.

While this is not an issue for states that export electricity, it creates a distinct disincentive to pursue EE in the 26 states that import electricity. As an example, if a state generated 1,000,000 MWh of EE savings through programs and projects, and imported 25% of the electricity it consumed, only 750,000 MWh of EE savings would count toward compliance Because an importing state may not take credit for all of its EE savings and an exporting state may only take credit for its own EE savings, the rule would leave a significant amount stranded and uncounted because neither the importing state nor the producing state could claim credit for savings.

Figure 5: State Generation as a % of State Retail Sales



EPA should ensure a workable interstate solution in which EE programs and projects are not discounted or penalized. When pursuing options that will lead to 111(d) compliance, states and EGUs will be far less likely to pursue mechanisms that do not possess full compliance value.

Encourage the Use of Tradable Credits. EPA should support the development and use of single-state and multi-state emission credit trading programs and other market-based systems. This will facilitate compliance in either a state-driven portfolio approach or an EGU-obligated compliance approach. It will facilitate the use of the least-cost compliance options, such as those offered by IEE. Assuming EPA supplies states with clarifying guidance along the lines articulated in this document, it should be a fairly straightforward matter to include GHG reductions from IEE projects in such market-based programs.

Tradable credits are particularly effective in a business setting in which clarity and simplicity associated with credit trading will facilitate projects that would not have otherwise been developed. An emission trading program for the CPP would lower compliance costs, increase compliance flexibility, and spur investment in innovations that can enable lower-cost compliance activities both inside and outside the "fence-line" of an EGU. Several emission credit trading programs exist as models for, or even the foundations of, a functioning market for GHG emission reduction credit trading that could be applied to 111(d). California's "AB 32" trading program and the Northeastern States' Region Greenhouse Gas Initiative (RGGI) are the best illustrations for EPA to consider.

Alternate Approach to the Best System of Emission Reduction

CAA Sec. 111(a)(1) defines the term "standard of performance" for application in Sec. 111(d) as the best system of emission reduction that the Administrator determines to be adequately demonstrated. The definition also directs the Administrator to consider costs in setting the standard of performance. The inclusion of EPA's building blocks 2, 3 and 4 in the best system of emission reduction allowed for both calculating and meeting the standard of performance proposed in the NOPR is entirely appropriate. Reliance on building blocks 2, 3, and 4 – including the use of IEE projects – is consistent with the CAA, with long-standing interpretation of the CAA by the courts, and with widely-employed and adequately demonstrated energy practices.

In its proposal the EPA has presented a path toward significant GHG emission reduction while allowing the overwhelming majority of existing EGUs to continue operating. This appropriate balance can only be achieved by the inclusion of building blocks 2, 3 and 4.

Building Blocks 2, 3 and 4 Have Been "Adequately Demonstrated" as Options for Meeting Electricity Demand While Reducing Emissions. The NOPR straightforwardly relies only on those approaches to emission reduction from electricity production that are well demonstrated. The NOPR extensively documents EPA's approach to setting the standard of performance drawing exclusively from existing activities in use today that fall into each of the four building blocks.

"System" Is a Broad Term. The term "system" in "best system of emission reduction" should not be assumed to have been a casual or unintentional choice by Congress when it drafted CAA section 111. Congress could have used other terms including "device", "equipment" or "technology" if it intended to constrict EPA's authority under section 111(d) only to requiring pollution controls that could be physically attached to, or exclusively used within, an emissions source. The term "system" plainly indicates a broader approach to emission control strategies permitted by this section of law. As is pointed out in the NOPR, that broader interpretation is consistent with past court rulings relevant to EPA's current proposal. The inclusion of energy efficiency strategies, such as IEE projects, in the CPP are appropriately included in the concept of a "system" of emission reductions.

State Pathways for Industrial Energy Efficiency to Contribute to 111(d)

Synthesizing State Plans under 111(d) with EPA Requirements

Table 1 summarizes the key components of an acceptable state plan and identifies opportunities for EPA to develop guidance that would make it more likely that IEE projects will be included as key components of approvable state compliance plans.

Table 1: IEE Program Elements Align with EPA Pathway Requirements

EE Project Pathway Requirements	State Industrial Energy Efficiency Program Element	EPA Guidance Needed/Desired
Identification of affected entities	The EGUs for which IEE can contribute to GHG emission reductions will be identified in the state plan. State program can / should indicate that credits or reductions from IEE will be used for compliance if available.	EPA should clarify the extent to which states are responsible for identifying specific EE sites or sectors before EE savings are contracted or commissioned.
Description of Plan approach and geographical scope	State compliance plans should indicate that IEE improvements will be monitored and used for compliance.	None
Identification of state emission performance level	Using the appropriate factor for the GHG value of avoided electricity consumption, the state can determine the avoided CO_2 emissions produced by verified IEE projects.	EPA should affirm its approved conversion factor to translate avoided electricity generation to GHG reductions, which should apply equally to all EE savings.
Demonstration that the plan is projected to achieve the state's emission performance level	IEE projects on their own, or as a collection of measures, can be included in the plan as measures to augment principal compliance measures, and as a means of increasing confidence that the overall plan will achieve compliance.	None
Milestones	A state office responsible for documenting emission reductions attributable to EE projects (e.g. SEO) should be able to confirm total emissions avoided from the prior year using reporting provided by a registry, or other appropriate source. This will enable the state to take credit for emission reductions from validated projects.	None
Corrective Measures	Emission reductions will only be counted after they have occurred and been verified.	None

EE Project Pathway Requirements		State Industrial Energy Efficiency Program Element	EPA Guidance Needed/Desired
Identification of Emission Standards and any other measures		None	None
Demonstrate that emission standard is:	Quantifiable	Industrial efficiency will only be included in 111(d) compliance after it has occurred and been verified using an appropriate M&V protocol.	EPA should facilitate the use of GHG reductions from industrial efficiency for 111(d) compliance by providing guidance on acceptable M&V approaches, including the approach recommended in this paper (e.g. SEP M&V Protocol or IPMVP Option C).
	Non-Duplicative	Nothing in the CAA requires or accounts for the GHG reductions achieved by IEE. Any GHG reductions achieved by industrial projects would be non-duplicative.	EPA should clarify that verified GHG emission reductions from industrial efficiency will be treated in the same manner as RE projects and state- and utility-run EE programs.
	Permanent	IEE-related GHG emission reductions will only be included in 111(d) compliance after the reduction has occurred and been verified.	EPA should facilitate the use of GHG reductions from industrial efficiency for 111(d) by indicating that the approach described in this paper for inclusion in compliance is acceptable.
	Verifiable	IEE savings are measured and verified in accordance with international protocols.	EPA should facilitate the use of GHG reductions from industrial efficiency for 111(d) compliance by clarifying that verified reductions will be treated in the same manner as other EE programs.
	Enforceable	States can ensure that M&V protocols are enforced prior to accepting any GHG reduction credit for IEE.	EPA should approve use of model pathways.
Identification of monitoring, reporting, and recordkeeping requirements		The standard protocols followed by IEE provides a high level of rigor for monitoring, reporting and recordkeeping.	EPA (perhaps in collaboration with DOE) could facilitate the use of GHG reductions from industrial efficiency for 111(d) compliance by providing guidance on the acceptable application of M&V protocols and the level of detail needed for reporting.

Pathway for Including GHG Emission Reductions from Industrial Energy Efficiency in 111(d) Compliance Activities

TABLE 2: PATHWAY FOR INCLUDING GHG EMISSION REDUCTIONS FROM INDUSTRIAL ENERGY EFFICIENCY IN 111(d) COMPLIANCE ACTIVITIES	
State 111(d) Compliance Plan Development	State plans should clarify that GHG reductions from IEE may be used for compliance. IEE savings will likely be included in state plans as part of a portfolio of EE measures, such as performance contracting, building codes, ratepayer programs, etc. Each approach to EE has its own timeframe, profile, and funding source. Inclusion of IEE should increase the robustness of the plan's ability to ensure compliance.
Registration and Verification	IEE resources could be listed in a centralized registry, such as the DOE's Superior Energy Performance program, or another national, regional, or state registry. State 111(d) compliance officials could check the registry to identify the quantity of GHG emission reductions have occurred attributable to verified IEE measures. If an EGU is the obligated entity, ownership of verified units of EE can be directly sold by the industrial operator to the EGU owner, or converted to tradable emission reduction credits for use in single-state or multi-state credit trading system.
Purchasable Compliance	As much as EGU owners can purchase compliance by paying to increase dispatch of natural gas-fired generation, EGUs could purchase compliance through contractual relationships with the industrial entities developing and implementing efficiency measures. The reliance on appropriate M&V protocols, such as the SEP M&V Protocol, would support the use of such market-based contractual relationships. Alternately, the EGU could, where available, purchase GHG emission reduction credits from a trading market or directly from an industrial facility.
State 111(d) Progress Reports	Using M&V reports from all registered IEE in the state, the national registry, SEO or other appropriate office can aggregate on an annual basis all IEE savings and provide state program compliance officials with the GHG avoided. The rigor of the M&V will provide precise data regarding IEE produced to date.
Enforceability	Only achieved and verified GHG emission reductions from IEE would be incorporated in compliance reporting. Enforceability is, therefore, fairly straightforward, because it will not involve the consideration of projected emission reductions that fail to materialize.
Incentives	Entities regulated under 111(d) could provide financial incentives to pursue IEE through direct contractual arrangements, traditional utility or tax incentive payments, or the purchase of emission reduction credits.

Overview

As it works to finalize the rule, EPA should define approvable pathways for the inclusion of EE produced from IEE. Doing so would increase the market demand for IEE as states seek to comply with 111(d). One possible approach to developing approvable pathways is described here – but others could be developed that would also promote increased EE delivered via IEE.

The pathway approach in Table 2 describes options for including IEE projects in compliance activities regardless of whether the state delegates compliance obligations to EGUs or retains the responsibility at the state level. In all cases, use of a market-based emission reduction credit trading system, similar to the approach used in the Acid Rain Program, would simplify the inclusion of EE – including IEE – in 111(d) compliance activities.

Discussion

As states implement section 111(d), increasing the quantity of delivered energy efficiency will, in many cases, be the least expensive means of reducing GHG emissions from power generation. Industrial energy efficiency measures are, in most

cases, pursued for economic reasons. Industrial entities seeking to reduce operating expenses will modify operations to improve efficiencies. Investments in IEE are usually only pursued when the payback of investment in the project can be achieved in 1 to 3 years.

To the extent that 111(d) implementation creates incentives – and approved pathways – that allow incentives (such as tradable emission reduction credits) to be used for compliance, demand for efficiency projects is likely to increase. The ability of IEE to generate revenue, in addition to reducing operating costs, would tend to shorten payback periods on project investments. This would have the effect of increasing the scope of some industrial measures and make more projects viable by bringing their payback period within acceptable timeframes. The availability of revenue, in addition to cost savings, would increase the GHG emission reductions produced by IEE.

In the majority of states, the only action needed to enable inclusion of IEE in state plans would be developing a means of aggregating the EE produced by IEE measures. As discussed elsewhere in this paper, a national registry of IEE projects would be the most efficient option, relieving states of the burden for organizing their own registry and aggregation activity. That said, state or regional registries could be managed by a single state employee or third-party agent.

If the state retains responsibility for compliance with 111(d), the national registry, SEO, or another appropriate office, would serve as an aggregator of EE produced by IEE projects. Project information, once aggregated, can then be shared with the state air office responsible for compliance with 111(d). Only achieved and verified GHG emission reductions from IEE projects would be incorporated in compliance reporting. By requiring projects to use internationally accepted protocols for verifying electricity savings and GHG reductions, such as DOE's SEP M&V Protocol and IPMVP, a project registry could ensure that only properly verified GHG emission reductions are included in the program for 111(d) compliance.

If the state delegates compliance responsibility to EGUs, an EGU could arrange to use the GHG emissions from IEE in one of three ways. It could contract directly with the industrial owner/operator for the compliance value of the GHG emission reductions. The EGU could purchase emission reduction credits generated by the IEE savings. Finally, credit for GHG reductions could be directed by the registry to EGUs based on where the electricity demand reductions occurred.

Discussion of Elements Needed for State Programs

State 111(d) Compliance Plan Development – State plans should clarify that GHG reductions from IEE may be used for compliance. IEE savings will likely be included in state plans as part of a portfolio of EE measures, such as performance contracting, building codes, ratepayer programs, etc. Each approach to EE has its own timeframe, profile, and funding source. Inclusion of IEE should increase the robustness of the plan's ability to ensure compliance.

Registration and Verification – As stated earlier, IEE resources could be listed in a centralized registry, such as the DOE's SEP program, or another national, regional, or state registry. State 111(d) compliance officials could check the registry to identify the quantity of GHG emission reductions that have occurred attributable to verified IEE savings. If an EGU is the obligated entity, ownership of verified units of EE can be directly sold by the industrial operator to the EGU owner, or converted to tradable emission reduction credits for use in single-state or multi-state credit trading system.

Data standardization also will ensure that M&V reports are prepared in a manner that enables effective and efficient evaluation of the program. The aggregator could periodically audit a sample of M&V reports to ensure their accuracy. Absent a standardized data format, audits are likely to involve expensive, and unproductive re-measuring of equipment performance to meet an auditor's needs.

Purchasable Compliance – Much as EGU owners can purchase compliance by paying to

increase dispatch of natural gas-fired generation, with respect to IEE, the obligated EGU or affected state entity could purchase compliance through:

1. Traditional ratepayer offerings, usually for individual IEE projects (prescriptive incentives, custom incentives etc.)
2. Binding bilateral contracts with industrial companies participating in an IEE initiative (at a whole-facility level where multiple capital projects and operational improvements within a facility can be bundled together)
3. The purchase of emission reduction credits in a GHG market.

Existing programs such as state manufacturing technical assistance programs, federal programs such as SEP, as well as individually and privately-delivered corporate energy saving programs could all qualify in options 2 and 3 above as long as well-established international protocols for M&V are employed (e.g. SEP M&V protocol, IPMVP Option C-Whole Facility).

The aggregator will also be able to ensure against double counting of any GHG reductions for projects using utility rebates or other incentives. This can be done by requiring the project registry to identify any incentives used for an IEE project, and to identify the appropriate ownership and attribution for purposes of 111(d) compliance of any related GHG reductions. By using uniform data standards, and by tracking the regional electric grid in which the IEE project reduced electricity consumption, this aggregation approach can be the basis of regional trading of EE-derived GHG emission reductions. Such an approach would eliminate concerns regarding potential double counting of EE savings across state lines, while also eliminating the EE penalty discussed elsewhere in this paper.

State 111(d) Progress Reports – Using M&V reports from all registered projects in the state, the national registry, SEO or other appropriate office can aggregate on an annual basis all IEE savings and provide state program compliance officials with the GHG avoided by IEE. The rigor of the M&V will provide precise data regarding IEE produced to date.

Using the registry process discussed above, the state will be able to include in its progress reports the precise quantity of IEE resources delivered. The available quantity of IEE-derived GHG emission reductions can be used to provide the EGU or state with additional reductions that can ensure compliance. These reductions can serve as a cushion against any compliance shortfall, or as a longer-term bank that can be used do defer or avoid more costly compliance measures.

Enforceability – Only achieved and verified GHG emission reductions from IEE would be incorporated in compliance reporting. Enforceability is, therefore, fairly straightforward, because it will not involve the consideration of projected emission reductions that fail to materialize.

Incentives – IEE projects are most often implemented to reduce operating costs through investments with short (1 to 3 year) payback periods. For states that allow GHG emission reductions from IEE projects to be included in 111(d) compliance, IEE projects could benefit from additional revenues or incentives that offset project costs. Entities regulated under 111(d) could provide financial incentives to pursue IEE projects through direct contractual arrangements, traditional utility or tax incentive payments, or the purchase of emission reduction credits. The use of such mechanisms is likely to expand both the scale and number of IEE projects. Given the industrial sector's sensitivity to achieving brief payback periods, small incentives could lead to significant increases in GHG emissions avoided via IEE.

APPENDIX A

Industrial Energy Efficiency Project Summaries

Nissan

- **SEP Silver Certified**: Smyrna, TN vehicle assembly plant
- 7.2% improvement in energy performance over 3 years
- $938,000 total annual energy savings
- 4 month payback
- Used the DOE EnPI Tool to measure and track improvements

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

-Nissan North America Energy Team

View this and other SEP case studies at:
http://superiorenergyperformance.energy.gov/successes_and_testimonials.html

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General Dynamics

- **SEP Gold Certified**: Scranton, PA facility. 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

"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

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APPENDIX A (CON'T)

Industrial Energy Efficiency Project Summaries

Schneider Electric

Map data points are intended for illustrative purposes only.

- **SEP Platinum Certified**: Smyrna, TN facility
- Improved energy performance by 15.3% over 3 years
- Facility did not add any staff to support SEP implementation.
- Smyrna's success is driving Schneider Electric to ***implement SEP across 9 additional facilities:***
  - United States: 7
  - Canada: 1
  - Mexico: 1

"At first, we didn't appreciate the value of third party verification, but our facility has evolved to value third party verification as critical. Any facility can claim energy savings, but a third party verification proves the savings to be real."

- Schneider Electric, Smyrna, TN

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CCP

Energy Team at CCP Composites US LLC in Houston, a synthetic resin manufacturing plant

- **SEP Gold Certified:** Houston, TX, facility (CCP was SEP Certified Gold in 2010, and recertified in 2013)
- Improved energy performance by 13.0% over 3 years
- EnMS implementation resulted in $87,000 in annual operational improvement savings ***with no capital investment***
- Energy management is now a key part of the company corporate culture
  - Energy cost savings provide competitive edge in a low-margin industry

"Nearly all our energy efficiency projects are now at least influenced, if not initiated as a result of SEP participation. Prior to SEP, we would not have thought to be more energy efficient; it was not part of our corporate culture.

- CCP Composites US LLC

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APPENDIX A (CON'T)

Industrial Energy Efficiency Project Summaries

Harbec Plastics

HARBEC Inc. President, Bob Bechtold, and Energy Team Amy Bechtold and Jeff Eisenhauer at their Ontario, NY, facility.

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

- Bob Bechtold, President

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

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APPENDIX B

Companies That Have Achieved SEP Certification per DOE Website

The companies listed below have earned SEP certification in one or more facilities. The percentage of energy performance improvement, year of certification, and facility locations are also provided.

These pioneers obtained ISO 50001 certification as part of their SEP certification. Their experiences provide insight into the value of SEP.

SEP Platinum Certified

COMPANY / LOCATION	ACHIEVEMENT
Mack Trucks *Macungie, PA - Oct. 2013*	41.9% over 10 years
Volvo Trucks, NA *Dublin, VA - Feb. 2012*	25.8% over 3 years
Dow Chemical Company *manufacturing plant: Texas City, TX - Apr. 2011*	17.1% over 3 years
HARBEC Inc. *Ontario, NY - Nov. 2013*	16.5% over 3 years
Schneider Electric *Seneca, SC - Aug. 2013*	15.6% over 3 years
Schneider Electric *Smyrna, TN - Apr. 2014*	15.3% over 3 years
3M Canada Company *Brockville, Ontario, Canada – Jun. 2012*	15.2% over 3 years

SEP Gold Certified

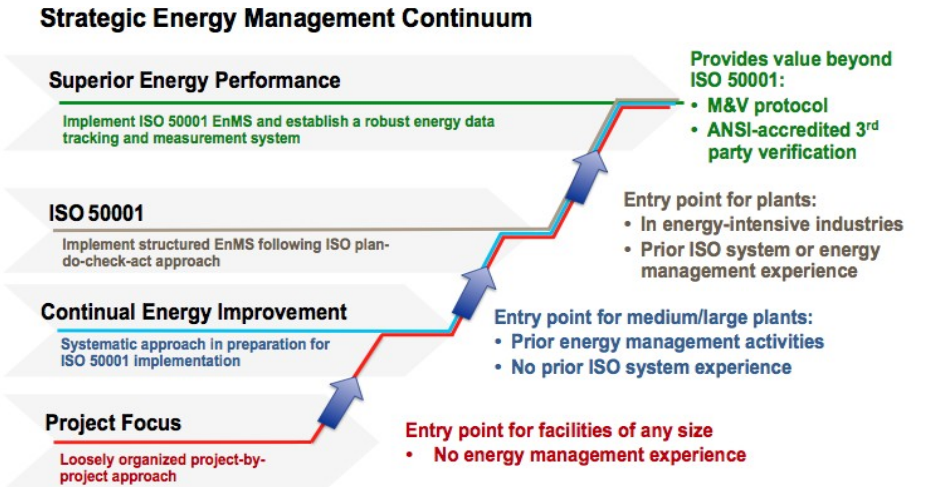
COMPANY / LOCATION	ACHIEVEMENT
CCP Composites US LLC *Houston, TX - Sept. 2013* (SEP Gold certified in 2010 with 14.9% over 3 years)	13.0% over 3 years
Cummins *Whitakers, NC - Jan. 2014*	12.6% over 3 years
General Dynamics *Scranton, PA - Apr. 2013*	11.9% over 3 years
Allsteel *Muscatine, IA - May 2012*	10.2% over 3 years
Cooper Tire *Texarkana, AR - Oct. 2012*	10.1% over 3 years

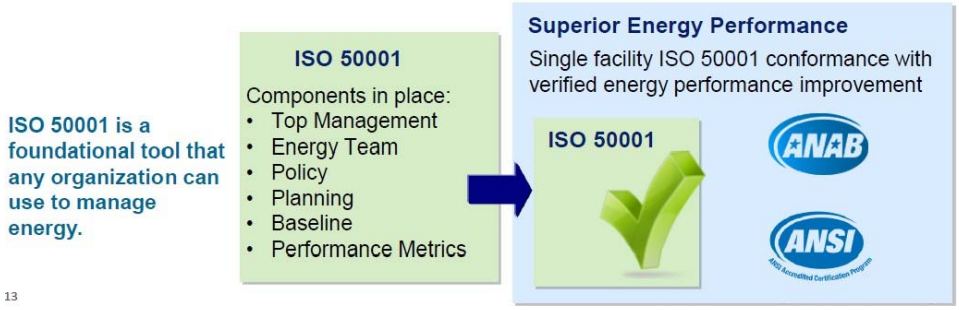
SEP Silver Certified

COMPANY / LOCATION	ACHIEVEMENT
Bridgestone *Wilson, NC - Oct. 2012*	16.8% over 10 years
Olam Spices *Gilroy, CA - Mar. 2013*	9.8% over 3 years
Owens Corning *Waxahachie, TX - Nov. 2010*	9.6% over 3 years
Schneider Electric *Cedar Rapids, IA - Jul. 2014*	8.8% over 3 years
MedImmune *Gaithersburg, MD - Oct. 2014*	8.5% over 3 years
Dow Chemical Company *energy systems plant: Texas City, TX - Apr. 2011*	8.1% over 3 years
Nissan NA *Smyrna, TN - May 2012*	7.2% over 3 years
Schneider Electric *Lexington, KY - Mar. 2014*	6.9% over 3 years
Schneider Electric *Lincoln, NE - Oct. 2013*	6.5% over 3 years
Freescale Semiconductor Inc. *Oak Hill, TX – Sept. 2010*	6.5% over 3 years
3M Company *Cordova, IL - Oct. 2012*	5.6% over 3 years

APPENDIX C

Superior Energy Performance Process & Achievement Levels

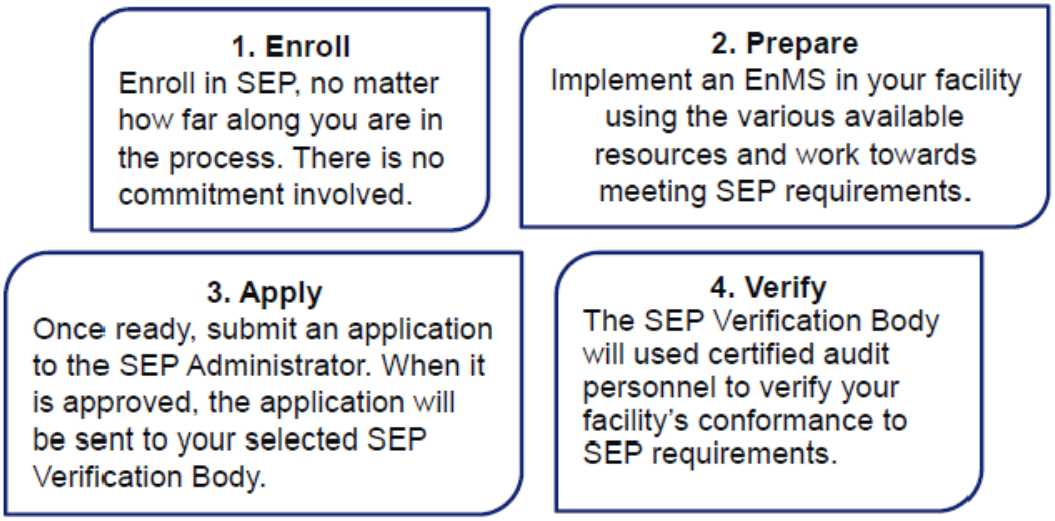




Performance Characteristics		Silver	Gold	Platinum
Energy Performance Pathway	**Energy Performance Improvement**	Meets a specified energy performance threshold over the last 3 years:		
		5%	10%	15%
Mature Energy Pathway Uses Best Practice Scorecard to earn points for energy management best practices and 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)

APPENDIX D

Superior Energy Performance Certification Process



5. Maintain and Recognize Achievement

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

6. Recertify

SEP Certification lasts for 3 years. In order to maintain certification, your facility will have to apply for recertification and undergo a recertification audit, similar to the initial certification audit, to show that the requirements are still met.

http://energy.gov/eere/amo/sep-and-iso-50001-certification-process

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APPENDIX E

Superior Energy Performance Verification Bodies and Certified Personnel