Setting Standards for Excellence

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December 1, 2014

U.S. Environmental Protection Agency
Attention Docket ID No. EPA–HQ–OAR–2013–0602
Mail code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460.

Via email: a-and-r-docket@epa.gov
Attention Docket ID No. EPA–HQ–OAR–2013–0602

Re: Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, EPA–HQ–OAR–2013–0602, 79 Fed. Reg. 34830 (June 18, 2014)

Dear Administrator McCarthy:

The National Electrical Manufacturers Association (NEMA) appreciates the opportunity to comment on the Environmental Protection Agency's (EPA) Clean Power Plan (CPP) proposal. We commend the EPA for an open process of stakeholder engagement during the period leading up to this proposal as well as during the public comment period. Please accept the attached comments as our recommendations as they pertain to any final rule.

NEMA is the association of electrical equipment and medical imaging manufacturers, founded in 1926 and headquartered in Arlington, Virginia. Its nearly 400 member companies manufacture a diverse set of products including power transmission and distribution equipment, lighting systems, factory automation and control systems, electric motors and drives, and medical diagnostic imaging systems. The U.S. electroindustry accounts for more than 7,000 manufacturing facilities, nearly 400,000 workers, and over $100 billion in total U.S. shipments. Please find our detailed comments below. We look forward to working with you further on this important effort.

If you have any questions on these comments, please contact Joseph Eaves of NEMA at 703-841-3221 or joseph.eaves@nema.org.

Sincerely,

Kyle Pitsor

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NEMA Comments on Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units

Executive Summary

Our comments center on the importance of energy efficiency and its inclusion in the final rule. Energy efficiency can help all sectors of our economy reduce CO_2 emissions, and those reductions will contribute, in part, to a state's ability to meet the reduction targets proposed in the rule. We recommend the following actions in any final rule:

- Energy efficiency should be an integral, creditable part of state and tribal plans and given equal credit, because a megawatt-hour saved reduces just as much CO_2 as a megawatt-hour generated from a carbon-free generation unit (see page 3).
- We encourage EPA to explicitly allow states to include energy savings resulting from private energy efficiency investments, as well as from state- and utility-run programs. This includes the use of energy savings performance contracts (ESPCs), low-cost energy efficiency and renewable energy finance mechanisms, energy code compliance, building energy benchmarking (see page 4).
- We recommend that EPA explicitly allow states to claim credit for the energy saved from investments in industrial facilities if those projects are completed using a tool or protocol that can measure and verify energy savings (see page 10).
- State and municipal tax incentives, regulations, and product rebate programs should not only be credited in state implementation plans, but they should be actively encouraged by EPA (see page 11).
- EPA should allow states to count CO_2 emissions reductions derived from energy efficiency gains in the electric transmission and distribution system (outside the electricity generating unit (EGU) and in front of the meter), including CO_2 reductions resulting from the installation of energy-efficient transformers, energy storage technologies, and the implementation of volt/VAR optimization programs (see page 12).
- Distributed generation, regardless of type, helps reduce emissions by bringing electricity on-site or near to demand, reducing transmission losses, as well as wear-and-tear on utility equipment by mitigating peak demand. NEMA supports EPA's inclusion of renewable energy as an option for states to meet the CO_2 emission targets in the rule (see page 15).
- The final rule should allow states that had energy efficiency programs or activities in place by June 2014, or that begin new programs any time before the implementation of the final rule, to receive credit towards compliance in 2020. We also suggest that the value of early energy efficiency investments is credited at a rate above 100 percent due to the higher value that near-term CO_2 reductions have in avoiding emissions (see page 16).
- State-by-state product efficiency standards for products such as appliances and equipment should <u>not</u> be eligible for compliance with the Clean Power Plan. We believe that energy conservation standards for these products should stay within federal jurisdiction as manufacturers serve a national market (see page 17).

- EPA should offer clarity regarding heat rate improvements at power plants that could trigger New Source Review regulations under Section 111(b) of the Clean Air Act (see page 17).

Importance of Energy Efficiency

NEMA believes that energy efficiency policies, for the residential, commercial, and industrial sectors, should be an important component to any national energy policy. As such, we believe that energy efficiency should be an integral, creditable part of any state and tribal plans arising from any final rule arising from the EPA *Clean Air Act* Section 111(d) emission guidelines for carbon dioxide (CO_2) emissions from existing power plants. The guidelines set by any final rule should recognize the states' obligation to ensure affordable and reliable electric service as well as to protect the environment. EPA should allow states' flexibility as to how they comply with the 111(d) regulations, including energy efficiency policies and programs.

Energy efficiency touches all aspects of our economy and, in the context of any rule related to 111(d), can help states meet the requirements of such a proposed rule by recognizing the importance of states finding energy savings across all sectors. Admittedly, there is more than one way to assess the cost equation that policy makers must wrestle. Energy efficiency regulation is an expensive means to reduce a ton of carbon from the atmosphere compared to other means.[1] On the other hand, energy efficiency measures, when measured in terms of cost per kilowatt-hour of electricity, can be less than the cost of constructing new electricity generating units (EGUs).[2] Not all of our choices intended to reduce carbon emissions require us to consider constructing new sources of electricity generation, therefore the cost per ton of carbon avoided should be borne in mind at all times --- by both states and the federal government --- when considering policy strategies to reduce carbon emissions. However, energy-efficiency solutions can, without consideration of its capacity to reduce carbon emissions, yield economic benefits to consumers and business, and the marketplace, either alone or when combined with cost-justified and technically feasible energy conservation regulation, can reduce carbon emissions. State policies that facilitate and promote energy efficiency should be given credit toward the achievement of the proposed goals.

Residential and commercial buildings consume approximately 40 percent of the primary energy and 70 percent of the electricity in the U.S. on an annual basis.[3] Recent advances in commercial building equipment — such as lighting, sensors, controls, electric motors and drives, and integrated systems, including high performance pump, fan and compressor products — now make it possible to achieve a significant reduction in buildings' energy consumption, transforming older, more inefficient buildings into high-performance buildings (HPBs). In addition, through automation and integration with the grid, individual buildings and groups of buildings can help manage peak demand through demand response programs, reducing CO_2 emissions from the most carbon-intensive peaking EGUs. HPB products make buildings smarter, safer, and more efficient, while contributing to energy security and creating high-quality manufacturing and construction jobs.

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[1] W.Nordhaus, *The Climate Casino* ch. 15 (2013)(new energy efficient refrigerator reduces carbon emissions at a cost of $167 per ton; substituting natural gas for coal in electricity generation reduces carbon emissions at a cost of $20/ton).
[2] http://www.aceee.org/sites/default/files/publications/researchreports/u1402.pdf
[3] U.S. Dept. of Energy, *Buildings Energy Data Book (2011)*

Just as with commercial buildings, residential homes are getting smarter and more efficient. According to the Energy Information Administration, 14 percent of home electricity use goes towards lighting, 18 percent for cooling, 9 percent for heating water, and 6 percent space heating — all of which can be reduced with off-the-shelf technologies.[4] Reducing energy waste in homes can significantly reduce the monthly financial burden on homeowners, who spend approximately 3 percent of their income on energy bills each year.[5] This strengthens Americans' purchasing power and the overall economy, in addition to lowering CO_2 emissions.

The industrial and manufacturing sectors benefit from energy efficiency as well. In 2010, according to the Department of Energy, the industrial sector consumed 21 percent of the nation's total energy and 23 percent of the nation's electrical energy.[6] When high-efficiency drives and electric motors are combined with sensors, intelligent process controls and monitoring systems, it is estimated that 15-30 percent energy savings are attainable in most industrial environments.[7] These savings go directly to a company's bottom line, resulting in more efficient productivity, less cost per unit produced, and lower prices to consumers — all of which improve international competitiveness and lower emissions nationwide.

Finally, the electric grid itself can be modernized to operate more efficiently. NEMA members manufacture the equipment that will build America's 21st Century electric grid. A modern grid uses information and communications technologies, such as smart meters and high-tech sensors, to isolate problems and repair them remotely; recover more quickly from extreme weather outages; and maximize the efficiency, reliability and affordability of electricity. New grid technologies and solutions consume less energy and decrease the carbon-intensity of the grid through the use of efficient transformers, volt/VAR optimization, energy storage, microgrids, and combined heat and power (CHP) applications; allow energy efficient buildings and residences to sell power to the grid; and accommodate a growing number of electric vehicles — all of which contribute to lower emissions and economic growth.

States and tribes should adopt energy efficiency programs and activities that may vary substantially by state but reflect local conditions. Recognizing this diversity, EPA should invite multiple approaches to allowing energy efficiency emissions reductions to be part of compliance plans.

Demand-Side Energy Efficiency

We support the inclusion of demand-side energy efficiency in the rule, as it is a proven, well-established industry practice and a common policy goal for many states. We encourage EPA to explicitly allow states to include energy savings resulting from private energy efficiency investments, as well as from state- and utility-run programs. Not accounting for both private- and public-sector energy efficiency investments could severely hinder the use and implantation of energy efficiency programs nationwide.

EPA should encourage states to develop a clear path for inclusion, crediting, and administrative review and oversight of utility-, state-, and non-utility-delivered energy efficiency activities providing emissions

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[4] http://www.eia.gov/tools/faqs/faq.cfm?id=96&t=3

[5] http://www.eia.gov/todayinenergy/detail.cfm?id=10891

[6] U.S. Energy Information Administration, *Annual Energy Review (2011)*

[7] Collated from Siemens, Eaton, and Rockwell case studies.

reductions included in state plans. This may include energy savings performance contracts, industrial energy efficiency and other privately contracted and delivered energy efficiency historically unaccounted for in ratepayer and state programs.

Furthermore, state plans should include policies and incentives that help utilities make these investments. For example, some states require utilities to prioritize cost-effective energy efficiency over other resources when making procurement decisions. States have also seen success by enforcing and adequately funding an energy efficiency resource standard (EERS) program, which drives investments in utility-sector energy efficiency programs.

Below, we have further outlined areas of focus that EPA should consider, and we offer solutions to EPA's questions in these areas.

Building Energy Efficiency

Energy Savings Performance Contracts

We recommend that EPA allow states to include the use of energy savings performance contracts (ESPCs) as a compliance mechanism under building block four. Focusing on multiple ways to deploy demand-side energy efficiency gives states additional options and flexibility in meeting their carbon reduction targets. EPA should allow states to include not only utility-run and state-run programs in their state implementation plans, but also private-sector projects in the form of ESPCs delivered by energy service companies (ESCOs).

Under an ESPC contract, a private ESCO agrees to deliver and install energy-saving measures and equipment that are paid for with energy bill savings. The performance of the energy conservation measures installed, as well as the energy savings, are contractually guaranteed by the ESCO and are measured and verified (M&V) using internationally recognized protocols such as the International Performance Measurement and Verification Protocol (IPMVP). This rigorous M&V process ensures that these projects deliver quantifiable and verifiable energy savings, making ESPCs an ideal component of any state implementation plan.

In terms of total impact, in 2012 ESCO activities resulted in approximately the same amount of energy efficiency investment as all utility-run programs ($6 billion each), according to Bloomberg New Energy Finance's, "Sustainable Energy in America Factbook."[8] We encourage EPA to explicitly allow states to use ESPCs to comply with the *Clean Power Plan* – not doing so would result in a sizeable, low-cost source of potential emissions reductions being left on the table.

NEMA supports, and would like to reiterate, the findings of a report written by a group of ESCOs – Ameresco, Honeywell, Ingersoll Rand, Johnson Controls, Schneider Electric, Siemens, and United Technologies – in their separately filed comments titled, "Greenhouse Gas Reductions through Performance Contracting under EPA's Clean Power Plan." They recommended EPA include additional guidance in its final rule with respect to ten key issues:

[8] http://www.bcse.org/factbook/pdfs/2014%20Sustainable%20Energy%20in%20America%20Factbook.pdf

- **Identify Approvable Pathway.** Without limiting state flexibility, EPA can offer clarifying guidance to enable states to include performance contracting project-related emission reductions in their 111(d) compliance plans.
- **Recognize All Existing Programs.** EPA should acknowledge – as it did with energy efficiency resource standards, etc. – that existing state performance contracting activities provide a potentially substantial contribution to 111(d) compliance.
- **Targeting Sources of Energy Savings.** EPA should clarify how this requirement applies to performance contracting projects. We recommend that the states be required only to identify building types (e.g. state-owned, hospitals, universities etc.) targeted for performance contracting and a reasonable estimate of savings to be achieved from anticipated performance contract (PC) projects.
- **Aggregation of PC-created Emission Reductions.** EPA should describe approvable approaches for aggregation of PC project-related energy efficiency for use in 111(d) compliance. We recommend that a national registry be created for this purpose, as that approach would be the most efficient and would provide the greatest degree of consistency in all aspects of inclusion of project-related GHG reductions in 111(d) compliance. Alternately, at a minimum, the state energy office (or another designated Agency) can collect (directly or via a third party) data from all PC projects in the state and determine the avoided emissions achieved.
- **Clarify Approvable Approach for Key Compliance Criteria.** EPA can assist states by identifying approvable approaches for key compliance criteria that will facilitate inclusion of performance contracting project-related emission reductions. Key compliance criteria for which EPA should identify approvable approaches include M&V protocols, auditing requirements for state performance contracting projects, performance contracting program evaluation methods, and corrective measures.
- **Existing Facilities/Installations.** Emissions reductions from performance contracting projects that are validated by an approved M&V approach and persist into the compliance period should be eligible to contribute to 111(d) 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 *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. This early-action provision would help ensure that the states have an incentive to reduce carbon emissions prior to 2020.
- **Contributions to Future Avoided Emissions.** All avoided electricity consumption should be allowed to count toward 111(d) compliance for performance contacting projects subjected to proper M&V.
- **Identify Remedies for the 111(d) State Energy Efficiency Penalty.** EPA should address and resolve the energy efficiency penalty created when energy efficiency projects are implemented in electricity-importing states. As proposed, the rule would leave stranded and uncounted the emission reductions created by energy efficiency in an importing state because neither the importing state, nor the generating state, could claim credit for emissions reductions equal to 100 percent of those created by the energy efficiency program or project.
- **Encourage the Use of Tradable Credits.** EPA should support the development and use of single-state and multi-state credit programs and other market-based systems. This will encourage the use of the least-cost compliance options, which in many cases, will involve comprehensive energy retrofits.

Low-cost Finance

We encourage EPA to specifically recognize in its final rule that the energy savings stemming from low-cost energy efficiency finance programs such as property-assessed clean energy (PACE) financing, revolving loan funds, loan-loss reserve funds, tax incentives, and product rebates should be available to states as compliance mechanisms under building block four. According to a survey of North American building owners, 38 percent cited either a lack of funding or other financial criteria as the primary barrier to pursuing energy efficiency investments in their properties.[9] By encouraging the use of low-cost financing mechanisms by residential and commercial building owners, states can unlock energy savings in a sector that consumes more than 70 percent of the United States' electricity on an annual basis.[10] The following sub-sections include additional information about why each of these finance mechanisms should be specifically recognized in EPA's final rule.

Property-Assessed Clean Energy (PACE) Financing

Property-Assessed Clean Energy (PACE) is an innovative financing mechanism that allows building owners to pay for energy efficiency and renewable energy improvements to their facility through a property tax assessment that can be repaid over time, typically over the course of no more than 20 years. By removing the up-front financing barrier, which as noted above is building owners' top barrier to investing in energy efficiency, PACE has the potential to unlock energy improvements in commercial buildings, as well as in residential buildings where local, state, and federal laws and regulations allow.

The U.S. Department of Energy (DOE) issued guidelines for PACE projects in its "Guidelines for Pilot PACE Financing Programs" document.[11] These DOE guidelines are intended to help structure projects so as to ensure that the energy savings are realized and that mortgage holders are protected. Specific guidelines to help ensure that projects will deliver energy savings include, but are not limited to, the following:

- Projects should have a savings-to-investment ratio of greater than one;
- Property value should be greater than outstanding debts attached to the property;
- Mortgage-holders should receive notice of PACE liens;
- PACE liens should not accelerate in the event of a property owner default;
- Projects should be limited to 10% of the property's estimated value;
- Contractors and inspectors should be properly certified and licensed; and
- PACE programs should incorporate a debt service reserve fund to protect investors.

In addition to these DOE guidelines, EPA may wish to suggest additional underwriting provisions for PACE projects to verify that funds are used to pay for the clean energy-related projects for which they are intended.

We encourage EPA to explicitly reference PACE financing in its final rule as a compliance tool available to the 31 states that have authorized it, and to encourage the remaining 19 states that have not to authorize the use of PACE and to implement programs.

Revolving Loan Funds

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[9] http://www.institutebe.com/InstituteBE/media/Library/Resources/Energy%20Efficiency%20Indicator/Executive-Summary_2014-Energy-Efficiency-Indicator.pdf
[10] http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=1.1.9
[11] http://www1.eere.energy.gov/wip/pdfs/arra_guidelines_for_pilot_pace_programs.pdf

We also encourage EPA to explicitly reference revolving loan funds in its final rule as a compliance tool available to help all states reduce their CO_2 emissions under building block four. Revolving loan funds have been proven to leverage initial capital investments by providing low-interest loans to multiple projects and replenishing the fund with the interest charged to the facility owner. Texas, for example, uses its LoanSTAR revolving loan fund to help finance energy efficiency investments in state, public school, university, and hospital facilities around the state, which have resulted in $395 million in low-interest loans as of January 2014, a total of $419 million in energy savings for Texas taxpayers, and avoided emissions of more than 3.7 million tons of CO_2.[12] According to the National Association of State Energy Officials, as of July 2013 there were 79 revolving loan fund programs in operation across 44 states, which represents a total of $2 billion in energy efficiency financing.[13] These programs should be explicitly referenced and the expansion of these programs should be encouraged in EPA's final rule.

Loan-Loss Reserve Funds

By reducing counterparty risk for lenders, loan-loss reserve funds allow lenders to reduce interest rates on loans offered to building owners because they will be partially or fully reimbursed in the event that a borrower defaults on a loan. States should be allowed to and encouraged to set up and fund loan-loss reserve programs in order to leverage their investment and reduce the cost of delivering energy efficiency and reducing CO_2 emissions. For example, Michigan Saves has worked with private lenders to offer a loan-loss reserve so that they will reduce the rates they offer to homeowners in Michigan looking to install energy-efficient equipment in their homes at annual interest rates of no more than 7 percent.

Because loan-loss reserve funds can reduce the cost of financing energy efficiency upgrades to buildings, we encourage EPA to explicitly reference loan-loss reserve funds in its final rule as a compliance tool that states can use to reduce CO_2 emissions under building block four.

Tax Incentives and Rebates

By offering building and home owners tax deductions, tax credits, or rebates for installing certain energy-efficient technologies, states can directly reduce the cost of investing in energy efficiency and encourage building owners to reduce their energy consumption and CO_2 emissions. Many states have property tax exemptions for energy-efficient buildings or buildings with solar photovoltaic systems, sales tax exemptions for certain energy-efficient technologies or renewable energy systems, personal and corporate tax credits or deductions for installing energy-efficient technologies or renewable energy systems, and/or rebate programs for energy-efficient technologies (e.g., LED lighting, solar photovoltaic systems, efficient hot water heaters, efficient furnaces or heat pumps, energy audits, and more). These tax incentives and rebate programs should be actively encouraged and specifically mentioned in EPA's final rule as compliance mechanisms for states to use to reduce CO_2 emissions under building blocks three and four.

NEMA would like to emphasize that this section does not constitute an exhaustive listing of low-cost finance tools available to help reduce the cost of investing in energy efficiency. To ensure maximum flexibility for states, additional tools (e.g., on-bill financing, energy infrastructure banks, energy-efficient mortgages) should also be available to be used as compliance mechanisms. However, NEMA believes that the aforementioned low-cost finance tools should be explicitly referenced in the final rule to give

[12] http://www.seco.cpa.state.tx.us/ls/

[13] http://www.naseo.org/Data/Sites/1/documents/selfs/state_energy_rlf_report.pdf

states additional certainty as to the types of programs they could implement to help reduce their CO_2 emissions under building block four of the *Clean Power Plan*.

Code Adoption and Compliance

As a compliance mechanism under building block four, we encourage EPA to explicitly allow states to count the incremental energy savings from energy code adoption and compliance programs. States that adopt the most recent version of the energy code on a regular, three-year cycle reduce energy waste in both commercial and residential buildings. For example, the 2010 version of the model energy code ASHRAE 90.1 is 30 percent more energy efficient than the 2004 version of the same model code.

Because energy codes only save energy if they are enforced, EPA should also allow states to count energy savings that result from code compliance beyond the status quo. According to the Institute for Market Transformation (IMT), energy code compliance can be as low as 50 percent.[14] In Rhode Island, the electric utility National Grid conducted a survey that found energy code compliance rates for specific energy systems to be as low as 7 percent for bi-level lighting controls and 50 percent for lighting occupancy sensors. Despite a state-wide compliance average of 70 percent, they found that no single building was in full compliance; in other words, buildings in Rhode Island are performing 30 percent worse than the code requires of them.[15]

IMT estimates that programs targeting energy code compliance have a 600 percent return on investment - $6 in energy savings for every $1 invested.[16] With code compliance hovering around 50 percent, there is a large opportunity for states to better enforce their energy codes, which will result in additional energy savings and CO_2 reductions. How states approach the enforcement challenge should be decided by each state based on local circumstances, but NEMA recommends that states focus on the following ways to improve energy code compliance:

- Educate and outreach to the architects, contractors, and builders with the responsibility to design and build and retrofit code-compliant buildings;
- Combine both classroom and on-the-job energy code training for code officials with regular follow-up and continuing education, especially when new versions of the code are adopted;
- Provide tools for code officials to be more productive with their time so that they can assess energy code compliance without spending additional time on a job site;
- Require tests of newly constructed buildings by third-party experts to boost compliance by builders; and
- Hire additional code officials to support existing officials who do not have sufficient time to adequately inspect all of the buildings that they are required to inspect.

Simply improving compliance with existing energy codes would have a major impact on reducing CO_2 emissions for a relatively small investment. We recommend that EPA explicitly recommend that states focus on energy code compliance as a cost-effective way to drive investments in energy efficiency as a tool to comply with building block four.

[14] http://www.imt.org/codes/code-compliance

[15] http://www.rieermc.ri.gov/documents/evaluationstudies/2012/RI%20Code%20Compliance%20Baseline%20Study%20%20Final%20Report%20-%20July%2023%202012.pdf

[16] http://www.imt.org/resources/detail/building-energy-code-compliance-a-low-cost-tool-to-boost-jobs-cut-pollution

Building Energy Benchmarking

Data from EPA's ENERGY STAR Portfolio Manager shows that buildings that benchmark their energy use reduce their energy consumption by seven percent over three years.[17] Around the country, two states (i.e., Washington and California), one county (i.e., Montgomery County, Maryland), and ten cities (i.e., Austin, Boston, Cambridge, Chicago, Minneapolis, New York City, Philadelphia, San Francisco, Seattle, and Washington, DC) have enacted mandatory benchmarking ordinances that require certain buildings to measure their energy performance using ENERGY STAR Portfolio Manager. EPA's own analysis of 35,000 buildings showed that those buildings that benchmarked their energy use reduced their energy consumption by 2.4 percent per year on average with the least efficient buildings reducing their energy consumption by the greatest amount (12 percent over three years).[18]

We recommend that EPA allow states to count energy savings from mandatory benchmarking programs under building block four, so long as those energy savings cannot be double counted under a separate program (e.g., utility rebate program).

Industrial Energy Efficiency

The opportunity to achieve industrial energy efficiency (IEE) savings is enormous given the large consumption of energy by America's industrial sector – roughly one-third of America's total energy consumption – and the inherent benefit to reduce costs. IEE can be delivered through ratepayer-funded energy efficiency programs, custom programs, and private-sector delivered IEE projects. Despite the myriad benefits of reducing energy consumption and energy costs, there are challenges to capitalizing on these opportunities, which energy management systems such as the International Organization for Standardization's ISO 50001 Energy Management Systems standard and the Superior Energy Performance Program can overcome.

The Clean Power Plan (CPP) recognizes end-use energy efficiency savings and distributed renewable energy generation as a means to reduce CO_2 emissions from the power sector. The CPP can unleash substantial additional CO_2 savings delivered through IEE 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 CO_2 reductions generated through IEE projects as a means of compliance will provide states with enhanced flexibility and will dramatically lower the cost of complying with 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 energy efficiency is one of the least-cost compliance options. It can play a critical role in helping the United States meet its emission reduction policy objectives.

NEMA, in collaboration with the Institute for Industrial Productivity, recommends that EPA:

[17] http://www.energystar.gov/buildings/about-us/research-and-reports/portfolio-manager-datatrends

[18] http://www.energystar.gov/sites/default/files/buildings/tools/DataTrends_Savings_20121002.pdf

- 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 was issued 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.

For more information about these recommendations, see the attached report, "Securing Greenhouse Gas Reductions through Private-Sector Delivered Industrial Energy Efficiency Projects through EPA's Clean Power Plan" (Appendix A).

State Tax Incentive and Rebate Programs

State and municipal tax incentives, regulations, and product rebate programs that are intended to accelerate investments in energy efficiency outcomes and energy-efficient technologies can reduce emissions, improve communities, and save consumers money. These types of programs vary across states and municipalities, but currently approximately over 1,500 such programs are in place nationwide.[19] Clearly, many communities are innovating where national action has been absent. Through action on energy efficiency at the local scale, communities are finding ways to meet their particular needs and interests. The following tax incentives and rebate programs have been implemented in a number of states, and could be easily replicated by others:

- **Personal and corporate tax credits and deductions:** In return for investing in energy efficiency and/or renewable energy technologies that reduce CO_2 emissions, state could offer individuals or corporations tax credits or deductions. For example, Kentucky has a tax credit program for business to deduct up to 30 percent of the installed cost for energy efficient lighting system or HVAC system. The state also, allows residents to take a 30 percent personal tax credit for energy efficiency improvements to their homes.[20]
- **Property tax exemptions:** For investments made to reduce the CO_2 emissions of a property (e.g., energy efficiency or distributed energy generation), states or local jurisdictions could offer property tax exemptions to encourage the deployment of CO_2-saving technologies. For example,

[19] http://www.dsireusa.org/
[20] http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=KY30F&re=0&ee=0

California's Active Solar Energy Systems New Construction Exclusion program allows for up to 100 percent of the system value to qualify for a property tax exemption.[21]

- **Sales tax exemptions:** For qualifying purchases of CO_2-saving technologies, some states have waived sales tax. For example, both Texas[22] and Georgia[23] have sales tax holidays annually on Energy Star products along with many others.
- **Product rebates:** Direct product rebates could be offered to consumers of CO_2-saving technologies. For example, Black Hills Power in Wyoming offers a wide range of product rebates for both residential and commercial customers.[24]

EPA should acknowledge the CO_2-reduction benefits these programs create and should allow states to include them in their compliance plans.

Utility Investments in Transmission and Distribution Systems

NEMA members are leading the way in developing and manufacturing grid technologies that result in emission reduction derived from energy efficiency gains in the electric transmission and distribution system (outside the EGU but in front of the meter). When utilities install these products, EPA should recognize the emissions savings and count them as a means of state compliance under building block four.

System losses and inefficient EGU dispatch, and therefore CO_2 emissions, can be reduced through replacement of less efficient assets with more efficient assets, as well as through operational practices enabled by certain technologies. Because these improvements are often confined within a utility's area of operation, they are measureable and verifiable. Some examples of these technologies include:

Efficient Transformers
Transformers are a widely recognizable piece of the electric system and nearly all electricity consumed passes through transformers on its way to the customer. Transformers enable electricity to be moved efficiently over long distances and allow electricity to be delivered at the proper voltage to the customer. While a transformer is not intended to use electricity *per se*, as a matter of physics no transformer is 100% efficient. As a result each time an electrical current is passed through a transformer, some electricity is lost.

Manufacturers have invested heavily in transformer technologies that dramatically improve efficiency, such as NEMA Premium® Efficiency-rated transformers. Yet because of the ability to repair old units, many aging transformers continue to persist on the electric grid, despite their lower levels of efficiency

[21] http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA25F&re=0&ee=0
[22] http://www.window.state.tx.us/taxinfo/taxpubs/tx96_1331/
[23] http://gefa.georgia.gov/energy-star-and-watersense-sales-tax-holiday
[24] http://www.blackhillspower.com/save-money-energy/rebates

compared to modern transformers. Indeed, the average age of a substation transformer[25] and a distribution transformer[26] is 42 years.

EPA should recognize and give credit to emissions reductions gained through utility replacement of inefficient transformers.

Efficient Conductors and Cable
Approximately 7% of the energy generated is lost in the transmission of power to the customer. The use of more efficient conductors and cable could reduce these losses, reducing the excess power generation, and subsequent emissions, required to meet actual demand and improve system reliability.

Lower loss, low sag conductors can also improve grid reliability and capacity in a more economical and environmentally responsible manner. These conductors improve reliability as they maintain clearance during emergencies and periods of high power loadings thus reducing the chance of system failure. They also reduce the environmental impact of increasing grid capacity by allowing utilities to use existing structures thereby eliminating the environmental disruption caused by new line builds.

Intelligent Grid: An Intelligent Grid uses wide area monitoring technologies and real time two way communications, to maximize the efficiency of the transmission and distribution grid, as well as the dispatch of renewable energy and a reduction of peak load through demand response.

Types of Intelligent Grid solutions include:

- Wide area monitoring systems (WAMS) that allow for optimized power flow and renewable energy dispatch on the grid. For example:
    - **Sensors, Weather Nodes, and Base Stations:** These devices function as an integrated system to monitor the capacity of a power line. The sensors clamp directly onto the conductor and can be used to determine the clearance and capacity of the line. The Weather node collects data and atmospheric conditions surrounding the transmission line and the base station transmits the data to the utility.

      The use of this type of equipment allows a utility the ability to continuously monitor transmission lines thus allowing for more optimized integration of the most efficient and least carbon intensive generation sources by eliminating "apparent" capacity constraints resulting from the use of overly conservative static line ratings.

- Reducing peak demand through demand-response systems that remotely adjust power consumption thereby reducing the need for additional power generation capacity.
    - **Demand Response:** Demand response is the process of reducing peak demand instead of dispatching additional EGUs in order to maintain balance between supply and demand on the electric grid. Demand response has traditionally been most effective during hot summer days when air-conditioning loads increase, although during the winter of 2013-2014 when the U.S. experienced a polar vortex, demand response was used to manage the wholesale price of electricity, maintain grid reliability, and keep

[25] http://www.galvinpower.org/resources/library/fact-sheets-faqs/electric-power-system-unreliable
[26] http://www.ey.com/Publication/vwLUAssets/EY-Living_on_borrowed_time/$FILE/EY-5-Insights_protect_PU_Utilities-Risk.pdf

people safe and warm while at the same time reducing the need to operate the least-efficient, most-carbon-intensive EGUs.

The Federal Energy Regulatory Commission estimates that peak demand can be reduced by anywhere from 38-188 gigawatts (4-20 percent reduction in peak demand) between 2009 and 2019.27 If all of the cost-effective demand response were utilized, it would eliminate the need for 2,000 peaking power plants.28 We encourage EPA to explicitly allow states to implement demand response programs as a means of reducing peak CO_2 emissions and complying with building block four.

- Improving the efficiency and quality of electrical transmission through enhanced control of voltage and power flow.
    - **Volt/VAR Optimization (VVO):** Traditional Volt/VAR (volt-ampere reactive) management technologies have been used by the power industry for over 30 years to reduce electric line losses and increase grid efficiency. Today, technologies like smart meters have advanced to allow increasing levels of Volt/VAR Optimization (VVO), thus reducing overall distribution line losses by 4–6 percent through tight control of voltage and current fluctuations[29].

      Conservation voltage reduction (CVR) is a VVO technology that has numerous potential benefits. This type of VVO solution can be used to flatten voltage profiles and then lower overall system voltage while staying within the specified ANSI voltage limits. In short, doing this reduces overall system demand by a factor of 0.7-1.0 percent for every 1 percent reduction in voltage. From a consumer perspective, this reduces the energy they consume. From a utility perspective it reduces the amount of power they need to generate or purchase from a generator, reducing emissions.[30]

      In Virginia, Dominion Power has successfully implemented VVO and CVR to deliver only the level of voltage needed to ensure the safe and effective operation of electricity-consuming devices, thus reducing energy waste by 2.8 percent on average.[31] These savings are easily quantifiable and verifiable, making VVO and CVR an ideal activity for states to include in their plans to help them reduce CO_2 emissions under building block four.

Energy Storage: Although not a technology that reduces energy demand or carbon emissions on its own, energy storage technologies (e.g., batteries, thermal storage, flywheels, compressed air, etc.) can help optimize generation and reduce CO_2 emissions by matching supply to demand in three primary ways:

1. Energy storage enables electricity generated at night to be discharged during peak hours of the day when carbon-intensive generation is operating at a high capacity factor.

[27] http://www.ferc.gov/legal/staff-reports/06-09-demand-response.pdf (page 27)
[28] http://www.ferc.gov/legal/staff-reports/06-09-demand-response.pdf (page x)
[29] http://www.greentechmedia.com/articles/read/entergy-tests-ami-voltage-optimization
[30] http://www.nema.org/Policy/Energy/Smartgrid/Documents/VoltVAR-Optimazation-Improves%20Grid-Efficiency.pdf
[31] http://www.michigan.gov/documents/energy/Powell_418130_7.pdf

2. Energy storage technologies facilitates the integration of high levels of renewable energy on the grid by smoothing out fluctuations in production due to the variable nature of wind and solar generation.
3. Energy storage improves the heat rate of fossil fuel generating units by allowing them to avoid ramping up or down in response to demand, thus letting them operate in their optimal and least-polluting range.

Energy storage is a set of technologies that should be implemented by states, in particular as they seek to install increasing amounts of renewable energy as a means of complying with building block three, as they seek to dispatch less carbon-intensive generation under building block two, and as they improve the efficiency of their existing electricity generating units under building block one.

Distributed Generation

NEMA believes America needs a plentiful and balanced supply of electrical energy to meet demand regardless of fuel source (e.g., coal, natural gas, nuclear, hydro, solar, wind, geothermal). Thus, NEMA supports EPA's inclusion of renewable energy as an option for states to meet the emission targets in the rule. Distributed generation, regardless of type, helps reduce emissions by bringing electricity on-site or near to demand, reducing transmission losses, as well as wear-and-tear on utility equipment by mitigating peak demand. In addition, with emerging technologies, distributed generation can be coupled with storage, frequency response, and voltage support equipment to help meet peak evening demand, provide ancillary services, and allow even higher levels of renewable energy integration.

We also support the rule including combined heat and power (CHP) and waste heat and power (WHP) as a source of generation that states can use to comply with emission reductions. By producing both heat and power from a single fuel source (CHP) and by capturing otherwise wasted heat from industrial processes to generate additional electricity (WHP), CHP and WHP are very efficient sources of power. CHP and WHP are proven and demonstrated approaches to lower emissions, make U.S. manufacturers more competitive, and enhance electric reliability. The Administration has already recognized these benefits and has established a national goal to encourage greater deployment of CHP and WHP. EPA should leverage the Administration's earlier action and allow states to include the use CHP and WHP in their reduction plans.

Credit for Early Movers

NEMA believes that the final rule should allow states that had energy efficiency programs or activities in place by June 2014, or that begin new programs any time before the implementation of the final rule, to receive credit towards compliance in 2020. It is our concern that states that have established programs or have programs underway may reduce or halt these programs until they can receive credit for the emissions savings these programs create.

EPA should provide early-action recognition as an incentive for earlier emissions reductions. Some stakeholders have suggested the idea of credit banking as a solution[32]. While NEMA does not have a

[32] Advanced Energy Economy, Comments on the Clean Power Plan, 2014

formal position on the solution, we do recognize EPA has experience with such programs in the past and should look to those for guidance.

For example, in its NO_X State Implementation Plan (SIP) call, EPA clearly provided states with a mechanism to allow a source that reduced emissions before the May 1, 2003 compliance start date to generate early reduction credits (ERCs).[33] ERCs were then usable to offset emissions during the compliance period. EPA also included banking provisions in its Federal Implementation Plan (FIP) to serve as a backstop for the NO_X SIP call, but also to encourage states to adopt policies such as banking in their SIP revisions.[34]

If EPA is inclined to establish a credit banking program, we suggest that the value of early energy efficiency investments is credited at a rate above 100 percent due to the higher value of near-term CO_2 reductions. In its *Synthesis Report of the Fifth Assessment Report*, the Intergovernmental Panel on Climate Change (IPCC) noted that:

> Inertia in the economic and climate systems and the possibility of irreversible impacts from climate change increase the benefits of near-term mitigation efforts (high confidence). The actions taken today affect the options available in the future to reduce emissions, limit temperature change, and adapt to climate change. Near-term choices can create, amplify or limit significant elements of lock-in that are important for decision-making. Lock-ins and irreversibilities occur in the climate system due to large inertia in some of its components such as heat transfer from the ocean surface to depth leading to continued ocean warming for centuries regardless of emission scenario and the irreversibility of a large fraction of anthropogenic climate change resulting from CO_2 emissions on a multi-century to millennial time scale unless CO_2 were to be removed from the atmosphere through large-scale human interventions over a sustained period…. Irreversibilities in socio-economic and biological systems also result from infrastructure development and long-lived products and from climate change impacts, such as species extinction. The larger potential for irreversibility and pervasive impacts from climate change risks than from mitigation risks increases the benefit of short-term mitigation efforts. Delays in additional mitigation or constraints on technological options limit the mitigation options and increase the long-term mitigation costs as well as other risks that would be incurred in the medium to long term to hold climate change impacts at a given level.[35]

By giving a higher value to earlier movers, EPA will encourage states to accomplish their CO_2-reduction goals even faster while simultaneously discouraging utilities from putting existing and planned energy efficiency policies and programs on hold.

Miscellaneous

Product Energy Efficiency Standards

NEMA and its members have a long history of working with policymakers and regulators in establishing mandatory national energy efficiency product standards that are economically justified and technically feasible. Given that the rule allows flexibility to states to find emission savings across all sectors, we do

[33] Robert A. Wyman Jr. & Janda D. R. Kuhnert, *Regional SIP Issues*, in The Clean Air Act Handbook 116 (Robert J. Martineau & David P. Novello eds., 2nd ed. 2004).
[34] *Id.* at 118.
[35] http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_LONGERREPORT.pdf (p.87)

have a concern that states could consider new energy conservation standards on products. While we support state programs to incentivize the purchase or energy efficient products, we believe mandatory energy conservation standards should remain within the province of federal jurisdiction to avoid a patchwork of conflicting state product requirements, since products are manufactured and sold on a national basis. State-by-state product energy conservation standards should not be eligible for compliance with the Clean Power Plan.

Clean Power Plan Impact on New Source Review

NEMA supports EPA giving states as much flexibility as possible to comply with the new rules through the different building blocks. One area of concern we wish to mention is the concern that certain heat rate improvements at power plants could trigger New Source Review regulations under Section 111(b) of the *Clean Air Act*, which has been a topic of discussion by many stakeholders[36]. We are encouraged to hear that EPA may offer additional flexibility in the final rule when it comes to this issue. We hope the final rule will offer a solution that will result in continued improvements at individual plants and not jeopardize future plant upgrades.

[36] http://breakingenergy.com/2014/10/09/heat-rate-improvements-can-be-challenging-for-coal-fired-plants-under-clean-power-plan/

Appendix A

December 1, 2014

SECURING GREENHOUSE GAS REDUCTIONS THROUGH PRIVATE-SECTOR DELIVERED INDUSTRIAL ENERGY EFFICIENCY UNDER EPA'S CLEAN POWER PLAN

Institute for Industrial Productivity

NEMA National Electrical Manufacturers Association

ABB

Danfoss

EATON Powering Business Worldwide

GE

Ingersoll Rand

Rockwell Automation

Schneider Electric

SIEMENS

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.

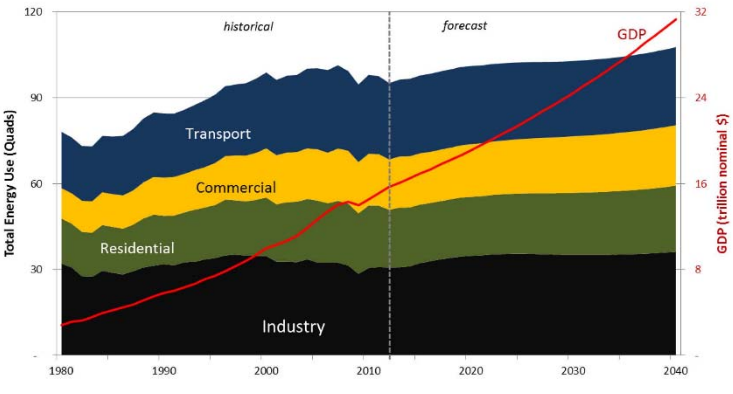
> "By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to promote American manufacturing by helping to facilitate investments in energy efficiency at industrial facilities, it is hereby ordered as follows…"
> *—Executive Order 13624 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.

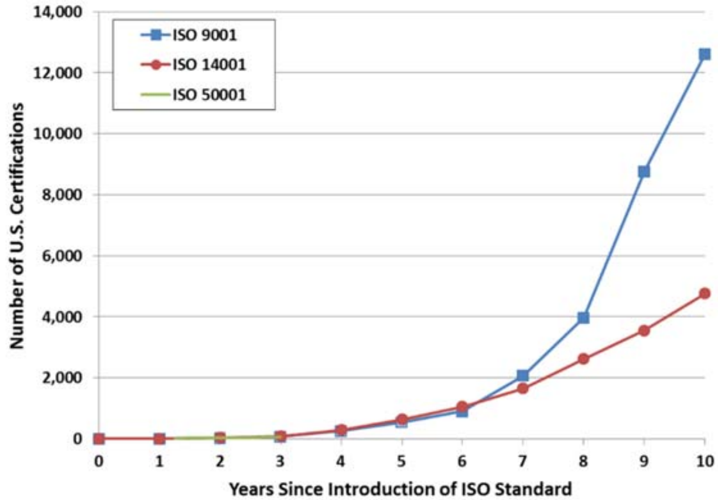
What is ISO 50001?

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).

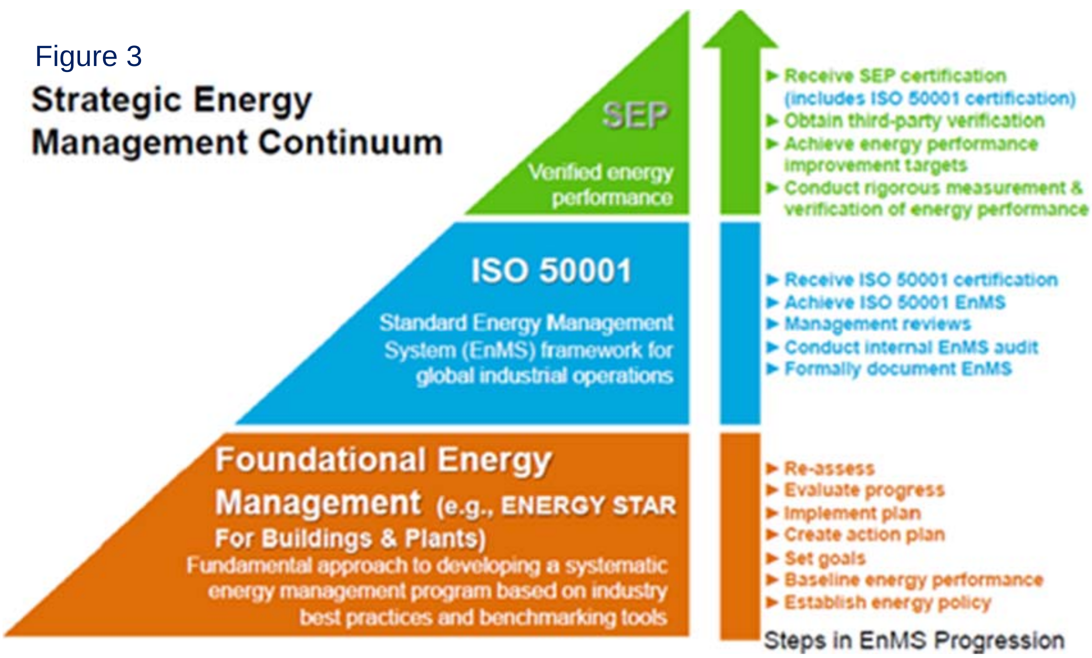
To continue SEP certification beyond three years, a facility must apply for recertification. The recertification audit may not require a Stage 1 audit unless significant changes occurred since the previous certification. To recertify, a facility must submit the SEP application six months prior to the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

Strategic Energy Management Continuum



[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

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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.

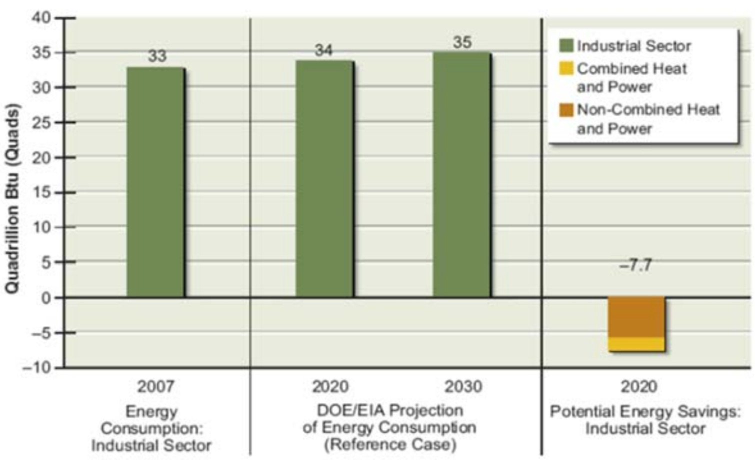
than two years for those with energy costs of $1.5 - $3 million per year).

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.

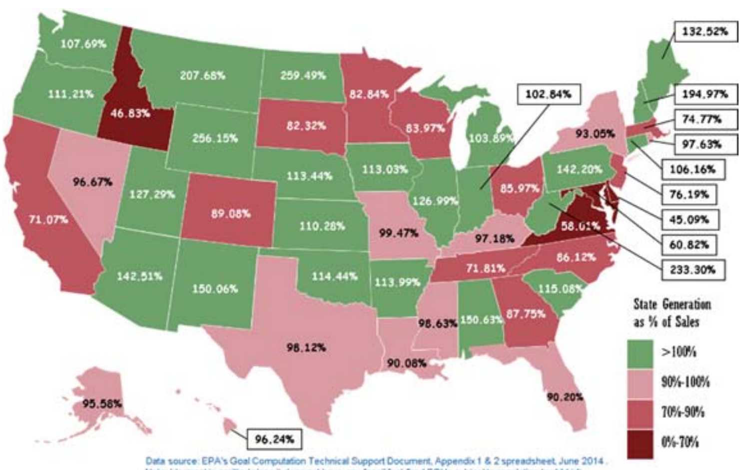
Existing Facilities/Installations. EPA proposed that RE projects constructed prior to the 111(d) proposal and implementation be eligible to contribute to 111(d) compliance despite the fact that these projects were not purpose-built for 111(d) compliance. EE savings from IEE projects should be regarded 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 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

- **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

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

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General Dynamics

"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

- **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

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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

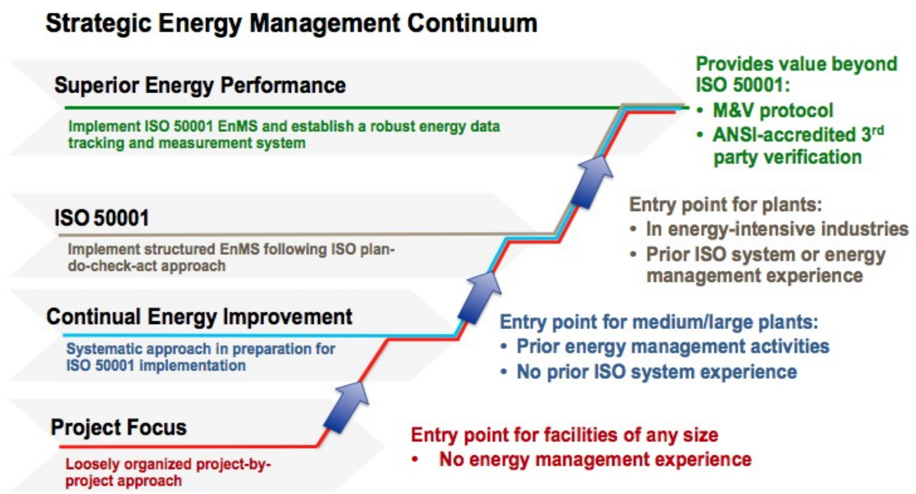
COMPANY / LOCATION	ACHIEVEMENT
CCP Composites US LLC *Houston, TX - Sept. 2013* (SEP Gold certified in 2010 with 14.9% over 3 years)	13.0% over 3 years
Cummins *Whitakers, NC - Jan. 2014*	12.6% over 3 years
General Dynamics *Scranton, PA - Apr. 2013*	11.9% over 3 years
Allsteel *Muscatine, IA - May 2012*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

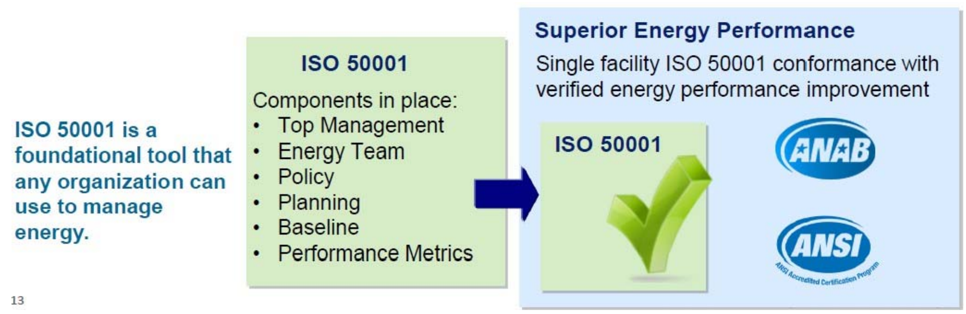
SEP Silver Certified

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

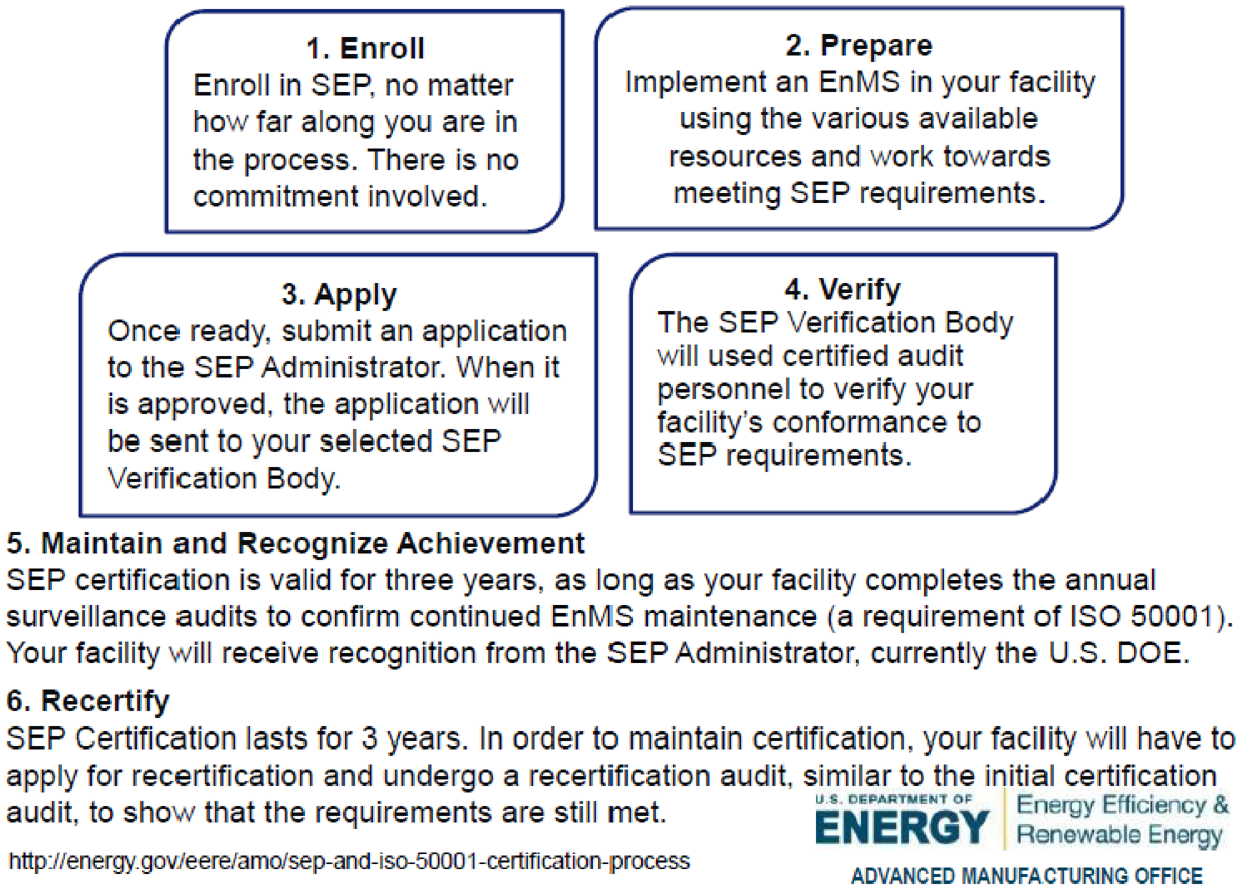




Performance Characteristics		Silver	Gold	Platinum
Energy Performance Pathway	**Energy Performance Improvement**	Meets a specified energy performance threshold over the last **3** years:		
		5%	**10%**	**15%**
Mature Energy Pathway Uses Best Practice Scorecard to earn points for energy management best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



1. Enroll
Enroll in SEP, no matter how far along you are in the process. There is no commitment involved.

2. Prepare
Implement an EnMS in your facility using the various available resources and work towards meeting SEP requirements.

3. Apply
Once ready, submit an application to the SEP Administrator. When it is approved, the application will be sent to your selected SEP Verification Body.

4. Verify
The SEP Verification Body will used certified audit personnel to verify your facility's conformance to SEP requirements.

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