



Department of Energy
Washington, DC 20585

**STATE ENERGY PROGRAM NOTICE 11-001 AND
EECBG PROGRAM NOTICE 11-001
EFFECTIVE DATE: January 21, 2011**

**SUBJECT: GUIDANCE ON BASIC BEST PRACTICES IN MANAGEMENT OF
ENERGY PERFORMANCE IN BUILDINGS**

PURPOSE: To provide guidance to the Department of Energy's (DOE's) Energy Efficiency and Conservation Grant Program (EECBG) and State Energy Program (SEP) grantees and subgrantees on implementing best practices for energy management in commercial and government buildings. In this guidance, the term "grantee" includes all grantees of SEP and EECBG, which include states, U.S. territories, local units of government, and Indian tribes. The information in this guidance is provided as technical assistance to be used by grantees and subgrantees on a voluntary basis.

This guidance highlights best practices in the area of basic benchmarking, measurement, and verification of building energy performance utilizing the ENERGY STAR program platform and the Portfolio Manager software tool developed jointly by the Environmental Protection Agency (EPA) and DOE, or an equivalent program and/or tool.

This guidance is meant to be used in tandem with earlier program guidance on program evaluation (EECBG Program Notice 10-017, effective July 21, 2010 and "State Energy Program Evaluation Guidelines" which are included as Attachment A to this guidance.)

SCOPE: The provisions of this guidance is provided to recipients of EECBG and SEP funds awarded pursuant to formula grants or the American Recovery and Reinvestment Act of 2009 (Recovery Act).

LEGAL AUTHORITY: The Energy Policy and Conservation Act, as amended (42 U.S.C. § 6321 et seq.) authorizes DOE to administer the SEP Program. Title V, Subtitle E of the Energy Independence and Security Act of 2007, as amended, authorizes DOE to administer the EECBG Program. All grant awards made under these programs shall comply with applicable law, including the Recovery Act, and other procedures applicable to these Programs.

GUIDANCE: This guidance provides technical assistance for grantees seeking to estimate energy savings in buildings through the establishment of pre-project (baseline) and post-project energy performance metrics and to measure and track ongoing energy performance of the building stock in their jurisdictions using a whole-buildings approach.

As a minimum best practice in energy management, grantees may consider measuring and tracking the weather-adjusted whole building energy performance for the buildings in which EECBG and SEP funding has been spent to improve energy performance via energy efficiency, conservation, or renewable energy project implementation. Such tracking allows the grantee to determine whether benefits continue to accrue and provides a basic platform for on-going energy usage improvement. Grantees may also consider measuring and tracking performance of all buildings they own and may consider supporting the measurement and tracking of energy performance of all buildings within their jurisdictions.

Grantees may choose to implement software or processes developed in-house or provided by a vendor to track the energy performance of their energy efficiency, conservation and renewable energy projects. An option for measuring and tracking energy performance in buildings is ENERGY STAR's Portfolio Manager Tool, available at: <https://www.energystar.gov/benchmark>.

Portfolio Manager is an interactive energy management tool that allows organizations to track and assess energy and water consumption across their entire portfolio of buildings by entering data from utility bills into a secure online environment. There is no service fee for using this tool, which is provided to the public as a government service. Note that this tool is not currently designed for use with residential buildings.

The Portfolio Manager tool is one portion of a larger ENERGY STAR program for commercial buildings, including the Guidelines to Energy Management, available at: <http://www.energystar.gov/guidelines>.

Basic Energy Performance Measurement

Grantees seeking to use data from utility bills should consider establishing a baseline energy performance of their buildings stock and should consider measuring and tracking improvements in energy performance against their benchmark. For all building types covered by Portfolio Manager, Portfolio Manager provides whole building energy performance metrics, such as Energy Use Intensity (EUI), which is an energy performance metric expressed in thousands of British Thermal Units per square foot of building space (kBtu/Sq. Ft.). For many building types, Portfolio Manager will provide a 1-100 Energy Performance Score. Grantees may select to use either a metric or the score to measure and track building energy performance.

Portfolio Manager provides a standard platform with which to measure and track the performance of improvement projects. A *baseline* should be established using energy utility data from at least twelve months *prior* to the implementation of any EECBG- or SEP-funded efficiency, conservation, or renewable energy project in the building. Building performance and improvement in *post-installation* weather-adjusted energy consumption should be tracked using energy utility data *after* the implementation of any

EECBG- or SEP-funded efficiency, conservation, or renewable energy project in the building.

Portfolio Manager technical information on topics such as required input data, energy performance metric calculation, weather-adjustment factors, and the tracking of on-site renewable energy use is available at www.energystar.gov/benchmark.

Portfolio Manager Output and Reporting

Upon properly entering energy use and building data into Portfolio Manager, the tool will provide outputs that may be used for DOE quarterly reporting in Performance and Accountability for Grants in Energy (PAGE), including energy savings, energy cost savings, square foot retrofit, on-site renewable energy generation, and greenhouse gas emission reductions. To calculate energy savings from a project impacting buildings, a grantee should consider creating a baseline of energy use by entering at least one year of data prior to project implementation and energy use after the project implementation. Using a baseline end date that corresponds to the project implementation date will allow the tool to calculate a “Change from Baseline: Adjusted Energy Use” in thousands of British Thermal units (kBtu) (see figure 1).

Grantees may consider adding up Portfolio Manager outputs from each building receiving SEP or EECBG funding and enter savings into PAGE (see figure 2).

1. For each building retrofit, upload utility bills (12 months before + after energy conservation measure) plus square foot retrofit and other data into Portfolio Manager (PM)
2. Sum up energy savings, energy cost savings, etc. calculated by Portfolio Manager and enter into PAGE

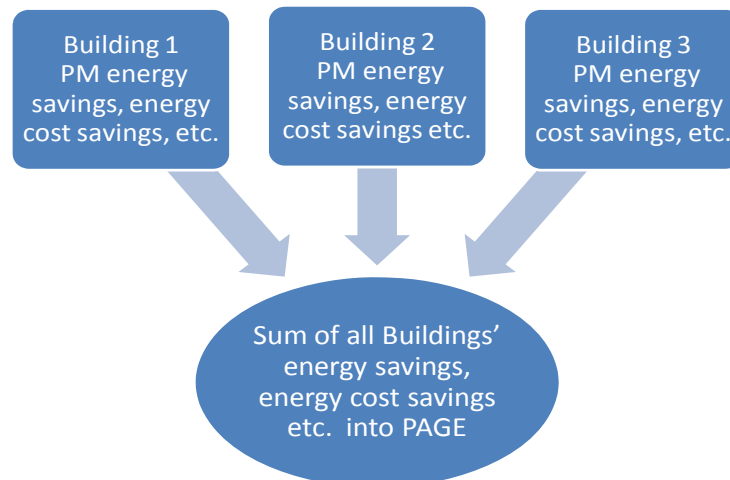


Figure 1: Concept of Summing Building Savings for Use in PAGE Reporting

Use of Grant Funds to Measure and Track Performance in Portfolio Manager

Grantees are encouraged to fund the measurement and tracking of energy efficiency using SEP or EECBG funds previously allocated to building energy audits or other activities. For example, for the EECBG Program, measuring and tracking building energy performance would be an eligible activity under Category 3 (energy audits) as part of a high-level energy audit, under Categories 5 or 6 (retrofits and energy efficiency programs) if related to other energy efficiency efforts, and under Category 13 if related to tracking of on-site renewable energy generation on or in a government building. (42 USC 17154). If Portfolio Manager output data are used for grant reporting purposes (i.e., Portfolio Manager outputs are used for reporting in PAGE), use of the tool could alternatively be considered an administrative expense. Grantees planning on reporting savings results in PAGE should consider maintaining printouts or electronic reports from Portfolio Manager in order to support reported savings and to help support evaluation of the Program.

Using Portfolio Manager to Verify and Track Progress of Improvement Projects

To facilitate verification, Portfolio Manager can generate a Statement of Energy Performance for each building, summarizing important energy information and building characteristics such as site and source energy intensity, CO₂ emissions, gross floor area, and number of personal computers. The Statement of Energy Performance, which can be verified by a professional engineer or architect, can enable grantees using Portfolio Manager to:

- Apply for the ENERGY STAR label if the building qualifies
- Satisfy LEED for Existing Buildings (LEED-EB) requirements if desired
- Support mortgage, sale, and/or lease transactions
- Document performance in energy service contracts

Communicate energy performance with tenants/owner/customers
Grantees that choose to maintain records of key Portfolio Manager outputs should consider printing reports quarterly to support later verification efforts.

Financing Retrofits – Energy Performance Contracting (EPC) and ENERGY STAR ENERGY STAR Performance Contracting Best Practices

Leveraging ENERGY STAR tools can facilitate and expedite the EPC project development process. Energy service companies (ESCOs) can use the tools to identify and prioritize buildings that have the greatest opportunity, set efficiency goals, evaluate progress and determine financial performance, working with the grantee. Grantees developing requests for proposals (RFPs) for EPCs can refer to the following document to assist in developing RFP language to incorporate ENERGY STAR into performance contracts:

http://www.energystar.gov/ia/partners/spp_res/Performance_Contracting_Best_Practices.pdf

ESCOs may use additional or alternative tools and processes to more accurately measure performance of specific retrofits or buildings in order to verify that savings resulting from the measures meet the annual savings guarantee. The International Performance Measurement and Verification Protocol (IPMVP) is commonly used and widely accepted. This does not pre-empt the use of ENERGY STAR tools as a simple, effective and independent means to track overall building performance.

http://www.energystar.gov/ia/partners/spp_res/Performance_Contracting_Best_Practices.pdf

Detailed/Advanced Energy Program Evaluation, Measurement and Verification

Grantees may consider undertaking a minimum monitoring activity to ensure the benefits of the grant persist. More detailed guidance related to Evaluation, Measurement and Verification (EM&V) of grantee projects can be found in EECBG Program Notice 10-017 available at

http://www1.eere.energy.gov/wip/pdfs/eecbg_evaluation_guidelines_10_017.pdf and the SEP Energy Program Evaluation Guidelines. More extensive EM&V would provide grantees deeper understanding of their activities and its current and future benefits in their communities. Technical Assistance resources for EM&V efforts are available to EECBG and SEP grantees; requests for resources should be directed through Project Officers. EECBG grantees with resources to conduct more sophisticated EM&V efforts may consider conducting the studies in accordance with Program Notice 10-017. SEP grantees may consider conducting EM&V activities in accordance with the SEP Energy Program Evaluation Guidelines, which are included as Attachment B to this guidance.

If there are any questions regarding SEP or EECBG guidance, grantees should contact their Project Officer.



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Attachment A: EPA Portfolio Manager User Support Resources

- To create an account and get started with Portfolio Manager, visit www.energystar.gov/benchmark and click on the “Register” link on the right under the login prompt. Here you will also find the **Benchmarking Starter Kit**, which includes a Data Collection Worksheet, a Quick Reference Guide, and animated training on how to get started with Portfolio Manager.
- Register for cost-free live and recorded training (on Portfolio Manager and other ENERGY STAR tools and resources) at: www.energystar.gov/businesstraining
- To find out more about additional ENERGY STAR resources for buildings please visit www.energystar.gov/buildings.
- For more information on what the ENERGY STAR platform offers governments, please visit: www.energystar.gov/government
- For general information about EM&V, visit EPA’s EM&V Web page at: <http://epa.gov/statelocalclimate/state/activities/measuring-savings.html>

The screenshot shows the EPA Portfolio Manager interface. At the top, there are tabs for 'My Facilities' and 'My Campuses'. Below that, a navigation bar includes 'GROUP: EECBG Sample Group', 'VIEW: EECBG View', and search options. A table displays energy data for three facilities: Department of Health, DQT Office 2, and Municipal Library. The 'Total Floor Space (Sq. Ft.)' column is circled in red. Below the table, there are download and search options.

Facility Name	Baseline Site Electric Use (kWh)	Current Site Electric Use (kWh)	Total Floor Space (Sq. Ft.)	Change from Baseline: Adjusted Energy Use (kBtu)	Annual Energy Cost (US Dollars \$)	Change from Baseline: Adjusted Energy Use (%)	Change from Baseline: GHG Emissions (MtCO ₂ e)
Department of Health	193,481.0	207,492.0	10,477	112,972	\$20,574.09	4.1	8.44
DQT Office 2	94,049.0	102,689.0	11,754	143,795	\$23,415.00	7.1	5.67
Municipal Library	140,680.0	157,385.7	10,000	180,796	N/A	11.2	11.72

Figure A1: Key Portfolio Manager Output View

Attachment B: State Energy Program Evaluation Guidelines

This guidance provides Grantees with suggested guidelines to plan and conduct evaluation efforts for State Energy Program (SEP) activities funded through the American Recovery and Reinvestment Act of 2009 (ARRA or Recovery Act). It is important that the results achieved with funds provided by the Recovery Act are documented and assessed to the extent practicable for Grantees.

The guidelines are divided into two parts. The first part is intended to guide the states' administrative and management efforts while the second part presents technical standards pertaining to the methods used to conduct program evaluations.

This document is provided as optional guidance for those SEP grantees and sub-grantees that elect to: (1) conduct their own evaluation efforts pertaining to their use of SEP/ARRA funds; and (2) follow certain of the suggested guidelines from DOE set forth herein. The guidelines contained in this document consist of recommendations, not requirements, for recipients that plan to voluntarily conduct evaluation activities.

ADMINISTRATIVE AND MANAGEMENT STANDARDS

The following recommended evaluation administrative and management standards apply to the SEP national evaluation, and are provided for use by the States who elect to conduct their own SEP/ARRA evaluations. These standards allow evaluation efforts to be implemented using a number of research approaches, provide flexibility in determining how SEP/ARRA evaluation results reporting¹ objectives are met, and avoid the necessity for states to acquire significant new staff resources or evaluation management capabilities.

1. **Evaluation Metrics:** Projects supported by SEP/ARRA funds are recommended to be evaluated via an evaluation process that focuses on reporting metrics which reflect the principal objectives of the SEP. The national evaluation will focus on the following list of metrics, and we recommend that the States focus on them as well, adding others as desired to reflect individual priorities:
 - a. Energy and demand savings
 - b. Renewable energy capacity and generation
 - c. Carbon emissions reductions
 - d. Job creation (including number, type, and duration)

Other possible metrics include, but are not limited to, economic impacts (in addition to job creation) and the adoption of new technologies.

¹ Evaluation results reporting are separate from SEP/ARRA progress reporting metrics.

2. **Independent Evaluations:** In order to obtain reliable results, programs should be evaluated independently. SEP Recovery Act evaluations should be conducted by independent evaluators who have no financial or management interests in the projects being evaluated. The evaluators should be independent professionals who do not benefit, or appear to benefit, from the study's findings, and the state program managers and administrators should have no influence on the findings of the study that is conducted.
3. **Attribution of Effects:** Evaluations of SEP Recovery Act-funded efforts should document the resulting effects (energy savings, renewable generation, carbon reductions and job creation) that are above and beyond the effects that would have been achieved without those funds. That is, studies should focus on net effects of the SEP Recovery Act initiatives. The effects of jointly funded initiatives, such as when SEP Recovery Act funds are combined with funds from other programs or financial offerings, will be allocated to the Recovery Act in proportion to the percentage of those funds in relation to total program or project funding.
4. **Evaluation Budgeting:** Evaluation budgets should be sufficient to ensure that reliable results are generated and reported. Typically, outcome evaluations require the allocation of between 2% and 8% of the program/project budget depending on the size and type of program/projects being evaluated. However, evaluation budgets also depend on the level of research rigor applied to those studies. For planning purposes, we recommend that states allocate 5% or less of their SEP Recovery Act funds for evaluation.
5. **Timing of the Evaluation:** Planning for an evaluation (identification of key metrics, research questions, data requirements, etc.) should begin at the same time that project activities are initiated. For many states, the services of an independent evaluator may not be immediately available upon project start-up, meaning that there may be a lag in the collection of baseline data regarding some important metrics. However, such data collection should begin as soon as possible and record-keeping on project expenditures and activities should start immediately. Evaluations should be structured to provide information to program managers as early as possible while still providing necessary rigor and reliability. It would be extremely helpful to the national SEP evaluation if State evaluations are structured so that initial study results are available within 12 months of the start of the evaluation.

TECHNICAL EVALUATION STANDARDS

The following technical standards are recommended for the evaluation studies to be performed on SEP Recovery Act-funded programs. The recommendations are presented in two sections. The first section presents general design and objectivity standards that focus on establishing objective and reliable approaches. The second section contains more detailed recommendations that are to be used within the evaluation research approaches applied to individual studies.

General Design and Objectivity Standards

1. **Study Design:** The development of the evaluation approach should be independent of project administrators and implementers and should be capable of being implemented within the evaluation budget available for the study. The independent evaluator should work with project administrators to understand the project and its operational processes and establish an evaluation approach that is reliable and cost conscious.
2. **Study Rigor and Reliability:** The study results should be reliable. This means that the study approach must be rigorous and capable of accurately assessing impacts using the relevant SEP metrics. The studies should be designed to fit within the evaluation budget without budget overruns, and should be conducted at the highest possible level of research rigor within that budget. The evaluation community has established a number of evaluation protocols that give substantial guidance on reliable evaluation approaches. These include the National Energy Efficiency Program Impact Evaluation Guide of November 2007, the US DOE Impact Evaluation Framework For Technology Deployment Programs of July 2007, and the California Evaluation Protocols of April 2006. These documents provide guidance on establishing evaluation approaches that represent state-of-the-art evaluation approaches. There are several other protocols that can be used to guide the design and implementation of the evaluation efforts². The evaluation

² US EPA (1995). *Conservation Verification Protocols: A Guidance Document for Electric Utilities Affected by the Acid Rain Program*; FEMP (2000). *Federal Energy Management Program (FEMP) M&V Guidelines: Measurement and Verification for Federal Energy Projects*. Federal Energy Management Program. September. Version 2.2, DOE/GO-102000-0960; ASHRAE (2002). *Measurement of Energy and Demand Savings, Guideline 14*. American Society of Heating, Refrigeration and Air Conditioning Engineers: Atlanta, GA.; Nexant and Lawrence Berkeley National Laboratory (2002). *Detailed Guidelines for FEMP M&V Option A*. Federal Energy Management Program.; AIS, SRC International (2001). *European Ex-post Evaluation Guidebook for DSM and EE Services Programmes*. International Energy Agency. April.; Xenergy, ADM Associates, VACom Technologies and Partnership for Resource Conservation (2001). *2001 DEER (Database for Energy Efficiency Resources) Update Study*. California Energy Commission. Study ID 3001.; Violette, Daniel (1995). *Evaluation, Verification, and Performance Measurement of Energy Efficiency Programs*. International Energy Agency.

- approach should be designed in a way that provides findings with the highest level of reliability achievable with the available research budget.
3. **Threats to Validity:** The independent evaluator should assess the various threats to validity for the study design and analytical approach and develop a study plan that minimizes those threats and reduces the associated level of uncertainty. Both the evaluation plan and the study report should identify these threats and describe how the evaluation approach minimizes threats to the validity of the study findings.
 4. **Alternative Hypotheses:** To the extent possible, the study design should be developed in a way that addresses alternative hypotheses regarding how observed effects may have occurred.
 5. **Ability to Replicate:** The methodological description of the study should be sufficiently detailed to allow the research design to be assessed for appropriateness by outside reviewers. The description should also be sufficiently detailed to allow the study to be replicated by other evaluation professionals.
 6. **State-of-the Art Analysis:** The study approach should, to the extent possible, use current state-of-the-art evaluation approaches that maximize the use of technical advancements and the most current analytical approaches.
 7. **Unbiased Assessment:** The evaluation design, data collection efforts, analytical approach, and reporting of results should be objective and unbiased. Unsubstantiated claims or unsupported conclusions or personal points of view should be excluded and the study results should be based on objective data/information analysis.
 8. **Attribution of Effects:** The study should focus on identifying the outcomes of the project in question and identify the net effects that can be attributed to the SEP's implementation and support efforts.
 9. **Use of Skilled Professionals:** The evaluation should employ and be led by evaluation professionals who are trained, skilled, and practiced within the area of research associated with the study being conducted.
 10. **Conflict of Interest:** Evaluators must disclose any real or perceived conflicts of interest that they might have and the grantee should have an effective plan to manage conflicts.

Study Design and Application Standards

1. **Evaluation Expertise:** The evaluation planning and implementation efforts should be directed, managed and implemented by skilled evaluation professionals experienced in the specific areas of evaluation to which they are being used to support the SEP Recovery Act evaluation efforts. Inexperienced staff should be well supervised and their work reviewed by experienced evaluation professionals for objectivity and accuracy.

2. **Study Plan:** Each evaluation should have a detailed study plan that identifies how the evaluation is to be conducted, specifying the individual tasks within the study to be completed. The study plan should also specify how data will be collected, describe processes to assure objectivity and accuracy, and identify the analytical approach to be applied for each of the four types of evaluation metrics (jobs created, carbon saved, energy generated and energy saved).

3. **Study Report:** If a study report is produced by the grantee, the grantee is highly encouraged to provide a copy to the appropriate DOE SEP Project Officer and include an Executive Summary of the results of the study. The Executive Summary should contain a table presenting:
 - a. The net energy savings impacts for each year over the effective useful life of the actions attributable to the energy programs and projects supported by SEP Recovery Act funds
 - b. The renewable capacity installed and the annual renewable energy generated and projected to be generated each year over the effective useful life of the installed capacity;
 - c. The net tons of carbon not released into the atmosphere over the effective useful life of the projects implemented;
 - d. The number and type of short term and long term full time and part time jobs generated as a result of the programs and projects supported by SEP Recovery Act funds; and
 - e. The results of the SEP Recovery Act cost effectiveness test applied to the energy impacts achieved.

4. **Sampling:** All studies that rely on sampling approaches for collecting data to drive the impact analysis objectives should, to the extent possible, use procedures that minimize bias and maximize the sample's representativeness of the targeted population. Sampling should be structured to be no less rigorous than a 90% level of precision with a confidence limit of plus or minus 10% for the key attributes on which the sample is being selected.

5. **IPMVP Field Efforts:** Field measurements of equipment baseline and post-retrofit or post installation operations should be conducted using one of the four primary data collection protocols specified in the IPMVP (International Performance Measurement and Verification Protocol). This protocol describes the types of field data collection typically used by the evaluation industry to obtain measurements needed to calculate energy impacts. This protocol describes IPMVP options A, B, C, & D for both single project end use and whole building actions. The IPMVP requires that key performance indicators that drive the estimates of program impacts should be collected via on-site metering, monitoring and verification efforts. The protocol requires measurements to be collected that represent key savings calculation indicators.
6. **Survey and Interviews:** When surveys and interviews are used to collect data from which impacts are calculated, the questions should be objective, unbiased and non-leading. Closed-ended, scaled, or quantitative response questions should be structured to allow a full range of applicable responses. Open-ended questions should be single subject response questions that allow for a complete response. Complex questions that require a preamble to set a stage for a response consideration should be avoided to help assure that the response is objective and not guided toward a specific outcome.
7. **Cost Effectiveness Test:** The SEP Recovery Act Financial Assistance Funding Opportunity Announcement of March 12, 2009 published by the DOE specifies that “Each state portfolio of projects funded by SEP ARRA grants should seek to achieve annual energy savings of at least 10 million source BTUs for each \$1,000 of total investment.³” This cost effectiveness test means that, on average across each state’s portfolio of programs, the energy impacts to be achieved should be no less than 10 million source BTUs⁴ per year per \$1,000 of SEP Recovery Act funds spent. These energy savings will recur each year over the effective useful life of the actions induced by the state’s portfolio. The evaluations conducted using SEP Recovery Act Funds should calculate and report the results from this test for the projects evaluated. The evaluation report should present the results of this cost effectiveness test in the Executive Summary of the report and present the calculation approach in the test in enough detail that the test can be replicated from the information presented in the evaluation report. This test is called the SEP Recovery Act Cost Test (SEP-RAC test). There are no other cost effectiveness test requirements for SEP Recovery Act project portfolios. The cost effectiveness

³ See: Energy Savings, Section 5.7, page 28.

⁴ Source BTU: The energy content of the fuel needed to supply the energy saved, For example, end use natural gas savings has a BTU content of about 100,000 BTUs per therm; the BTU content of electric savings will depend on the fuel source of the energy saved and the generation efficiency of the power plant to which the savings apply. A coal fired plant that is about 33% efficient would save about 10,000 BTUs per kWh saved. A savings of electricity from a hydroelectric power plant would have no BTU savings and no carbon savings because carbon fuel is not burned to provide the kWh saved.

test normally required within state regulatory environments that are focused on least cost net present value energy supplies do not apply to the SEP Recovery Act projects. DOE's objective is to achieve deep lasting savings that provide net energy efficiency, renewable energy, carbon reductions and job impacts well into the long-term future of the United States.

8. Comments and questions relating to the above standards (both administrative and technical) should be addressed to Faith Lambert at 202-586-2319 or faith.lambert@ee.doe.gov.