# Credit Where Credit Is Due: Incorporating Building Efficiency into State Implementation Plans

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## ABSTRACT

On multiple occasions, the U.S. Environmental Protection Agency (EPA) has endorsed end-use energy efficiency as a low-cost, rapidly deployable mechanism to help states meet air-quality standards. By implementing efficiency programs, as well as receiving credit for policies and programs already on the books, states can inexpensively satisfy EPA emission regulations. In particular, EPA has endorsed the incorporation of energy efficiency measures in state implementation plans as a means of achieving National Ambient Air Quality Standards.

However, despite EPA endorsement, as well as a wealth of resources addressing the topic, states may be hesitant to embark on what they view as an unclear path. This paper serves to illuminate the process of obtaining State Implementation Plan (SIP) credit for energy efficiency policies and programs by providing a template for states that draws from provisions in approved SIPs and EPA guidance.

By correctly using the template, states may be able to incorporate efficiency programs and policies targeting buildings into their SIPs, claim credit for the associated emissions reductions achieved through decreased fossil fuel consumption, and thereby lower the cost of complying with government regulations. This document outlines the steps a state should consider to draft a SIP that includes energy efficiency. A description of the SIP template and a model provision created using the information contained in this document are available separately at http://www.aceee.org/123-solutions.[1]

## Introduction

End-use energy efficiency has been cited multiple times as the least-cost, most rapidly deployable mechanism for reducing air pollution and lowering energy consumption (NAPEE 2009; Neubauer et al. 2013; NRDC 2013; McKinsey and Company 2010). At present, 25 states have in place some form of energy efficiency resource standard (EERS), with many other states embracing a myriad of other energy efficiency policies and programs (ACEEE 2014). Additionally, demand-side management energy efficiency programs have experienced high levels of growth over recent years, with total program budgets rising roughly $4 billion nationwide from 2008–12 (Downs et al. 2013). However, despite the growing prevalence of energy efficiency policies at the state, local, and utility level, very few jurisdictions have successfully taken credit for the emissions reductions attributable to energy efficiency in plans for meeting National Ambient Air Quality Standards (NAAQS).[2] States are required to submit

[1] Users of this template are strongly encouraged to work closely with their EPA regional offices. What is offered here is merely a template representing ACEEE's interpretation of EPA guidance; the exact requirements needed for an approvable SIP may vary by region. You should modify the template as appropriate to accommodate those variations.

[2] Jurisdictions that have successfully included energy efficiency/renewable energy measures in SIPs include: Washington, D.C., region (1-hour and 8-hour ozone), Texas (Dallas/Fort Worth, 8-hour ozone), Louisiana

State Implementation Plans (SIPs) to EPA regional offices that map out a concise strategy for improving or maintaining current levels of air quality in order to comply with NAAQS. These plans are then subject to EPA approval and oversight during implementation.

The purpose of this paper is to supplement EPA guidance on the incorporation of energy efficiency into SIPs by providing states with a template tool to aid in drafting SIP provisions containing energy efficiency policies and programs. This template is intended to outline the steps/processes, language, documentation, and planning required on the part of states to satisfy what has been expressly laid out in previous EPA guidance.[3] This paper is the second in a series of SIP Templates. The first iteration of this concept was released on March 13, 2014, and, in addition to general guidance and instruction, it focused on the drafting of a model SIP provision for a state EERS (Herndon, Hayes, and Robinson 2014).

The focus of this iteration of the SIP Template is on the crediting of emission reductions from state programs and policies aimed at improving the efficiency of buildings. In the United States, commercial and residential buildings account for roughly 40% of total energy consumption, over 70% of electricity consumption, and nearly 40% of greenhouse gas emissions (EIA 2014). These numbers can be decreased through a variety of measures, such as improving building energy codes, building retrofit programs, and utilizing energy savings performance contracts (ESPCs). However, how these different measures may be included for emissions reduction credits in a SIP varies depending on the specifics of the measure in question. These variations will be examined closely in the following sections.

## Steps to Crediting Energy Efficiency in a State Implementation Plan

The following section contains information and resources designed to aid states in their preliminary considerations as they begin the process of working to incorporate energy efficiency into their SIPs. The five recommended steps that are detailed below provide a pathway for states to follow.

### Step 1: Develop a Preliminary Estimate of Potential Emission Reductions

In order to determine the value of proceeding with the incorporation of energy efficiency into a SIP, a state may first look to develop a preliminary estimate of potential energy savings and emissions reductions that may be attributable to energy efficiency policies or programs. This initial estimate may be developed using ACEEE's Energy Efficiency and Pollution Control (EEPC) Calculator.[4] The EEPC tool presents an order-of-magnitude calculation of the nitrogen oxide ($NO_x$), sulfur dioxide ($SO_2$), mercury, and carbon dioxide ($CO_2$) emissions that could be

(Shreveport, 8-hour ozone), and Connecticut (8-hour ozone). More information on these SIPs can be found in Appendix K of EPA's *Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans* (EPA 2012).

[3] This work product is not intended to represent an exhaustive account of what is required by EPA regional offices from states in submitting SIP provisions. This work product is only intended to serve as a resource for states to aid in this process. It exists as a working document and may be subject to change.

[4] For more information on ACEEE's EEPC Calculator, visit: http://www.aceee.org/fact-sheet/ee-pollution-calculator.

reduced from several energy efficiency measures. The tool is engineered to present state-specific results and is made available online here: www.aceee.org/research-report/e134.[5]

In pursuing a more sophisticated analysis of the emissions reductions attributable to energy efficiency, states may look to EPA's recently released AVoided Emissions and geneRation Tool (AVERT). Through the use of AVERT, states can determine the effectiveness of state and regional efficiency efforts in the reduction of $NO_x$, $SO_2$, and $CO_2$ from electric power plants. AVERT is capable of presenting county-level data on avoided emissions based on temporal energy savings and hourly generation profiles. With the concurrence of the appropriate EPA regional office, AVERT modeling results may even be acceptable to include in air-quality modeling for SIPs. AVERT is available for free online here: http://epa.gov/avert.

**Step 2: Bring Together Relevant State Agencies**

At the beginning of the process, it may be best to inform and involve all pertinent parties. This step serves to establish relationships between agencies, avoid confusion, identify relevant policies, and otherwise coordinate the effort. Some examples of groups state or local environmental agencies may seek to include are:

- State air regulators
- State governor's office
- State energy office
- Public utility regulators
- Utilities
- Regional EPA representatives
- Regional transportation organization and independent system operator

In addition to bringing together these groups, states may also find it useful if each stakeholder agency becomes familiar with the following concepts early on in the process to better facilitate interagency dialog:

- Features of the electric system
- Data sources used for generation and demand forecasts in air-quality modeling
- A state's methodology for estimating energy savings
- Roles and responsibilities of key state energy-related organizations
- State, tribal, and local energy efficiency/renewable energy (EE/RE) policies and programs in the jurisdiction
- Estimating potential emission reductions
- Understanding existing EPA energy efficiency and renewable energy SIP guidance
- Common key environmental and energy terms

[5] It should be noted that ACEEE's EEPC Calculator is intended only for formulating an order-of-magnitude estimate for the emissions benefits that may be attributable to energy efficiency policies and programs. To satisfy EPA requirements for a demonstration of attainment, a more sophisticated analysis will be needed. The EEPC Calculator can help states determine if energy efficiency measures will yield emissions reductions substantial enough to merit a more sophisticated analysis.

Stakeholder agencies may want to consider the following preliminary questions before proceeding. Having this information easily accessible may prove useful throughout the entire process:[6]

- What energy efficiency policies and programs has the jurisdiction already adopted?
- What are the details of those policies and programs in terms of implementation dates, stringency, financial commitments, historic investments in energy efficiency, and important enforcement features?
- Is there any information on the energy impacts (projected and/or historical) of those energy efficiency policies in terms of energy saved and air emission impacts?
- Which organization or agency monitors and evaluates the energy impacts of those energy efficiency policies?
- Are program/policy impacts regularly/consistently reported to the state? How consistent and rigorous are these estimates?
- What funding sources do the EE policies and programs depend upon?
- What compliance and enforcement does the state use for EE policies?

**Step 3: Consider Potential Policies and Programs to Pursue**

When considering potential energy efficiency policies or programs to pursue for incorporation into a SIP, states may consider policies that have already been in place for some time, new policies, or policies that are emerging or being developed. States can take credit for emissions reductions they are already getting from current programs, or use the SIP process to spawn new efficiency efforts. A number of energy efficiency policies targeting buildings can be incorporated into SIPs in different ways. The following are just a few examples of policies and programs related to buildings that states may look to include in their SIPs.

*Energy Savings Performance Contracts (ESPCs):* A contract entered into between a state or local government and a third-party energy service company (ESCO). The government contracts an ESCO to finance and install energy-efficient technologies at a single site, campus, or across a building fleet. The ESCO generally pays upfront capital costs for the efficiency improvements (which may include the installation of new windows, high-efficiency heating and cooling systems, or distributed generation technologies) and maintains ownership of the financed materials. The government then repays the capital costs paid by the ESCO from a portion of the energy savings attributable to the improvements.[7]

*Mandatory Rating and Disclosure Policies:* States and municipalities may enact legislation that requires the owners of buildings to assess and document building energy performance prior to the sale of a property. The results of said assessment are then disclosed to potential purchasers in order to inform their decisions. Policies such as these enable tenants, building owners, and potential buyers to assess the energy consumption of a property and develop educated determinations of measures that may be necessary to improve site energy

[6] A table of "Common 'Getting Started' Questions and Answers" is available in the *Roadmap*, page 24, Table 1: http://www.epa.gov/airquality/eere/pdfs/EEREmanual.pdf (EPA 2012).

[7] More information on ESPCs can be found here: http://energy.gov/eere/femp/articles/energy-savings-performance-contracts.

consumption. Currently, New York City, California, Washington, D.C., Austin, TX, and Washington State all have mandatory rating and disclosure policies in place.[8]

*State Lead-by-Example Initiatives:* States and local governments may enact initiatives that commit government buildings to a wide array of retrofits to improve energy efficiency. Governments may look to target municipal buildings, public schools, or government operations in general for cost-effective energy efficiency measures. By reducing the energy consumption of government facilities and operations, states stand to save taxpayers money while simultaneously reducing harmful emissions.

*Grants, Loans, and Tax Credits for Private Commercial and Residential Building Efficiency Improvements:* State and local governments may wish to incentivize energy efficiency improvements in privately owned commercial and residential buildings through the use of project grants, low-interest loans, and tax credits for investments in energy efficiency. These incentives can be applied to either green building practices or private retrofits. By monitoring program participation, state and local governments can report estimates of avoided energy consumption to EPA.

*Building Energy Codes:* State adoption of building energy codes can be very effective at lowering the energy consumption of new commercial and residential structures. Building energy codes are regulations adopted by state or municipal governments that mandate that building components meet certain standards of energy efficiency. Many of the impacts of existing building codes are included in baseline emissions and electricity demand forecasts from the Energy Information Administration's *Annual Energy Outlook* (*AEO*). Therefore, if a state is using *AEO* as a starting point for baseline projections, only updates that will increase energy savings beyond those forecasts should be claimed.[9]

When considering any of the above options, states should keep in mind any overlap that may occur among various policies and programs in order to avoid double counting emissions reductions. States can claim SIP credit for emissions reductions from energy efficiency at the measure, program, policy, or portfolio level. However, attention should be paid to how certain policies and programs interact to avoid misrepresenting actual achieved emissions reductions. For example: A variety of energy efficiency programs may be generated from compliance with a statewide EERS policy, such as utility-operated demand-side management programs or retrofit policies for buildings. States should not claim separate credit for savings that result from an EERS and a utility-run building retrofit program if the savings from the retrofit program are already included in the emissions reductions estimated for the EERS.

**Step 4: Pick an Implementation Pathway**

Once a particular policy or program has been deemed appropriate to be included in a SIP, states may then refer to the four implementation pathways laid out in the EPA *Roadmap*. States may follow these four distinct pathways as a framework for including energy efficiency policies in SIPs. Pathways should be chosen based on the specifics of the measure in question. Each

[8] Because the emissions impacts of these policies may be difficult to directly quantify, a state may look to include them through the weight of evidence pathway discussed in the next section. More information on building rating and disclosure policies can be found here: http://www.buildingrating.org/content/rating-disclosure.

[9] Other tools are available for developing a state's electricity sales and emissions forecast; however, they must be approved by EPA for use in this context. A state should make every effort to understand what energy efficiency policies are embedded in whatever forecast they use.

pathway has its own documentation requirements and analytical provisions. These four pathways are detailed below.[10]

*Baseline Emissions Projection Pathway:* This approach is best for policies that are already in place. The air-quality benefits of those policies can be estimated and included in a "baseline" air-quality forecast against which the emission reductions from the SIP are compared to determine if a state is likely to attain air-quality goals. This approach does not require federal enforceability of the policy and emissions impacts can be estimated using energy models that reflect impacts on the power plant system as a whole.[11]

*Control Strategy Pathway:* This approach is best for new policies that will be adopted before the SIP is submitted, but were not factored into baseline emissions forecasts. This pathway has more stringent requirements, such as a requirement that policies be federally enforceable, and documentation must show that the policy is permanent, quantifiable, enforceable, and surplus. Though documentation requirements are more stringent, there is no limit on the amount of emission reduction credit that may be earned.[12]

*Emerging/Voluntary Measures Pathway:* Voluntary policies or emerging policies are those that have effects that may be difficult to quantify. This approach does not require federal enforceability of the policy and multiple policies may be bundled into a single submission and considered as a whole. Voluntary/emerging measures can generally be credited for up to 6% of the emissions reductions required to reach attainment unless a compelling case can be made that more credit is appropriate.[13]

*Weight of Evidence Pathway (WOE):* This approach is best suited for policies in a jurisdiction that is on the border of attaining air-quality standards and can be used to "tip the scale" in favor of the state's plan. The WOE pathway may be used by states when modeling the impacts of the policy or program is either too resource intensive or not feasible in order to show that, had the policy or program been included in air-quality modeling, the jurisdiction may have achieved the required NAAQS.[14]

Although largely dependent on the details of a specific policy, in the case of new building efficiency programs, the emerging/voluntary measures pathway or the weight of evidence pathway may often be the best options for incorporating these measures into a SIP.[15] Typically,

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[10] The four pathways for implementing energy efficiency policies into SIPs are first discussed on page 14 of the *Roadmap* (EPA 2012).

[11] When calculating emissions reductions from energy efficiency policies over a baseline emissions forecast, it is important to consider which policies are already accounted for in baseline projections in order to avoid double counting and ensure real reductions are being claimed. Some baseline emissions forecasts may already take into account, or make assumptions about, a variety of energy efficiency policies, such as the effects of building codes, appliance standards, or federal funding for energy efficiency. For more information on the baseline emissions projection pathway, see Appendix E of the *Roadmap*, available here: http://www.epa.gov/airquality/eere/pdfs/appendixE.pdf (EPA 2012).

[12] For more information on the control strategy pathway, see Appendix F of the *Roadmap*, available here: http://www.epa.gov/airquality/eere/pdfs/appendixF.pdf (EPA 2012).

[13] For more information on the emerging/voluntary measures pathway see Appendix G of the EPA *Roadmap*, available here: http://www.epa.gov/airquality/eere/pdfs/appendixG.pdf (EPA 2012).

[14] For more information on the weight of evidence determination pathway (WOE), see Appendix H of the EPA *Roadmap* available here: http://www.epa.gov/airquality/eere/pdfs/appendixH.pdf (EPA 2012).

[15] Because the WOE pathway is not usable for claiming emissions reductions credits due to the difficult nature of the verification and quantification processes involved, further discussion of this pathway has been omitted from the Template. However, the WOE Pathway may remain very useful to states in situations where the emissions reductions attributable to a certain program are difficult or unrealistic to quantify, yet should not be discounted for SIP purposes.

EPA recommends that "on-the-books" policies be included using the baseline emissions projection pathway; however, some existing building efficiency measures may not be included in baseline emissions projections (as are building energy codes) because they lack "the same high level of certainty as traditional measures for quantification purposes" (EPA 2012, p. 37). Additionally, the documentation requirements for inclusion of an energy efficiency measure through the baseline emissions projection pathway or the control strategy pathway may be more stringent and resource intensive than is warranted for the emissions reductions attributable to these programs.

Many building efficiency efforts are initiatives taken on by a state or local government to encourage or require citizens, businesses, or themselves to reduce energy consumption. Building efficiency programs are often best suited for the emerging/voluntary measures pathway or the weight of evidence pathway because they are typically "not enforceable against an individual emissions source or a party responsible for implementing the EE/RE activity" (EPA 2012, p. 37). However, these programs still may act as a valuable contributing resource to demonstrating attainment of NAAQS.

**Step 5: Satisfy Pathway Requirements by Gathering the Necessary Information and Documentation**

When attempting to receive credit for emissions reductions for measures incorporated into a SIP submission through the emerging/voluntary measures pathway, a jurisdiction must present evidence that it has met or will meet these requirements. While gathering information to fulfill these requirements, it may be necessary to consult often with the appropriate EPA regional office to ensure that the jurisdiction is providing acceptable documentation meeting these requirements. EPA guidance documents that lay out the requirements for energy efficiency and/or renewable energy measures to qualify for SIP credit through this pathway are detailed below.

*Permanent:* States are obligated to show that the emissions impacts expected from the measure will continue through the future attainment date. If a measure will not be fully implemented by the future attainment date yet still is necessary to reach attainment, the state needs to demonstrate that an equivalent amount of emission reductions will be achieved by a replacement measure.

*Surplus*: Emerging/voluntary measures must be additional to measures included in the baseline emissions projection in order to receive credit (no double counting).

*Enforceable:* State responsibility for measure enforcement includes a commitment to implement the measure, monitor and evaluate the effectiveness of the measure, and report on progress at least every three years. If the measure does not achieve the projected emission reductions, the state must remedy any SIP shortfall by providing for emission reductions to come from other sources.[16]

[16] Under the control strategy pathway, a state must show evidence that the measure is mandatory and given legal authority by adequate legislation/regulations from the appropriate governing body. Private sources of emissions, such as regulated utilities, can be held legally liable for noncompliance. In order to be included as a control strategy, measures must be federally enforceable in the case of a shortfall, meaning the measure must possess: independent verifiability, defined violations with identifiable liability, practicable enforceability, and authority for the state to apply penalties and secure corrective action against emission sources or other involved entities.

*Quantifiable:* In order for a policy or program to be considered quantifiable, it must have a measureable effect on emissions, and these calculations must be replicable.[17]

States should look to evaluate emerging/voluntary measures over time and monitor the programs to ensure that emission reduction targets are met and the established rate of progress is kept. Some states may already have evaluation, measurement, and verification mechanisms in place. States will need to document program quantification schedules and practices and convey in their SIP that the program will be reasonably monitored and emissions reductions will be adequately calculated.

In order to quantify the emissions reductions attributable to improved building efficiency through the emerging/voluntary measures pathway, it is best to begin with an estimation of the electricity consumption displaced by the measure in question. For some measures this process will be difficult. Measures based on voluntary participation, such as tax incentives and grants for efficiency retrofits, will need to have estimations generated of expected participation levels and the energy savings attributable to a fully implemented program. In the case that actual program participation falls short, the state will be obligated to enact supplementary measures as a remedy.

Once program participation and the attributable energy savings are estimated, the state will need to develop an estimation of avoided emissions. EPA recommends a capacity factor approach for estimating emissions reductions from emerging/voluntary measures. This approach is based on predicting which electricity generators will be displaced from reductions in electricity consumption caused by energy efficiency. More information on this approach can be found in Appendix I of the *Roadmap.*

## Additional Resources

The Regulatory Assistance Project released a paper in August 2013 entitled *Quantifying the Air Quality Impacts of Energy Efficiency Policies and Programs*. This paper outlines various methodologies available to states for quantifying emission reductions and addresses many of the issues that may come up throughout this process. It is made available online here: www.raponline.org/document/download/id/6680.

A series of webinars were released in 2012 by the Regulatory Assistance Project discussing the measurement of the air-quality benefits of energy efficiency. These webinars are available for download here: http://www.raponline.org/event/measuring-the-air-quality-impacts-of-energy.

In 2011, EPA released a resource for states entitled *Assessing the Multiple Benefits of Clean Energy*. Chapter 4 of this document provides valuable information on assessing the air-quality benefits of energy efficiency and other clean energy initiatives. This document can be found here: http://www.epa.gov/statelocalclimate/documents/pdf/epa_assessing_benefits.pdf.

As mentioned previously, through the use of EPA's recently released Avoided Emissions and Generation Tool (AVERT), states can determine the effectiveness of state and regional efficiency efforts in the reduction of $NO_x$, $SO_2$, and $CO_2$ from electric power plants. AVERT is capable of presenting county-level data of avoided emissions based on temporal energy savings and hourly generation profiles. With the concurrence of the appropriate EPA regional office,

[17] A comprehensive examination of the techniques available to quantify the emission reductions attributable to energy efficiency measures can be found in Appendix I of the *Roadmap*, available here: http://www.epa.gov/airquality/eere/pdfs/appendixI.pdf (EPA 2012).

AVERT modeling results may even be acceptable to include in air-quality modeling for SIPs. AVERT is available for free online here: http://epa.gov/avert.

For modeling the impacts of energy efficiency on the electric grid at a high level of sophistication, states may look to employ the National Risk Management Research Laboratory's Market Allocation Model (MARKAL). MARKAL is capable of developing future scenarios of energy system development and emissions subject to projected shifts in end-use demand. Additionally, MARKAL outputs include an economic component with total system costs and future projections of energy commodity prices. More information on modeling with MARKAL is available here: http://www.epa.gov/nrmrl/appcd/climate_change/pdf/MARKAL_handout_final.pdf.

ACEEE has made available to states a wealth of resources that aim to simplify and streamline the incorporation of energy efficiency into a SIP. The 123 Solutions for States page, available at http://www.aceee.org/123-solutions, houses many of these resources, including the Energy Efficiency and Pollution Control Calculator mentioned earlier. Additionally, a similar iteration of this template exists that examines the incorporation of a new energy efficiency resource standard into a SIP. This can be found here: http://www.aceee.org/files/pdf/sip-template-0314.pdf.

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