



Roadmap for Incorporating Energy Efficiency/Renewable Energy Policies and Programs into State and Tribal Implementation Plans

Appendix D: Understanding State Energy Efficiency
and Renewable Energy Policies and Programs

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SECTION D.1: INTRODUCTION

States have adopted and implemented a wide range of policies aimed at increasing the quantity of energy efficiency and renewable energy (EE/RE) resources. These policies have been implemented for many reasons including energy security, resource diversity, economic development, reducing exposure to volatile fuel prices, and improving air and water quality and public health. This appendix provides a general description of common EE and RE policies, and provides key questions for government officials to consider when evaluating whether it makes sense for state, tribal or local agencies to account for the future impacts of EE/RE policies in a State Implementation Plan/Tribal Implementation (SIP/TIP). (Appendix K provides information on states that addressed EE/RE policies and programs in their SIPs for the 1997 8-hour ozone National Ambient Air Quality Standards (NAAQS) and states that are considering incorporating EE/RE programs and policies in their SIPs in the future.)

In general, RE policies support such technologies as wind, solar, biomass, and hydro power, among others. Energy efficiency policies increase the adoption of technologies that reduce energy demand at the user site, such as high efficiency lighting or heating, ventilating, and air conditioning systems. However, certain applications like Combined Heat and Power (CHP) may be eligible under either policy depending on the state. For example, the Connecticut considers CHP as a RE technology under its renewable portfolio standard (RPS), while New York relies on EE funds to directly support CHP projects.

SECTION D.2: OVERVIEW OF STATE RENEWABLE ENERGY POLICIES

Renewable Portfolio Standard Policy Overview

The RE policy highlighted in this appendix is the state renewable portfolio standard (RPS), which generally places an obligation on electricity providers in a state to derive a specified percentage of their electricity sales from renewable energy. States may have other RE policies, including surcharges on customer electricity bills that fund RE projects, financial and tax incentives that encourage businesses and residents to install RE projects on their sites, and tax incentives that attract RE businesses to a state. Renewable portfolio standards are emphasized here because, when implemented, the RE policy impacts the operation of large numbers of power plants and can potentially decrease emissions from that sector in a particular state or power pool.¹

Renewable portfolio standards are typically overseen and enforced by public service commissions. (For more information on RPSs and other state RE policies, see EPA's Guide to Action (Chapter 5) and other resources highlighted in section D.6 of this appendix.) As of this writing, 29 states have some form of a RPS on the books.² Seven others have voluntary RE goals. However, there are significant differences between state policy designs. For example, the Massachusetts has very aggressive RPS requirements. Its policy requires that 15 percent of the state's electricity demand come from Class I renewable resources (e.g., wind, solar, hydro,

¹ A power pool is an association of two or more interconnected electric systems having an agreement to coordinate operations and planning for improved reliability and efficiencies.

² For more information, go to: <http://www.dsireusa.org/>.

landfill gas) by 2020, and the requirement increases 1 percent per year thereafter. The Massachusetts policy allows RPS obligations to be satisfied by imports from other states and power pools.

State RPS policies can differ in key respects:

- The quantity of RE that utilities must procure as a percentage of the total annual electricity sales
- The definition of what energy sources qualify as renewable
- Exemptions for retail providers (covered entities)
- Whether EE and/or CHP can qualify for RPS
- The geographic location where the RE facilities need to be located
- Vintage restrictions to determine the eligibility of facilities (e.g., hydro facilities that existed prior to the RPS being enacted)
- Penalties that utilities must pay if they do not meet the RPS
- Mechanisms for tracking certificate generation and compliance with targets
- Size, ramp-up, and timetable of the targets
- Existence and design of cost containment mechanisms

Incorporating Renewable Portfolio Standards Policies in State Implementation Plans

In order to incorporate an RPS in a SIP, the state needs to understand the details of its RPS, and its impacts on the operations and emissions of fossil fuel fired power plants that affect its state. This can be illustrated using the basic example of an RPS that leads to the construction of RE facilities such as wind farms. Since technologies have not yet developed to store significant quantities of electricity, when a wind plant is generating electricity, a local fossil plant will then be backed off, producing emission benefits. The location of the fossil fuel generation that is “backed off” is more important than where the wind generation is located. However, it will be easier to demonstrate localized emission benefits if a state’s RPS requires that RE be produced locally (within a state or power pool); if the state allows RE to be imported from far away (such as across the country), the local emissions benefit becomes harder to prove.

Jurisdictions interested in incorporating RPS policies in SIPs should note that the Energy Information Administration’s Annual Energy Outlook (AEO)³ already factors most “on-the-books” state RPS programs into its reference case energy forecast. For example, the AEO 2010 includes state RPS policies which were in place as of September 2009. As a result, state emission forecasts that use EPA’s version of the Integrated Planning Model (IPM)⁴ (which uses the same state RPS assumptions as the AEO) will already have state RPS policies reflected in the forecast. As a result, state and other agencies using EPA’s version of IPM should not do additional work to include the RPS in their SIPs since that could result in double counting.

³ For more information, go to: <http://www.eia.gov/forecasts/aeo/>.

⁴ For more information, go to: <http://www.epa.gov/airmarkt/progsregs/epa-ipm/index.html>.

If there are instances where RPS targets are not met, many states provide an “off ramp,” an alternative compliance mechanism or payment to the state by the non-compliant party. These funds are typically reinvested in RE efforts within a state to support increased compliance in the future. Importantly, if states consistently fall short of their RPS targets, they can alter the baseline discussed above, which could result in a material impact on emissions and air quality.

SECTION D.3: OVERVIEW OF STATE ENERGY EFFICIENCY POLICIES

Overview

For purposes of this manual, EE policies refer to a range of laws, regulations, and public utility commission (PUC) orders aimed at reducing energy demand through the use of more energy efficient equipment, technologies, and practices. These policies can be funded through ratepayer surcharges, federal funds (e.g., American Recovery and Reinvestment Act⁵), state general funds, proceeds from pollution auctions such as the Regional Greenhouse Gas Initiative⁶ and/or any combination of the above. Examples of EE policies include:

- Minimum efficiency requirements for new homes and buildings (building energy codes) or appliances (appliance standards).
- Requirements for utilities (or other program administrators) to deliver a specified amount of energy savings by developing EE programs to increase market adoption of EE technologies and practices (i.e., energy efficiency resource standards (EERS), also known as Energy Efficiency Portfolio Standards (EEPS)).
 - Some states have incorporated EERS to function alongside or as part of their RPS.
- Specified funding levels collected via ratepayer electric bills or other sources and dedicated to implementing EE programs (e.g., public benefits funds, air pollution allowance auction revenue).

In addition to the EE policies described above, a number of important regulatory mechanisms (e.g., utility incentive structures, innovative rate designs, and smart grid investments) can help achieve a state’s overall EE goals. However, these approaches are less relevant for the purposes of this guidance, either because their impacts are accounted for in the policies already described above or because their impacts are especially difficult to quantify.

Federal, state and local governments have authority over EE policies. For example, building energy code policies are typically developed at the federal level, adopted by states, and enforced by localities. Almost all states have some form of electric-sector EE programs. Most of them are funded through ratepayer surcharges, block grants to the states from the U.S. Department of Energy or with proceeds from auctions such as RGGI. The money collected from these surcharges is then reinvested, under the supervision of a state PUC, in a series of programs approved by each state to achieve the stated policy goals of reducing energy consumption. An example of this type of program is providing subsidies for the purchase of

⁵ For more information, go to: <http://www.recovery.gov/Pages/default.aspx>.

⁶ For more information, go to: <http://www.rggi.org/>.

more energy efficient equipment. These programs may be administered by utility officials, independent third party energy authorities, and/or state energy officials.

Similar to RPS discussed above, EE policies vary by state. Differences include:

- Level of funding
- Stability of funding year to year
- Types of programs, sectors, and end-uses targeted
- Evaluation, Measurement and Verification (EM&V) techniques and energy savings calculations
- Energy savings goals for the programs
- Stringency of codes and standards
- Degree of enforceability

Evaluation, Measurement and Verification

In order to appropriately estimate the energy savings from these programs, a state must have infrastructure in place to support evaluation, measurement and verification (EM&V) efforts. A rigorous and credible EM&V strategy can provide environmental regulators with a degree of certainty that savings claimed by the EE policies are actually being achieved. A key objective of evaluation is documenting compliance with regulatory requirements. Many EE evaluations are oriented toward developing retrospective estimates of energy savings attributable to a program, in a manner that is defensible in regulatory proceedings conducted to ensure that public funds are properly and effectively spent. However, the role of evaluation can go beyond simply documenting savings to actually improving programs and providing a basis for future savings estimates. If applied concurrently with program implementation, evaluations can provide information in real time to allow for as-needed course corrections. In summary, evaluation ensures that EE savings are “real” and provides important data for use by air regulators.

For more information on EM&V, see the National Action Plan for Energy Efficiency’s “Model Energy Efficiency Program Impact Evaluation Guide.”⁷ Additional information on state EE policies, see EPA’s Guide to Action (Chapter 4)⁸ and the other resources highlighted in section D.7 of this appendix.

Incorporating Energy Efficiency Policies and Programs in State Implementation Plans

In order to consider EE policies and programs in a SIP, states need to understand how the operations and emissions affect local and upwind fossil fuel fired power plants. At its most basic, when energy efficiency decreases electricity consumption by end-use customers, there is an equivalent decrease in electricity generation. This change in generation can, in turn, result in a decrease in power plant emissions.

⁷ For more information, go to: http://www.epa.gov/cleanenergy/documents/suca/evaluation_guide.pdf.

⁸ For more information, go to: <http://epa.gov/statelocalclimate/resources/action-guide.html>.

Once a state has estimates of energy savings, those savings need to be evaluated against the operational characteristics of the power pool in which they are implemented. Often times, energy savings reported from EE programs are given in total megawatt hours (MWh) per year, without respect to the time of year or time of day in which those savings were realized. Because emissions from electricity generation fluctuate over the course of a day, a month or a year, it is possible to generate more accurate estimates of emissions reductions by correlating the timing of energy savings with the characteristics of power plants operating on the margin at that time. For instance, the emissions and generation profile of power plants running on hot summer days may be different from the profile of plants running on a cool fall day.

The effort involved in matching energy savings with power-plant dispatch at a particular time is different than a similar analysis of RPS impacts. This is because RE sold into a power pool is tracked and metered every hour of the day, whereas efficiency savings are estimated using EM&V techniques. (Refer to Appendix I for more details on emission quantification methods).

SECTION D.4: OVERLAPPING ENERGY EFFICIENCY/RENEWABLE ENERGY APPLICATIONS

Overview

There are a number of applications that, depending on circumstance, can be addressed either under EE programs, RE standards, or both. Predominant among these is combined heat and power (CHP). For purposes of this discussion, CHP is the simultaneous production of heat and electricity from one fuel source. While a typical power plant does not reuse most of the heat it generates, a CHP facility will have a need for that heat. Thus, the total efficiency for a CHP plant can be over 60 percent while a typical power plant has an overall efficiency level of around 30 percent. This efficiency increase can result in significantly lower air emissions needed to produce an equivalent amount of usable energy from a CHP facility than would otherwise be produced by a separate boiler and power plant. CHP, by its inherent operation, functions as a supply-side energy efficiency measure.

Combined Heat and Power

CHP can be included as an eligible resource in state RPS or EEPS (as described in D.2 and D.3 above). Approaches include the development of a separate efficiency target or a separate tier devoted to EE projects, including CHP, or a separate tier for CHP itself. Many states have taken different approaches toward incorporating CHP into their EE/RE policies.

For example, some states have funded incentive programs for CHP and other efficiency measures through System Benefit Charges, which are a small surcharge on electricity rates. CHP incentive programs have included capital cost grants (in California and New Jersey), demonstration programs (New York), low interest loans (in Connecticut), investment tax credits

(in North Carolina) and combinations of capital grants and performance payments (in Massachusetts and Connecticut).⁹

In addition, several states, including Connecticut and Massachusetts, have rewritten air permitting rules to acknowledge the efficiency gains achieved from CHP by recognizing both the thermal and electric output of a CHP system in their output-based regulations.

Incorporating Combined Heat and Power Policies and Programs in State Implementation Plans

In order to consider CHP policies in a SIP, the state needs to understand the details of its policy, and the impacts of CHP systems on the operations and emissions of both on-site boilers and fossil fuel fired power plants in that state. CHP systems can help displace conventional sources of heat and power generation and as a result help reduce fuel use and regional emissions which may be accounted for in SIPs.

As with other EE/RE policies discussed in previous sections of this appendix, it is important to note that emission reductions may accrue at a regional level, and not necessarily in the specific location of an EE/RE project. While CHP systems can reduce regional emissions due to reduced demand for electricity from the power plant fleet, CHP systems may also have the effect of marginally increasing local, on-site emissions. For example, installing a CHP system on-site often increases the amount of fuel that is used at the site, because additional fuel is required to operate the CHP system as compared to the conventional stand-alone boiler or other on-site thermal equipment that the CHP system displaced. The efficiency and emissions benefits come from the fact that the incremental fuel and emissions at the CHP site are normally less than fuel and emissions avoided at the central power plant to provide an equivalent amount of electricity.

As described in section D.3, when users are purchasing less electricity, then less electricity needs to be generated at the power plant, and as a result emissions are avoided. The emissions benefits of CHP systems can potentially be incorporated into SIPs using the same general methods for EE measures outlined in section D.3 above, as long as any increased CHP site emissions are netted out from the decreased central station emissions. A more detailed description of how the benefits of CHP can be calculated and incorporated into SIPs, and specific items to consider when accounting for CHP, can be found in Appendix I.3, Step 2, Estimate the Energy Savings of Energy Efficiency and CHP Policies/Programs.

SECTION D.5: EXAMPLES OF STATE EE/RE POLICIES AND PROGRAMS

This section provides a brief summary of the EE/RE policies in three states. The states featured are for illustrative purposes only, but are intended to show the range of policies and programs in place today.

⁹ For more information on financial incentives for CHP, go to EPA's Combined Heat and Power Partnership Funding Resources Database: <http://www.epa.gov/chp/funding/funding.html>.

Connecticut

The Connecticut has a mature set of programs that has been mandated by the state legislature and receives funding. The state's primary EE program is a ratepayer funded Public Benefit Program that, among other activities, provides resources to assist homeowners and businesses to adopt a range of energy efficient technologies and practices. In 2009, Connecticut ranked 9th in the United States with respect to per capita EE expenditures.¹⁰ The state's RPS program was started in 2000 and will reach a maximum required percentage of 27 percent by 2020, among the highest in the country.¹¹

North Carolina

In 2007, North Carolina created its RE and Energy Efficiency Portfolio Standard (REEPS). Under the REEPS, public electric utilities in the state must obtain RE power and EE savings of 3 percent of prior-year electricity sales in 2012, increasing to 12.5 percent in 2021. Energy efficiency is capped at 25 percent of the 2012-2018 targets and at 40 percent of the 2021 target. Combined heat and power qualifies as an EE measure under the standard. Under this program, individual utilities now administer EE and RE programs in North Carolina with oversight and approval from the North Carolina Utilities Commission. Rate-regulated utilities may recover the costs for RE and EE programs through a Demand Side Management/Energy Efficiency rate rider.¹²

Mississippi

Utilities in Mississippi have historically offered few EE programs. Some do report energy savings and one utility company offers loans for residential customers. The Mississippi Public Service Commission has recently proposed expanding ratepayer funded EE programs.¹³ Mississippi currently has no RPS policy.

SECTION D.6: HOW STATE ENERGY EFFICIENCY/RENEWABLE ENERGY POLICIES AND PROGRAMS ARE ADMINISTERED

As stated earlier, most EE and RE policies are not administered by a state department of environmental protection (DEP), but by PUCs, and are implemented by state energy offices, an electric utility, an independent third party, or some combination. However, while a state environmental agency may not administer or enforce these policies, their successful implementation may have significant environmental impacts.

For example, an RPS that requires utilities to purchase from RE facilities within its state or air shed may result in fossil fired units in the same area running less frequently, which can result in significant air pollution benefits that are not reflected in a typical DEP permitting program for power plants. Therefore, it is in the interests of state environmental regulatory staff to become familiar with these policies and their potential environmental benefits and to reach out to the staffs in those organizations to stay up to date on those rules and programs.

¹⁰ For more information, go to: <http://www.aceee.org/sites/default/files/publications/researchreports/e107.pdf>.

¹¹ For more information, go to: http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm.

¹² For more information, go to: <http://www.aceee.org/sector/state-policy/north-carolina>.

¹³ Mississippi Public Service Commission (2011).

The EPA encourages state, tribal and local agencies to focus the majority of the effort at incorporating EE/RE in SIPs/TIPs on EE/RE policies because states have many such policies already “on the books” and because policies have more potential to provide more significant emissions impacts. Many of the specific EE/RE programs states run for a particular year will be captured by accounting for the policies that fund or require them. In attempting to account for individual EE/RE program impacts in SIPs/TIPs, agencies should demonstrate that these programs are incremental to any EE/RE policies the agency is already accounting for in its SIP/TIP. For example, if a state is already accounting for the impacts of its EERS, it should not include incremental impacts for a residential compact fluorescent light bulb incentive program that the utilities in the state develop to help meet the EERS.

SECTION D.7: WHERE TO GO FOR MORE INFORMATION

There are several places the reader can go for more information including:

- The Database of State Incentives for Renewables and Efficiency (DSIRE) is a comprehensive source of information on state, local, utility and federal incentives and policies that promote RE and EE. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the N.C. Solar Center and the Interstate Renewable Energy Council. <http://www.dsireusa.org/>
- The American Council for an Energy Efficient Economy (ACEEE) is a national nonprofit organization dedicated to advancing and deploying EE technologies, policies, programs, and behavior. They provide up to date information on EE programs and policies for all 50 states. <http://www.aceee.org/sector/state-policy>
- EPA State Climate and Energy Program: <http://epa.gov/statelocalclimate/state/index.html>
- EPA Clean Energy-Environment Guide to Action: <http://epa.gov/statelocalclimate/resources/action-guide.html>
- National Action Plan for Energy Efficiency: <http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html>
- Lawrence Berkeley National Laboratory on RPS: <http://eetd.lbl.gov/ea/ems/reports/lbnl-154e-revised.pdf>
- Lawrence Berkeley National Laboratory on EE: <http://eetd.lbl.gov/ea/ems/reports/lbnl-2258e.pdf>
- The Regulatory Assistance Project: www.raponline.org
- EPA CHP Partnership for help accounting for the emissions benefits of CHP projects: <http://www.epa.gov/chp/>

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