EXHIBIT E

A State Planning Guide for Clean Air Act Section 111(d)

June, 2014

Foreword

If you are a state planner or policy maker involved in implementing EPA's proposed regulation of existing power plants under §111(d) of the Clean Air Act, then this guide was written for you. EPA issued a Clean Power Plan Proposed Rule on June 2, 2014 which outlines state-specific CO_2 emissions targets by 2030 and flexible "building blocks" to achieve those targets.

This guide is not a legal analysis of §111(d), nor does it take a position on compliance pathways or EPA's proposed state-specific CO_2 goals. Instead, it is intended to assist states in the analysis and planning process, and suggests a number of practical steps states can take now to prepare for the final rule next June. The guide is intended as a concise, pragmatic resource for state planners as they consider a range of compliance options and the planning required for implementation.

Of course, we recognize that over the course of the coming year EPA may revise the final rule pursuant to state and stakeholder comments. However, given that this is a data driven process with tight analysis and planning timeframes, this guide and our staff can help states prepare and work with key stakeholders.

A key element of the document is a proposed planning horizon for key steps in the process, including data collection, stakeholder engagement, and statutory and regulatory procedures. Throughout, we encourage states to think broadly with respect to potential compliance pathways, to proactively engage with key state stakeholders, but also with neighboring states and EPA as appropriate, and to take careful note of key planning considerations, such as state legislative timeframes.

There is little question that states are leading the transition to a low-carbon economy. End use energy efficiency and renewable and nuclear energy policies are already reducing carbon emissions in most states; notably, 37 states have renewable energy (RE) mandates or goals and 30 states have energy efficiency (EE) goals. EPA's proposed rule studied these state policies and included four key building blocks as "Best System of Emission Reduction" (BSER) factors to achieve the state emission rate goals. Individual electric generating unit (EGU) heat rate improvement is building block one (1). Increased capacity of natural gas combined cycle plants is building block two (2). RE is building block three (3) and EE is building block four (4)—making RE and EE key compliance strategies in state §111(d) plans.

This also highlights the potential complexity of §111(d) compared to previous Clean Air Act regulations, while at the same time providing maximum flexibility for state policy makers. The proposed rule appears to continue progress already underway in states, and our discussions to date with state regulators, university think tanks and industry groups, make clear that an interdisciplinary team of state officials working collaboratively with the regulated industry and other stakeholders will be required to develop technically sound,

practical, and cost-effective plans to meet the requirements of §111(d). EPA's timeline for the rule should inspire action among state planners to begin planning now.

The Center for the New Energy Economy will update this handbook periodically, including following the issuance of the final rule in June 2015. My staff and I are ready to help you in the development of your §111(d) plans, so please do not hesitate to contact the Center for the New Energy Economy.

Sincerely,

Bill Ritter, Jr.
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41st Governor of Colorado
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Acronyms & Abbreviations

The energy industry and the Clean Air Act bring with them a long list of terms, acronyms and abbreviations that are important to be familiar with. Below is a list of the more common acronyms used along with hyperlinks to definitions.

AVERT	Avoided Emissions and Generation Tool
BSER	Best System of Emissions Reduction
CAA	Clean Air Act
CCS	Carbon Capture and Sequestration
EBT	Emissions Budget and Trading
EERS	Energy Efficiency Resource Standard
EIA	Energy Information Administration
EM&V	Evaluation, Measurement and Verification Criteria
ESPS	Existing Source Performance Standards
FIP	Federal Implementation Plan
FLIGHT	Facility Level Information on Greenhouse Gases Tool
GGRP	Greenhouse Gas Reporting Program
IPMVP	International Performance Measurement and Verification Protocol
ISO	Independent System Operator
MISO	Midwest Independent System Operator
M-RETS	Midwest Renewable Energy Tracking System
NAAQS	National Ambient Air Quality Standard
NEMs	National Energy Modeling System
NSPS	New Source Performance Standards
PUC	Public Utilities Commission or Public Service Commission (PSC)
PSD	Prevention of Significant Deterioration
RGGI	Regional Greenhouse Gas Initiative
RPS	Renewable Portfolio Standard
RTO	Regional Transmission Organization
SIP	State Implementation Plans
WCI	Western Climate Initiative

Background

The Clean Air Act (CAA) was established in 1970 with the goal of reducing air pollution to protect the public health and welfare. It was amended and expanded in 1977 and 1990 and now is the legal authority with which EPA is regulating greenhouse gas (GHG) emissions. EPA began by regulating CO_2 emissions from mobile sources and will now, at the direction of President Obama, establish emissions standards for new and existing power plants under sections §111(b) and §111(d) of the Act. The following section provides an overview of GHG regulation under the CAA, discusses past §111(d) regulation, and offers insights into how this process may be applied in the CO_2 context.

1. What led to this application of §111(d)?

Though originally enacted in 1963, it was not until the 1970 CAA amendments that the Act provided EPA with the authority to regulate a wide range of air pollutants across the country. The CAA was substantially amended in 1977 and again in 1990 to expand EPA's authority to regulate emissions. The 1977 amendments established provisions of the Prevention of Significant Deterioration (PSD) program giving EPA authority to regulate pollution sources outside of non-attainment areas. The 1990 amendments authorized the agency to regulate acid rain, established the Title V operating permit program and developed a new toxic air pollutant reduction program.

It has now been more than 20 years since the last set of amendments to the CAA, during which time the idea of regulating GHGs has received increasing attention. In 2007, the U.S. Supreme Court in Massachusetts v. EPA explicitly stated that the EPA has the authority to regulate GHGs under the CAA if the agency found that these emissions were harmful to public health and welfare. In response to this decision, EPA issued an Advanced Notice of Proposed Rulemaking to receive input from stakeholders regarding a wide range of questions surrounding whether GHGs should be designated as air pollutants that harm public health and welfare. In 2009, EPA issued a formal determination that GHGs are harmful and that a wide range of sources contribute to this harm. This Endangerment Finding automatically triggered regulation of mobile source emissions, leading EPA to work with the National Highway Traffic Safety Administration (NHTSA) and others to produce a suite of GHG regulations for mobile sources beginning in 2009.

EPA's position is that its Endangerment Finding obligates it to regulate not only mobile sources of CO_2, but also new and existing stationary sources[1]. Based on that assumption, EPA produced both a Timing Memo and a Tailoring Rule in 2010. The Timing Memo clarified that GHGs would be regulated under the PSD program once the agency produced a regulation requiring CO_2 reductions. To avoid regulating thousands of small GHG emitters, EPA's Tailoring Rule limits the CO_2 standards to the largest emitters including power plants, refineries, and cement production facilities. A full timeline of these EPA regulatory

[1] The Supreme Court upheld EPA's authority to regulate cross-state pollution in an April 29th ruling. http://www.nytimes.com/2014/04/30/us/politics/supreme-court-backs-epa-coal-pollution-rules.html

initiatives is available here.

These recent actions form the backdrop for President Obama's Presidential Memorandum of June 2013 (related to the Administration's June 2013 Climate Action Plan), directing EPA to finalize a GHG emissions standard for new sources under §111(b) of the Act, and for existing power plants under §111(d). It is now widely accepted that regulating CO_2 emissions from new sources requires the EPA to regulate emissions from existing sources.[2] While the §111(b) rulemaking is ongoing, more attention is being paid to §111(d) due to the greater inherent challenges of reducing carbon emissions from existing power plants and to concerns from the coal and utility industries that the regulation may force the closing of power plants before the end of their useful lives. The proposed rule appears to allow states the discretion to address these challenges in a flexible and economic manner through careful data analysis.

2. How is §111(d) unique?

Section 111(d) has been in the CAA since 1970. It is a unique framework of cooperative federalism that requires regulation of existing sources where the pollutant in question is neither a "criteria" pollutant subject to National Ambient Air Quality Standard (NAAQS) nor a toxic air pollutant regulated under CAA Section 112, such as mercury.

EPA set its §111(d) EGU emissions guidelines on the basis of a "best system of emission reduction" (BSER). The conversation is well underway regarding which strategies EPA should or should not permit in state §111(d) plans. The Agency's September 2013 "Questions for States" were designed to guide detailed input, asking what has been the state's previous experience reducing power sector emissions, how EPA should design the §111(d) guideline, and how EPA can facilitate development of these plans and compliance going forward. Appendix D of this toolkit collects and briefly summarizes state positions on these topics. These and other comments are continuously added to the online docket "Outreach Feedback on the CAA Section 111(d) Existing Source EGU Greenhouse Gas Rulemaking."

President Obama's 2013 memo and the proposed rule directed EPA to produce a draft rule by June 2014 (which it has) and a final rule by June 2015. EPA's schedule requires states to submit plans to respective regional office no later than June 30, 2016. The proposal acknowledges that thirteen months may be insufficient to prepare a plan and provides for an extension when justified. This extension option allows for an initial submittal by June 30, 2016, followed by submittal of a complete state plan either on or before June 30, 2017 for a single-state plan or June 30, 2018 for multi-state plans.

The compliance timeline is aggressive, particularly given the level of interagency coordination states will need to develop their plans, as well as the potential need for additional statutory authority in some states. Therefore, certain states may wish to analyze

[2] In *American Electric Power v. Connecticut* (2011) the Supreme Court noted that once the EPA establishes standards for new and modified sources under Sections 111(b) & 111(d) "then requires regulation of existing sources."

the extension options. We include, in Appendix B, a table of state legislative sessions, which highlights that several state legislatures are not in session during potentially critical points in the development of the state plan.

The cooperative federalism nature of past §111(d) rules, as well as the unique challenge of applying the rule to GHGs, has engendered a substantial dialogue between EPA, states and other stakeholders well in advance of the proposed rule. Throughout the fall of 2013, EPA held listening sessions in 11 states at which they received input from state agencies, think tanks, industry, environmental organizations and others. Certain groups developed detailed analyses and proposals as early as 2011, and at least 30 comprehensive proposals were released over the last year. EPA Administrator Gina McCarthy has been touring the nation, stressing to state and local officials that they will be responsible for much of the decision-making under §111(d).

3. What can we learn from previous §111(d) guidelines?

Since the 1970s, EPA has issued several emissions guidelines under §111(d). Compared to the emissions guideline currently under development for existing power plants, these have been narrow in scope both in terms of affected facilities and prescribed BSER measures. In these cases, BSER generally targeted technology-based solutions at the facility level, compared to some of the broader, system-based strategies contemplated as opportunities to reduce power sector GHG emissions in this case. It is worth noting that the §111(d) emissions guidelines for municipal solid waste landfills did allow for averaging of emissions rates across facilities as one compliance strategy. Appendix C includes a table of past §111(d) emissions guidelines, all of which are codified in 40 C.F.R §60.

KEY TAKEAWAYS:

- While there have been past applications of §111(d) to existing sources of air emissions, this will be the first time it has been used to regulate CO_2 emissions.
- It is worth studying past §111(d) actions to understand the mechanics of a compliance plan and the process involved for pulling information together.
- The proposed compliance timeline between final rule and state plan submittal is very short in this case, posing planning challenges, including for coordinating state regulatory and legislative calendars. The proposed timeline suggests the need to begin state and stakeholder convenings and analysis if states have not already.

Building Blocks to Achieve Emissions Reductions

There are many different options available for states to reduce emissions from existing power plants, including many strategies already underway. Some of these strategies have focused specifically on reducing GHG emissions, while others result in emissions reductions as a co-benefit.

Emissions reduction strategies can be distinguished broadly as "source-based," describing measures taken directly at the affected source (in this case, power plants), or "system-based," describing a much broader portfolio of measures, including those taken beyond the affected sources but which have the effect of reducing emissions at the source. The following four sections offer a more detailed description of the range of options that may be available to states. The remainder of this section breaks down these categories into greater detail and addresses persistent questions surrounding their viability as §111(d) compliance tools.

1. "Inside the Fenceline": changes at individual covered sources to reduce carbon intensity.

2. Unit Dispatch Strategies: shifting generation from units that have higher carbon emission rates to others with lower carbon emission rates.

3. "Outside the Fenceline": reduction of emissions through displacement by zero-carbon generation or reduction in electricity demand at or closer to the location of electrical demand than a central plant.

4. Regional Strategies: where groups of states coordinate to achieve emission reduction targets.

Building Block 1-"Inside the Fenceline"

"Inside the fenceline" strategies refer to changes at individual covered sources to reduce the carbon intensity of electricity production at individual covered sources. Past CAA actions affecting the power sector, including past §111(d) emissions guidelines, have overwhelmingly been met with inside the fenceline pollution control technologies. These compliance strategies will be the most familiar tool to state regulators, including the process for deciding upon and permitting particular control technologies, coordinating with the affected source during installation, and addressing cost recovery at the utility commission.

4. What is the extent of the "inside the fenceline" opportunity?

Minimizing heat losses is the greatest factor affecting plant efficiency and therefore the GHG emissions associated with a given amount of energy production. They are achievable through a wide range of improvements including equipment refurbishment, plant upgrades, and improved operation and maintenance schedules. Numerous studies have

addressed these opportunities, including a December 2013 Congressional Research Service report – "Increasing the Efficiency of Existing Coal-Fired Power Plants" – and a widely-cited 2010 technical report by the National Energy Technology Laboratory (NETL) titled "Improving the Thermal Efficiency of Coal-Fired Power Plants in the United States." In a 2010 whitepaper, EPA summarized the efficiency improvement techniques identified by NETL through a review of published articles and papers. The summary of these findings is shown in the below table:

Efficiency Technology	Description
Combustion Control Optimization	Combustion controls adjust coal and air flow to optimize steam production for the steam turbine/generator set. The technologies include instruments that measure carbon levels in ash, coal flow rates, air flow rates, CO levels, oxygen levels, slag deposits, and burner metrics as well as advanced coal nozzles and plasma assisted coal combustion. Combustion control for a coal-fired EGU is complex and impacts a number of important operating parameters including combustion efficiency, steam temperature, furnace slagging and fouling, and NOx formation.
Cooling System Heat Loss Recovery	Controls are applied to recover a portion of the heat loss from the warm cooling water exiting the steam condenser prior to its circulation through a cooling tower or discharge to a water body. The identified technologies include replacing the cooling tower fill (heat transfer surface) and tuning the cooling tower and condenser.
Flue Gas Heat Recovery	Flue gas exit temperature from the air pre-heater can range from 250- 350°F depending on the acid dew point temperature of the flue gas, which is dependent on the concentration of vapor phase sulfuric acid and moisture. For power plants equipped with wet FGD systems, the flue gas is further cooled to approximately 125°F as it is sprayed with the FGD reagent slurry. However, it may be possible to recover some of this lost energy in the flue gas to preheat boiler feedwater via use of a condensing heat exchanger.
Low-rank Coal Drying	Subbituminous and lignite coals contain relatively large amounts of moisture (15 to 40%) compared to bituminous coal (less than 10%). A significant amount of the heat released during combustion of low-rank coals is used to evaporate this moisture, rather than generate steam for the turbine. As a result, boiler efficiency is typically lower for plants burning low-rank coal. The technologies include using waste heat from the flue gas and/or cooling water systems to dry low-rank coal prior to combustion.
Soot Blower Optimization	Soot blowers intermittently inject high velocity jets of

	steam or air to clean coal ash deposits from boiler tube surfaces in order to maintain adequate heat transfer. Proper control of the timing and intensity of individual soot blowers is important to maintain steam temperature and boiler efficiency. The identified technologies include intelligent or neural-network soot blowing (i.e., soot blowing in response to real-time conditions in the boiler) and detonation soot blowing.
Steam Turbine Design	Recoverable energy losses can result from the mechanical design or physical condition of the steam turbine. For example, steam turbine manufacturers have improved the design of turbine blades and steam seals, which can increase both efficiency and output (i.e., steam turbine dense pack technology).

Source: EPA, *Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Generating Units*. March 2012.

There is considerable debate surrounding the feasibility of improved efficiency of the country's existing coal fleet. Many coal facilities have made efficiency improvements in order to meet previous state and federal emission standards for other pollutants and, in some states, for greenhouse gases. At the outset of §111(d) planning, state regulators will need a detailed record of past measures to improve plant efficiency, and should work with the state's utilities and/or merchant generators to assess additional opportunities.

5. Will Carbon Capture and Storage technologies be a factor?

In addition to the thermal efficiency improvements discussed above, EPA's Regulatory Impact Statement for the new source performance standard addresses the viability of Carbon Capture and Storage (CCS) technologies. This has been an area of great debate, with many industry groups and others arguing that CCS technologies are not yet commercially viable, and thus not qualified for inclusion as a "best system for emission reduction" in EPA's §111(d) emission guideline. EPA holds the view that opportunities for CCS technologies exist both pre- and post-combustion at coal-fired facilities. It is not yet clear whether or not CCS will be a practical strategy for near-term emission reductions as part of a state's §111(d) plan.

EPA also recently issued a final rule providing greater clarity for the "safe and responsible" implementation of certain CCS techniques in hazardous waste disposal. Additional background information about CCS is available on the agency's website.

Building Block 2-Unit Dispatch Strategies

Utilities and grid operators may have the opportunity to reduce emissions by shifting generation from units with higher emission rates to lower emitting units. Operational strategies to reduce emissions within the current generation fleet are comparatively low-cost in terms of capital input, but can involve considerable regulatory complexity.

6. What is the potential for increased utilization of the existing natural gas fleet?

According to Energy Information Administration (EIA), average capacity factors for the nation's combined-cycle natural gas fleet have increased steadily over the last decade, with facilities that normally serve only peaking or intermediate load increasingly contributing to base load power needs. In its recent Inventory of U.S. Greenhouse Gas Emissions and Sinks (1990-2012), EPA attributes the 3.8 percent decrease in emissions from fossil fuel combustion over the last year in part to a decrease in the carbon intensity of fuels consumed for power production. The major trend here is a shift from coal to natural gas, driven by decreases in gas prices. Since natural gas has about half the carbon intensity of coal, many utilities and regulators are looking to greater use of the nation's existing gas fleet as a low-cost opportunity to achieve greater emissions reductions from the power sector.

The International Energy Agency (IEA) finds that current natural gas capacity meets 46 percent of U.S. electricity demands with an opportunity to increase this capacity by 17 percent. Recognizing that the ability to increase the utilization of natural gas generation varies by state and region, state planners should investigate whether excess natural gas capacity exists and what factors might be limiting expanded use. These factors may include gas supply constraints, electricity transmission constraints, the relative fuel prices at the state level, variability in plant efficiency, the terms of coal supply contracts, state regulations, and dispatch particulars. These factors are explored in detail in the IEA report cited above.

7. How can environmental dispatch models contribute to reductions?

Although power plant operations have traditionally been scheduled to minimize costs, several strategies have been proposed for the dispatching power based on environmental objectives. The best recent example of environmental dispatch in practice is the loading order for power supply into the California Independent System Operator (CAISO) territory. The loading order refers to California's preferred sequence for meeting electricity demands: energy efficiency and demand response first; renewable resources second; and efficient natural gas-fired power plants third. In its December 2013 comments to EPA, the California Air Resources Board discusses how the loading order underpins coordination between the state's energy and environment agencies on a suite of programs and regulations that reduce power sector GHG emissions.

Building Blocks 3 and 4 -"Outside the Fenceline"

"Outside the fenceline" refers to strategies that reduce the production of electricity and thus emissions with measures outside the generation facility. These include demand-side energy efficiency strategies, renewable distributed generation and smart grid enhancements. Though many such strategies are already in place under state policy, effectively reducing power sector emissions, it is unconventional for EPA to include them in an emission guideline on the basis of BSER. Here we explore common questions for how to analyze outside the fenceline opportunities.

8. What state policies and programs are already reducing emissions?

Many current or future state programs are already reducing power sector emissions. These programs vary widely from state to state in the sense that they have different targets, different standards for compliance (voluntary vs. mandatory), and rely on and promote different types of clean energy and energy efficiency technologies. A proposal by 15 states demonstrates some of the most robust activity in this area notes that such state programs have been developed through democratic processes and reflect the different on-the-ground realities of the states, including the structure of energy markets and market participants. The fact that states are independently reducing emission through such a wide range of strategies suggests that a broad approach by EPA to a BSER is likely to be the most efficient and cost effective.

State planners should expeditiously assess all state policies and programs that may be reducing emissions already. These include (but are certainly not limited to) the following:

- Renewable Portfolio Standards (RPS) or Renewable Energy Standards (RES);[3]
- Energy Efficiency Resource Standards (EERS) including utility-administered demand-side management (DSM) and demand response (DR) programs;
- Non-RPS driven investment in renewables as part of an integrated resource plan[4] or attributable to state tax credits;
- ISO/RTO-administered demand response protocols;
- Emissions-driven loading orders or other load dispatch strategies;
- Green pricing programs separate from an RPS;
- Transmission improvements to reduce line loss;
- Major industrial sector repowering, such as utilization of waste heat and combined heat and power generation.
- Advanced pricing structures and smart metering infrastructure that use market mechanisms to reduce demand at times of critical need.

Most of these policies and programs are not currently evaluated in terms of GHG emissions reductions, at least not with the degree of rigor EPA is requiring in a state plan for outside the fenceline strategies.

9. How might these strategies factor into a state §111(d) plan?

Extensive stakeholder comments have addressed how state planners might incorporate outside the fenceline strategies into their §111(d) plans. We stress throughout this guide how a range of expertise – from public and private entities alike – will be necessary to fully evaluate which outside the fenceline strategies should contribute to a particular state's §111(d) plan. Appendix D summarizes state comments reflecting a range of views on the matter, from arguments that outside the fenceline strategies are not legally permissible under §111(d) to those arguing them to be a central compliance strategy. The following organizations have crafted detailed proposals for the design of state plans around outside

[3] DSIRE provides accurate and up to date data on all state RPS policies.
[4] Xcel Energy's investments in wind capacity are an example.

the fenceline strategies:

- Natural Resources Defense Council
  Closing the Power Plant Carbon Loophole: Smart Ways the Clean Air Act Can Clean Up America's Biggest Polluters, March 2013

  Using the Clean Air Act to Sharply Reduce Carbon Pollution from Existing Power Plants, Creating Clean Energy Jobs, Improving Americans' Health, and Curbing Climate Change, December, 2012.

- American Council for an Energy Efficient Economy
  Trailblazing without the Smog: Incorporating Energy Efficiency into Greenhouse Gas Limits for Existing Power Plants, August 2013.

- Nicholas Institute for Environmental Policy Solutions
  Energy Efficiency and Greenhouse Gas Limits for Existing Power Plants: Learning from EPA Precedent, June 2013.

  Regulating Carbon Dioxide under Section 111(d) of the Clean Air Act Options, Limits and Impacts, January 2013.

- The NorthBridge Group
  Alternative Designs, Impacts and Tradeoffs, December 2013.

- Regulatory Assistance Project
  Advice to States Considering Greenhouse Gas Rules for Existing Generation, February 2014.

- Georgetown Climate Center
  Reducing Carbon Emissions in the Power Sector: State and Company Successes, December 2013

  State and Regional Opportunities Under Clean Air Act 111(d), September 2013.
- Southwest Energy Efficiency Project
  Using Energy Efficiency to Help Meet Environmental Goals, January 2014.

- Brookings Institution, *Recommendations to the U.S. Environmental Protection Agency: Why EPA Should Offer a Price-Based Standard for Carbon Pollution from Existing Plants*, November 2013.

- National Climate Coalition, *Using EPA Clean Air Act Authority to Build a Federal Framework for Greenhouse Gas Reduction Programs*, May 2013.

10. How can these reductions be measured and verified going forward?

A major challenge to incorporating outside the fenceline strategies into a §111(d) plan will be linking those strategies to emissions reductions. They will need to be adequately evaluated, measured, and verified (EM&V) on their own before state planners can "count" them towards an EPA-approved compliance plan. The concept of EM&V has had the most attention in the demand-side energy efficiency arena, though the same principles apply to renewable energy generation or other programs.

State planners face several challenges here. The policies and programs outlined above are overseen by disparate state agencies and third parties, and in most cases not the air regulator. Furthermore, different states use different protocols, presenting a challenge to interstate compliance strategies. Some utilities are already subject to different EM&V protocols across state lines, a situation that could be complicated with coordination planning between states. Finally, many of the policies contain conditions on their implementation (cost effectiveness requirements, cost caps, exclusions, opt-outs, alternative compliance payments, etc…) that may impact their breadth and scope.

<u>Demand-side Energy Efficiency (EE):</u>
The American Council for and Energy Efficient Economy (ACEEE) defines EM&V as follows:

> *"EM&V demonstrates the value of energy efficiency programs by providing accurate, transparent and consistent assessments of their methods and performance.*
>
> *Evaluators analyze energy savings and identify causes and effects. They also may recommend program goals and funding levels. They draw on many sources of information, both qualitative (such as focus groups) and quantitative (such as meter readings and demographic surveys).*
>
> *One central objective of evaluation is to determine how much savings to attribute to an energy efficiency program as opposed to other factors (such as weather)…Estimating the quantitative effects of energy efficiency programs is termed "impact evaluation."*
>
> *Evaluators also compare benefits and costs for programs. The benefits may include, but are not limited to: lower greenhouse gas emissions, improved public health, lower energy prices, job creation, increased income, improved national security, and reduced construction expenses for utilities.*
>
> *Determining how well a program is designed and implemented is another key function of evaluation. Such evaluation efforts are critical to understanding and improving program performance. Analysis of program design and implementation is termed "process evaluation."*

Energy efficiency resource mandates or goals for utilities exist in 27 states[5] and, in many cases, electric and gas utility regulatory bodies have maintained methodologies for evaluating the impact, process and market conditions for many years. Some of these state approaches also assess resulting greenhouse gas emissions savings.

Established national EM&V protocols include:

- *International Performance Measurement and Verification Protocol (IPMVP)* developed by the Efficiency Valuation Organization;
- *Model Energy Efficiency Program Impact Evaluation Guide* issued by the DOE State and Local Energy Efficiency (SEE) Action Network;
- *The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Guideline 14-2002 Measurement of Energy and Demand Savings;* and
- DOE's *Uniform Methods Project for Determining Energy Efficiency Program Savings.*

In addition, many state and regional regulatory agencies have maintained their own EM&V guidelines for utility DSM programs for decades. These EM&V rules are often contained in a Technical Reference Manual (TRM). Below is a table of currently maintained national and state TRMs[6]:

State and Regional Technical Resource Manuals for DSM/EE Programs

Scope	Resource Name	Format	Information Included
National	Energy Star	Online Calculators	Ex ante savings based on algorithms
Regional-Northwest	Regional Technical	Online Database	Ex ante savings based on algorithms
Regional – Mid-Atlantic	Mid-Atlantic TRM	PDF	Algorithms and ex ante savings
Arkansas	Arkansas Deemed	PDF	Algorithms
California	DEER Database for	Software Program	Ex ante savings
Connecticut	Connecticut Light &	PDF	Algorithms and ex ante savings
Hawaii	Hawaii Energy Efficiency	PDF	Algorithms and ex ante savings
Maine	Efficiency Maine TRM	PDF	Algorithms and ex ante savings
Massachusetts	Massachusetts	PDF	Algorithms and ex ante savings

[5] From Database of State Incentives for Renewables & Efficiency (DSIRE) Summary Maps.
[6] State and Local Energy Efficiency Action Network. *Scoping Study to Evaluate Feasibility of National Databases for EM&V Documents and Measure Savings*, June 2011. Tables are current as of Summer 2012.

Michigan	Michigan Energy	Excel Database	Ex ante savings
New Jersey	New Jersey Clean Energy	PDF	Algorithms and ex ante savings
New York	New York Standard	PDF	Algorithms and ex ante savings
Ohio	Ohio TRM	Online Database	Algorithms and ex ante savings
Pennsylvania	Pennsylvania TRM	DOC	Algorithms and ex ante savings
Texas	Deemed Savings,	PDF	Algorithms and ex ante savings
Vermont	Efficiency Vermont	PDF	Algorithms and ex ante savings
Wisconsin	Focus on Energy	Online Database	Algorithms and ex ante savings

Renewable Energy (RE):
A reliable mechanism for tracking grid-connected renewable energy generation is also needed in order to model the impact that different systems will have on the state's emission profile. State planners should investigate existing mechanisms to attribute renewable impacts across a utility service region. Regional agreements, micro-trading regions or formalized partnerships with existing trading regimes (such as RGGI) should all be considered. Several Midwestern states (Illinois, Indiana, Iowa, Minnesota, Montana, North Dakota, Ohio, South Dakota and Wisconsin) also use the Midwest Renewable Energy Tracking System (M-RETS) to track renewable energy production and RPS compliance.

11. Where have State Implementation Plans already include RE and EE approaches?

In the last two decades, several states have included energy efficiency measures in their NAAQS SIPs in accordance with EPA guidance. Efforts to expand this approach include EPA's 2012 "Roadmap on Incorporating EE/RE Measures in State Implementation Plans. Guidance from the Southwest Energy Efficiency Project (SWEEP) identifies the following examples of state experience incorporating energy efficiency policies and programs into SIPs:

- Connecticut included energy savings from utility demand-side energy efficiency programs into its ozone SIP and received credit for avoided NOx emissions starting in 2003.

- Texas claimed credit from energy savings from new building energy codes in its ozone SIP for the Dallas-Fort Worth area in 2005.

- Metro Washington, DC Council of Governments included energy efficiency initiatives (LED traffic lights and building EE programs) in its regional ozone SIP.

- Massachusetts, Maryland and New York are piloting new pathways for NOx reduction.

KEY TAKEAWAYS:

- Outside-the-fenceline strategies are allowed by EPA, including RE and EE specifically.
- Including EE and RE will require a demonstration of enforceable and verifiable emissions reductions.
- Does your state have a Technical Reference Manual in place for demand-side efficiency EM&V? If not, is there a state or national protocol that is acceptable to state utility regulators?

Regional Approaches

Neither GHG emissions nor energy markets follow state political boundaries. This forms the basis for several stakeholder proposals discussing how state-centric strategies are not necessarily the most cost-effective or sensible based on market realities. Collaborative strategies among groups of states or regions, on the other hand, might enable greater flexibility and lower compliance costs.

While EPA's proposed rule does not *require* interstate approaches it does permit them. Any regional approach will be voluntary and largely state-driven, presenting both an opportunity and a challenge to states in considering an expanded realm of compliance options under an extremely tight timeframe.

12. What are the potential benefits of interstate collaboration?

The reports listed below specifically address potential regional approaches. Potential benefits of interstate collaboration include: multi-state shared regulatory experience; regional economies of scale; predictability and risk-sharing across an entire region; and administrative and accounting efficiency.

- Natural Resources Defense Council, Clean Air Act Section 111(d) CO2 Reduction Compliance Pathways for Pacific Northwest and Intermountain West States, March 2014.

- The ISO/RTO Council: Reliability Safety Valve and Regional Compliance Measurement and Protocols

- Regional Greenhouse Gas Initiative (RGGI): Report on Emission Reduction Efforts of the States Participating in RGGI and Recommendations for Guidelines Under Section 111(d) of the Clean Air Act, December 2013

- The Brattle Group and Great River Energy: A Market-based Regional Approach to Implementing EPA's GHG Emissions Regulation, January 2014

- The Georgetown Climate Center: State and Regional Opportunities Under Clean Air Act §111(d), September 2013

- Pace Energy and Climate Center: RGGI EPA Rules Collaborative: Responses to EPA Questions on Section 111(d) Guidelines, December 2013

- Regulatory Assistance Project (RAP): RGGI Unplugged: Accounting for All CO2 Emissions from the Electric Power Consumed in the RGGI Region, September 2013

13. What will be uniquely challenging about a regional strategy?

Unique considerations to designing a regional compliance mechanism include:

- Determining a sensible groupings of states;
- Establishing a basic governing framework;
- Evaluating methods for reducing emissions;
- Identifying interstate agreements necessary to cover costs of stranded assets
- Tasking an entity or entities (either existing or newly-formed for this unique case) with responsibility for administration and monitoring; and,
- Accomplishing the above under tight deadlines prescribed by EPA.

KEY TAKEAWAYS:

- Would a regional approach make sense for your state? What challenges would it solve compared to an intrastate approach?
- If so, what grouping of states might make sense?
- What existing interstate agreements does your state have (if any) with regard to environmental regulation? How might they provide a framework for a multi-state CO_2 emissions framework?

Assembling a Plan

14. What resources are available from EPA today to get started?

EPA will be holding a series of webinars in late June and early July on the proposed Clean Power Plan. More information can be found on the agency's Clean Power Plan website:

Webinar 1: Building State Goals
Date: Wednesday, June 25, 2014
Time: 2:30–4:30 PM Eastern Time

Webinar 2: Meeting State Goals
Date: Thursday, June 26, 2014
Time: 3:00–4:30 PM Eastern Time

Webinar 3: Implementation
Date: Tuesday, July 1, 2014
Time: 3:00–4:30 PM Eastern Time

EPA has developed a Clean Power Toolkit with regulatory, policy and technical resources for states and also issued a set of Clean Power Plan Proposed Rule Technical Documents which provide a high level of detail on the rule itself.

15. What are the key elements of a §111(d) state plan?

It has been almost two decades since some states were required to submit a §111(d) plan and institutional experience may not be available. However, all state air quality planning agencies are very familiar with the development of State Implementation Plans (SIPs) used to maintain NAAQS standards and regulations for criteria pollutants under §111(b), which have many similarities to the state plans required under §111(d).

Though states will benefit from having this understanding of the §111(b) process, and in some cases a SIP can complement the state plan for GHG emissions, it is important to be aware of their differences. Here's what EPA had to say when it established §111(d) emission guidelines for municipal waste combustors, highlighting some important distinctions from the SIP program:

> *The states and EPA fulfill different responsibilities under the two programs. The goal of Section 111(d) State Plans is to control the emissions of designated pollutants by establishing standards of performance for existing sources. Section 111(d) Emission Guidelines (including emissions limitations or performance levels) are technologically based and are established by EPA on a national level, and the states are responsible for developing and implementing a program to achieve compliance with these technologically-based standards. The goal of the SIPs, on the other hand, is to attain and maintain National Ambient Air Quality Standards (NAAQS) or ambient concentrations for certain criteria pollutants (lead, SO2, PM10, NO2, CO, and ozone) in a given area.*

> *Hence, in the SIP program, the state establishes emission limitations or standards based on the sources' contributions to local air quality, meteorology, and other local factors. The emission control requirements for a regulated source category under a SIP may vary from plant to plant based on local factors.* [7]

Whereas EPA outlines very specific requirements for plans under the SIP program, state equivalency plans under §111(d) are more open-ended and have in the past been accompanied by specific guidance from EPA for development of state plans. Where §111(d) was used to regulate municipal waste combustors, a Summary of Requirements describes how EPA might consider very specific factors in evaluating the sufficiency of a state plan.

In the proposed rule, EPA says a complete state plan must follow the EPA framework regulations at 40 C.F.R. 60.23 and would include the following 12 components:

1. Identification of affected entities
2. Description of plan approach and geographic scope
3. Identification of state emission performance level
4. Demonstration that plan is projected to achieve emission performance level
5. Identification of emission standards
6. Demonstration that each emission standard is quantifiable, non-duplicative, permanent, verifiable, and enforceable
7. Identification of monitoring, reporting, and recordkeeping requirements
8. Description of state reporting
9. Identification of milestones
10. Identification of backstop measures
11. Certification of hearing on state plan
12. Supporting material

For those that work on SIPs, this list will look familiar. However, the development of this type of plan for GHGs will be unique. For this reason, the remainder of the guide provides insights regarding just how to carry out this regulatory process in terms of GHG emissions.

16. Who are the agencies to have on board in §111(d) planning?

Early collaboration across a diverse team of state policymakers and planners will be needed. In her letter December, 2013 letter to EPA Administrator McCarthy, California Air Resource Board Chairman Mary Nichols notes that under the Clean Air Act, governors are free to designate the agencies responsible for compliance with the Act. This suggests that §111(d) "*may well provide a case for directing multiple agencies to work together on the planning process, whether as formal designees for federal compliance purposes or simply as a matter of effective state coordination.*[8]" CNEE believes, at minimum, each state should

[7] EPA "Municipal Waste Combustion: Summary of the Requirements for Section 111(d)/129 State Plans for Implementing the Municipal Waste Combustor Emission Guidelines." July 1996. Excerpt beginning page 1-9.

[8] Letter from Chairman Mary Nichols to Administrator McCarthy re: state implementation of 111(d),

include representatives from the following entities in their §111(d) planning efforts:

Propose State 111(d) Team Members

Agency	Agency Lead
Air regulatory agency	
Public Utility Commission, or equivalent	
Governor's Office	
State Energy Office	
State Legislative liaison	
Utility representatives[9]	
Consumer advocate	

As the state air regulator is responsible for developing and submitting compliance plans, it is most likely that this agency will play a lead role in the development of the state's §111(d) plan. For purposes of Heat Rate Improvements (Building Block 1), the relationship between state air agencies and regulated sources might remain largely as it has been with the exception of including CO_2 limits and heat rate/efficiency improvements in modified Title V operating permits.

Building Blocks 2, 3 and 4 provide greater flexibility and a larger toolbox for the lead air quality planning agency and will need to involve other state regulators. The lead agency will need an advisory or stakeholder team to assist it in the development of the state plan, with modeling demonstrations of equivalence for compliance strategies that would be reflected in permits or new state rules. CNEE recommends convening state §111(d) teams early to understand the rule and make decisions regarding responsibilities for major components of the process.

17. What resources are available to states to assess the economic impacts?

In September, 2011 EPA released a resource for quantifying the costs and benefits of clean energy called Assessing the Multiple Benefits of Clean Energy: A RESOURCE FOR STATES. In EPA's words:

> *"This Resource identifies the multiple benefits of clean energy and explains why they should be quantified and considered along with the costs. It starts by presenting clear, easy-to-understand background information on each type of befit to help non-specialists understand how the benefits are generated and what cans be done to*

December 27th, 2013. Docket EPA-HQ-OAR-2014-0020-0085.

[9] The number and size of utilities varies widely by state. A representative from major regulated utilities should be part of the 111(d), as well as municipal utilities and cooperatives with significant generation assets.

maximized them. Building on that foundation, the Resource describes analytic options that states can explore as the conduct and review analyses of clean energy initiatives. It provides a frame work for assessing multiple benefits, presenting detail information on basic and more sophisticated approaches along with descriptions of tools for qualifying each type of benefit…"

KEY TAKEAWAYS:

- Identify §111(d) team lead and point person from all relevant entities.
- Schedule §111(d) team meeting for late-June/early July 2014 following initial review of the proposal.
- Consider development of web page as public repository for all relevant information.
- Collaboration among air quality regulators, utility regulators, Governor's offices and other stakeholders will be key to successful plan development.

Timing Issues

18. How might the process involve state legislatures and what are the implications on timing?

It is important to recognize how long it can take to work through legislative avenues, and that some state legislatures are not in session, or have shortened or budget sessions, in 2016 during crucial months leading up to EPA's deadline for plan submittal. CNEE finds that 4 states do not convene their legislatures in 2016 and four more have only budget sessions. In addition, at least eight states have required legislative approval for past SIPs. See Appendix B for a complete list.

State legislatures have already been active in §111(d) legislation in the 2014 session. CNEE maintains a searchable database of all state energy legislation from the 2013 and 2014 sessions at www.aeltracker.org where more information can be found.

Consideration of Legal Authority

With a sense for the various responsibilities and how they are allocated among state actors, it is crucial to assess whether state law affords the necessary legal authority to develop the state §111(d) plan. We see this as a requirement for state plans under previous §111(d) emissions guidelines, which traditionally have focused on the role of a state air regulator.

Here we identify components of compliance process where legal authority is a relevant consideration:

- Where stakeholder input is required (and is expected to fulfill EPA public hearing requirements)
- Where new regulation has ratepayer impact
- Where reporting requirements are imposed
- Where the state plan designates permitting authority
- Where the state plan must be approved before submittal to EPA
- Where some element of compliance is ceded to a third-party, such as an ISO/RTO, other non-governmental organization, or other state. This will almost certainly be an issue where states develop a regional strategy.

This is potentially the greatest involvement of the state legislature – making sure administrative agencies have the authority to implement policies in a timely fashion.

19. What data will states need to make informed decisions?

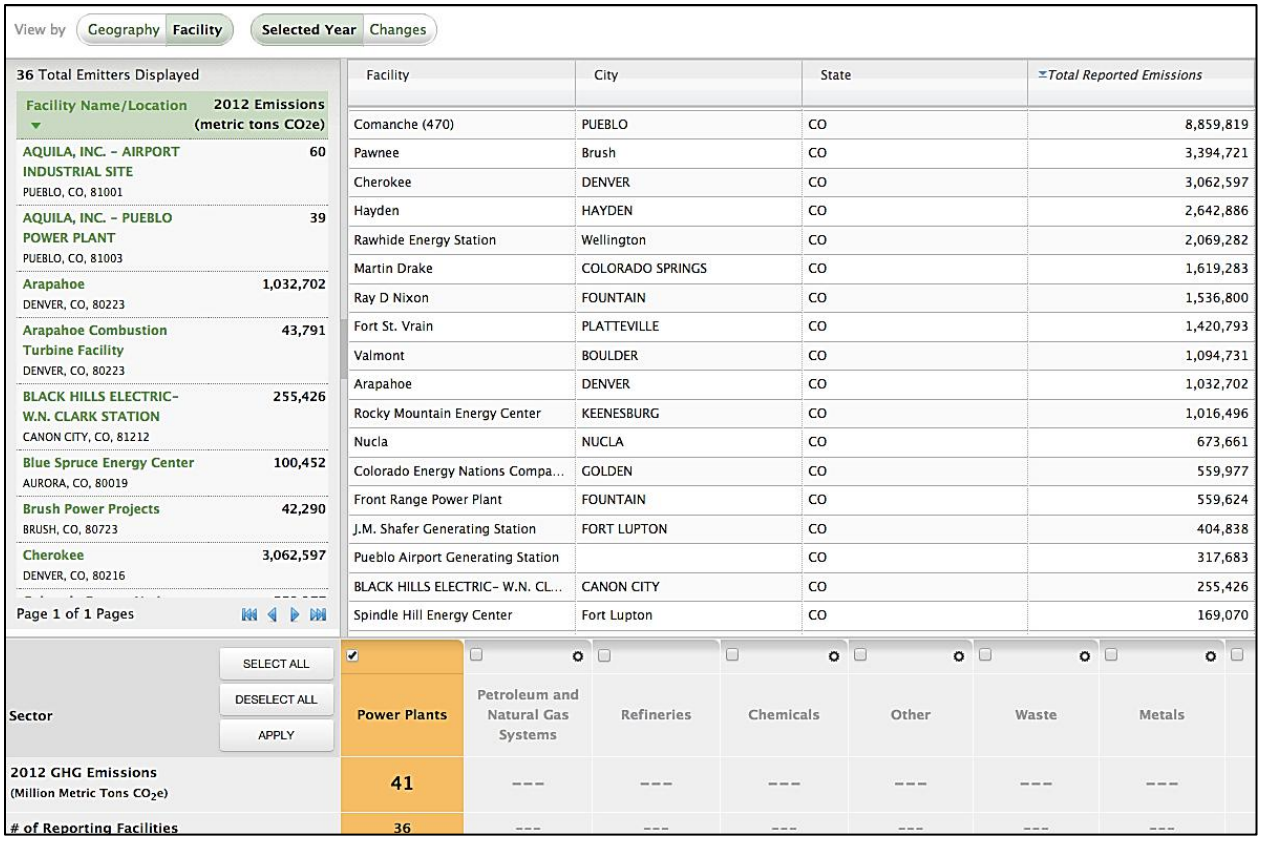
Baselining is a crucial step in the process. The proposal sets the baseline year as 2012. Though substantial and varied data will factor into the development of a state plan, there is a core set of information that the §111(d) team should have at its disposal to frame discussions. Also, since past §111(d) emissions guidelines have required state plans to include detailed inventories of the regulated sources and pollutants, doing this work upfront will likely pay off considering the time crunch.

The state team should start with an inventory of all major facilities supplying electricity to customers or at minimum an inventory of all major electric generating facilities within the state border. State permitting authority is historically limited to facilities within state lines, which makes sense for inside-the-fenceline compliance pathways. As a state evaluates the profiles of its various electric generating facilities, it will pay to collect the same data for units elsewhere that import into their territory.

Emissions Data

In 2009, EPA published a rule for the mandatory reporting from large GHG sources in the United States. Implementation of 40 CFR Part 98 is referred to as the Greenhouse Gas Reporting Program (GHGRP) and applies to direct greenhouse gas emitters, fossil fuel suppliers, industrial gas suppliers, and facilities that inject CO_2 underground for sequestration or other reasons. Reporting is generally at the facility level and required from 41 industrial categories, including emissions from fuel combustion. In general, the threshold for reporting is 25,000 metric tons or more of CO_2 equivalent per year.

The data resulting from GHGRP, covering 85-90 percent of total US GHG emissions current to 2009, should serve as the primary source for unit-level emissions. It will be important for the §111(d) team to study how this data is collected, verified and published. EPA has developed an online portal for viewing the data, referred to as its Facility Level Information on Greenhouse Gases Tool (FLIGHT).



EPA's online FLIGHT viewer.

The FLIGHT viewer allows users to view annual reported emissions for years 2010-2012 for all affected units (anticipated) under §111(d). Likely more useful to the team will be direct downloads of MS Excel versions of the underlying data sets as well as the operating permits themselves for the affected facilities.

Many states acted to collect GHG emissions data well before EPA's reporting requirement was in place, often in the form of an economy-wide emissions inventory. States with GHG inventories or other emissions data sets should evaluate whether they are comparable to the GHGRP methodology. If the §111(d) team prefers to use a data set of its own, it should be prepared to defend its methodology to EPA, which will want to see that power sector GHGs can be counted and verified.

KEY TAKEAWAYS:

- Inventory facility-level emissions data for all affected units.
- Reconcile EPA data with any unique state data or reporting requirement.

Energy Data

Considerable information on the energy system will be required to develop state §111(d) plans. This information will include both facility-level and system-level emissions.

Facility Data: Facility-specific data should include:

- Date the unit was placed in service
- Expected retirement date
- Nameplate capacity
- Historical annual generation
- Projected annual generation
- Capacity factor
- States / service territories served
- Percent generation serving in-state load vs. export

System Data: RTO/ISOs have excellent capacity to survey the system for certain data, particularly as it concerns reliability and asset planning. A stakeholder process before the utility commission could also facilitate this data collection effort, as it relies on assumptions rather than stack measurements or operating characteristics. One example is a system survey that MISO undertook as part of the Missouri PSC's open proceeding to consider CAA regulations. The survey asked about:

- Future load expectations
- Current resources and potential retirements
- List of known opportunities for "inside the fenceline" improvements, namely thermal efficiency improvements
- Potential new resources and energy efficiency/ demand response programs
- Confidence factors for forecasts
- Extent of assets in state vs. out of state

KEY TAKEAWAYS:

- Section 111(d) compliance goes beyond inside the fenceline options, suggesting a much wider range of energy system considerations in plan development.
- State air regulators will rely on outside expertise from utilities, utility commissions, and others for this information.
- Energy data should include both facility-level characteristics, as well as system-level characteristics.

20. How should states prepare policies and programs for inclusion in the plan?

As we discussed above, there is a range of strategies for states to consider that either directly control emissions or have the effect of reducing emissions.

States have played a lead role in implementing policies consistent with many of the objectives that may be contained within a §111(d) plan. Together, these policies and programs can be a tangled web of targets (some mandatory, others voluntary) and compliance timeframes, with an equally tangled web of authority for their administration involving several states and sometimes interstate actors. The §111(d) team should take careful stock of the full suite of these policies and programs in order to develop a coherent, cost-effective state plan. Such a plan may build upon or modify existing policies and programs, or propose entirely new ones in order to achieve the §111(d) objectives.

How to evaluate existing policies?

The 111(d) Team should have a good grasp of the following components of any existing or proposed policies and programs in order to undertake accurate modeling and the development of a realistic assessment of the program's potential contribution to a §111(d) plan:

- What is the administering entity or entities?
- Is the policy or program mandatory or voluntary?
- What is the compliance timeframe, and how related to EPA's timeframe for §111(d) implementation?
- To what extent will it be evaluated, measured and verified?
- What would be the legislature's involvement in modifying the policy?
- Is it already being evaluated in terms of GHG emissions reduction?
- How does it compare to similar policies and programs in other states?
- How cost effective is it?

For the purposes of state planning for §111(d) compliance, the most important consideration is demonstrating equivalent emissions reduction. Many look to the EIA's Annual Energy Outlook demand forecast to begin their power sector and emissions planning. To forecast energy demand, supply and emissions impacts, EIA models aggregate trends across the states and include some state policies currently "on the books" - such as Renewable Energy and Energy Efficiency policies and others mentioned above - in their methodology to determine energy demand, supply, and corresponding emission increases and decreases. The AEO forecast includes some EE/RE policies, but does not explicitly account for several key EE/RE policies currently operating in many states. In March 2014, EPA provided draft projections for emissions reductions from various state policies not addressed by AEO. These formed part of the basis for the proposal's TSD.

EPA provides various other tools for projecting the impacts of state energy efficiency and clean energy policies, particularly for use in CAA implementation protocols. In 2011 the

EPA produced a report that models savings through 2020 for various emissions including carbon dioxide, provides annual energy savings by state, and evaluates these impacts on regional emissions. The report provides a detailed methodology and summaries of each state's RE/EE adjusted impacts.

The Database of State Incentives for Renewables and Efficiency (DSIRE), maintained by the North Carolina Solar Center and the Interstate Renewable Energy Council, contains state RPS summary data that can be used to assess future mandatory renewable generation requirements for covered utilities in the future.

DSIRE
Database of State Incentives for Renewables & Efficiency

State (Notes as comments)	Target Year (yyyy)	Yearly Fractional Goals											
		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Arizona	2025	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.11
	2025	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.05
California	2020	0.22	0.23	0.25	0.27	0.29	0.31	0.33					
Colorado	2020	0.11	0.18	0.18	0.18	0.18	0.18	0.27					
	2020	0.01	0.02	0.02	0.02	0.02	0.02	0.03					
	2020	0.03	0.06	0.06	0.06	0.06	0.06	0.10					
Connecticut	2020	0.11	0.13	0.14	0.16	0.17	0.20	0.20					
	2020	0.03	0.03	0.03	0.03	0.03	0.03	0.03					
	2020	0.04	0.04	0.04	0.04	0.04	0.04	0.04					
Delaware	2027	0.08	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.18	0.19	0.20
	2027	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
	2027	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
District of Columbia	2023	0.07	0.09	0.11	0.13	0.14	0.16	0.18	0.18	0.18	0.18		
	2020	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00		
	2023	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03		
Hawaii	2030	0.10	0.15	0.15	0.15	0.15	0.15	0.25	0.25	0.25	0.25	0.25	0.25
Illinois	2025	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.17	0.18
	2025	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04
	2025	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	2025	0.05	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.11	0.12	0.13	0.14
	2025	0.03	0.04	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08
	2025			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Iowa	2000												
Kansas	2020	0.10	0.10	0.15	0.15	0.15	0.15	0.20					

DSIRE State RPS Summary Data.

21. What should states consider in terms of new or modified policies?

An understanding of current policies and programs, coupled the with facility-level data as described in the preceding section, should reveal areas where new or modified policy could make a more significant contribution to §111(d) plan objectives.

Specific considerations include:

- Is there any precedent for inter or intra-state utility cost sharing? Examples might include transmission, gas and electricity transmission infrastructure, technology improvements to comply with other air quality requirements. State §111(d) teams should evaluate these policies to determine whether they can serve as a means to balance GHG reduction costs across a region.

- What are the scenarios of emission reductions that the state can reasonably achieve at existing facilities, within the same utility, and within the state? EIA and EPA data can provide helpful information.

a. The scenarios can provide the state with insight on whether a mass or rate based approach is best.

b. What are the costs of retrofitting existing plants versus other offset or replacement scenarios including technologies inside the fence line and as outside the fenceline.

c. What policies might attract private capital for technologies that would achieve the 111(d) goals?

In the area of demand-side energy efficiency, it would be helpful to know the top 100 energy users in the state. EPA provides a formal guide and other resources for undertaking an Energy Efficiency Potential Study. ACEEE has released similar guidance on EE potential studies. A recent study by the Midwest Governors Association of EE potential in that region serves as a more concrete example.

In terms of renewable energy capacity, the National Renewable Energy Laboratory (NREL) recently evaluated technical renewable energy potential by state. NREL provides several tools for independently undertaking such an evaluation. Navigant also prepared a study for the Florida Public Service Commission evaluating the state's renewable energy potential; it could serve as a framework for other states.

Finally, states should consider that RPS policies only provide for the generation of GHG free power. There may be a need to incorporate these RPS targets into integrated resource planning, generation acquisition and resource retirement plans as well as dispatch rules to provide for a net *reduction* in GHG emissions.

KEY TAKEAWAYS:

- The §111(d) team needs to have a detailed understanding of how all strategies (particularly outside the fenceline) will reduce emissions, or have reduced emissions in the past.

Colorado Case Study

A combination of policies have placed Colorado on the road toward compliance with §111(d). As a result of these policies, Colorado's primary IOU, Xcel Energy, projects that their greenhouse gas emissions will be 35% below 2005 levels by 2020.

Here is how Colorado was able to get there:

- Energy Efficiency Resource Standard: Signed into law in 2007, this legislation requires a 10% reduction in energy consumption by 2020, with cost recovery for the utility and bonus earnings for exceeding the goal. As of 2013, utility DSM programs resulting from this legislation had saved more than 1,600 GWh.

- Renewable Energy Standard: Initially passed by a voter ballot measure in 2004 (10% by 2015), Colorado's RPS was increased by the legislature in 2007 (to 20% by 2020) and again in 2010 to 30% by 2020 for IOUs and 20% x 2020 for cooperative utilities. The state's IOUs are exceeding compliance targets.

- Clean Air Clean Jobs Act: This legislation directed the Public Utilities Commission to accelerate the retirement of 900MW of coal generation (50% of the coal fleet) and replace it with other sources (efficiency, renewables and natural gas). The PUC has now approved plans from regulated utilities that will significantly reduce GHG emissions 28 percent by 2020. This policy is a noteworthy case study in collaboration between a state air agency (Colorado Air Quality Control Commission) and PUC in both the policy formation and implementation.

Modeling

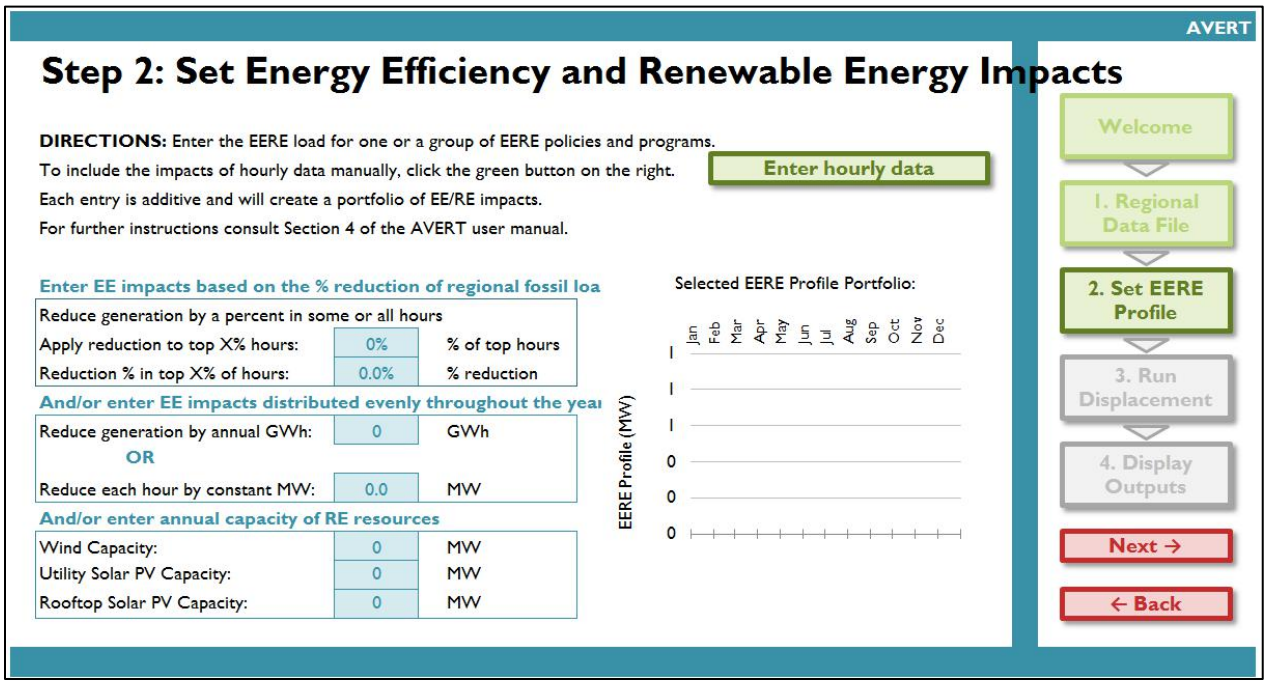
22. What is the role of resource modeling?

Analyzing myriad compliance pathways will require the use of scenario planning tools. While utilities maintain their own sophisticated hourly resource dispatch models, policy planners may need less sophisticated modeling software, particularly in the early planning stages. Available software includes the following:

AVoided Emissions and geneRation Tool (AVERT)

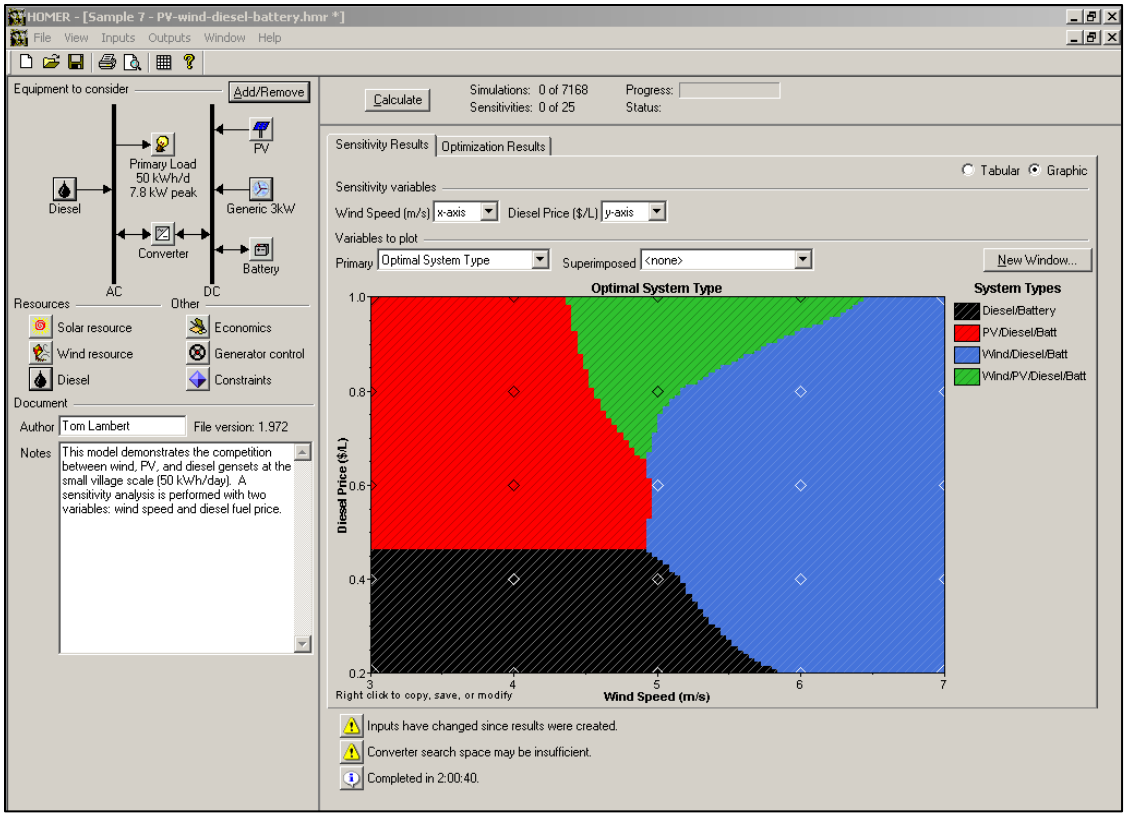
EPA notes on their Emission Modeling Clearinghouse that the agency "does not actively support the use of any one inventory, set of factors, or emissions models for input development to air quality modeling." EPA has, however, released a free resource called the AVoided Emissions and geneRation Tool (AVERT) in February 2014 that could be useful in initial assessment of outside the fence line approaches. AVERT estimates incremental emission reductions (nitrogen oxides (NO_X), sulfur

dioxide (SO_2), and carbon dioxide (CO_2) on a regional, state, and county level resulting from common clean energy policies including energy efficiency, demand reduction and select renewable generation technologies. EPA recommends that AVERT-calculated emission impacts of EE/RE policies can be used in air quality modeling for Clean Air Act plans and National Ambient Air Quality Standards with the concurrence of the appropriate EPA regional office.



Hybrid Optimization Model for Distributed Energy Resources (HOMER®)

In evaluating the potential for micro grids and distributed generation, the HOMER® software, developed at the National Renewable Energy Laboratory, is one of the best tools available. HOMER® considers solar, wind, biomass, hydro, batteries, flywheels, fuel cells, and conventional generation systems, such as diesel generators, micro-turbines, and combined heat and power systems. It is a powerful optimization model that simulates the chronological operation of hundreds of different system configurations and automates sensitivity analyses around the optimal solutions that it identifies. It tracks the emissions of all major air pollutants and the impact of emission pricing and constraints on economic system design. The Getting Started Guide and training workshops make it accessible to interested non-technical users as well as engineers. It has more than 100,000 users in 194 countries and is accepted as a standard for microgrid design by the World Bank and other funding organizations.



Utility Electric Resource Planning Models

Utilities maintain sophisticated probabilistic models that simulate the optimal decision-making for the utility's hourly dispatch of its resources against customer load. These software tools tend to be very data-intensive and require high levels of training for proficiency. These tools are commonly used to develop Integrated Resource Plans and will likely be a major factor in utilities' internal evaluation of §111(d) compliance scenarios. While most state planners aside from public utilities commissions are not likely use these models in the course of developing a §111(d) plan, it is important to be aware of them.

The following are the most common utility resource modeling tools[10]:

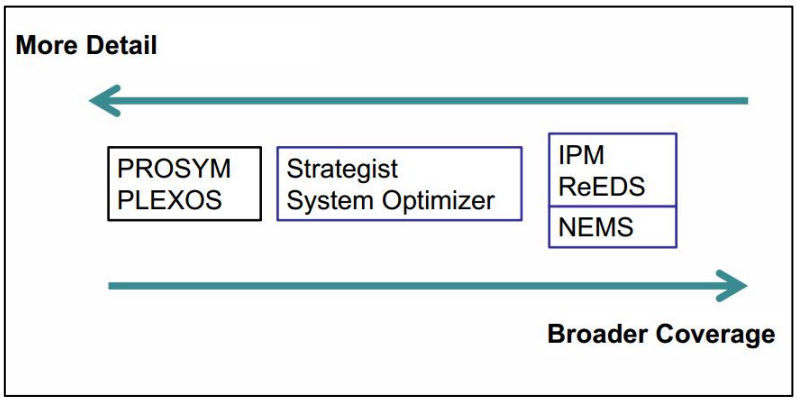
- PROSYM (from Ventyx)
  Adept at handling conventional generation dispatch response to renewable energy.

- Strategist (from Ventyx)
  Optimizes new capacity based on assumed market conditions, though limited hourly simulations for renewable energy.

- Regional Energy Development System (ReEDS) (from NREL)

[10] From Synapse Energy Economics, Inc.

Well suited to evaluate regional responses to policy changes, including transmission optimization.



Adapted from Ventyx.

Other models include:

- System Optimizer (Ventyx)
- IPM (ICF)
- NEMS (EIA)

KEY TAKEAWAYS:

- What first order modeling software makes sense for your state in looking at compliance options?
- Which hourly simulation tools are your utilities employing to make asset decisions?
- What are the strengths and weaknesses of the modeling tools used by your states utilities with respect to evaluating 111(d) options?

23. What other regional climate initiatives could serve as a model?

Existing state programs and partnerships on climate issues can inform regional approaches to compliance in the §111(d) context. Several may serve as a constructive framework for a new strategy or an element of a state plan. These programs include:

- Western Climate Initiative (WCI) began in 2007 as a collaborative effort between seven Western states and four Canadian provinces to design a regional, economy-wide cap-and-trade program for GHG emissions. Released in 2010, the Design for the WCI Regional Program outlined a market-based strategy to reduce regional GHG emissions to 15 percent below 2005 emissions by 2020. At present, California and Quebec are implementing the program and linked their systems on January 1, 2014.

- Western Regional Air Partnership (WRAP) is a voluntary agreement between EPA, federal land managers, and state, local, and tribal authorities to address EPA's Regional Haze Rule in the following states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. In fulfilling its mission of assisting states in understanding and addressing air quality issues facing the Western region, the organization provides access to data tracking and technical analyses.

- Regional Greenhouse Gas Initiative (RGGI) (see case study below)

- Pacific Coast Collaborative (PCC) is an agreement among the leaders of Alaska, British Columbia, California, Oregon, and Washington to leverage clean energy innovation and low-carbon development to reduce the effects of climate change on the regional economy. In 2010 the PCC issued Vision 2030, a plan centered on increasing solar, wind, geothermal, hydro, and tidal energy, as well as promoting energy-efficient technologies and more recently signed the Pacific Coast Action Plan on Climate and Energy, a nonbinding agreement to align climate regulations and market-based measures in each jurisdiction by calling for regional cooperation to reduce emissions and an integrated electrical smart-grid to support increased renewable generation.

- North America 2050 began as a larger collaborative effort of the three North American regional cap-and-trade programs: the Midwestern Greenhouse Gas Reduction Accord, the Regional Greenhouse Gas Initiative, and the Western Climate Initiative. NA2050 was composed of six working groups that facilitated dialogue among governments, private sector entities, NGOs, and academic institutions. Each working group provided support to participating jurisdictions based on members' priorities.

Congress created the acid rain market mechanism and Grand Canyon Visibility Transport Commission, while others were created by the states themselves, including RGGI, WCI, and WRAP. It is worth examining the supporting documentation required to get these interstate arrangements off the ground. This includes the RGGI Memorandum of Understanding as well as the Declaration of Intent underlying the Transportation Climate Initiative (TCI), a collaboration of Northeast states to reduce greenhouse gas emissions in the transportation sector. Both documents represent a milestone where states achieved consensus on certain principles before moving forward with the framework for collaborative action.

Regional Greenhouse Gas Initiative Case Study:

RGGI is widely regarded as achieving significant emissions reductions without raising electricity costs or impacting system reliability, and some predict that EPA could point to RGGI as a model for groups of states developing intrastate §111(d) compliance plans. An open question is whether EPA will allow RGGI, and the emissions reductions already achieved by RGGI states, to count towards §111(d) compliance. States in the eastern interconnection might have the option to simply join RGGI to fulfill some or all of their §111(d) obligations, rather than undertaking a new interstate program.

RGGI came about through an executive-branch agreement that limiting GHG emissions should be a policy priority. It built off of existing relationships on air quality issues between some northeast states. A group of Governors entered into a Memorandum of Understanding establishing a framework and goals for the program, developed with the flexibility to allow new states to sign on subsequently to the initial group. The RGGI MOU was accompanied by a model rule for states to customize and adopt as a means to formally establish the program. A draft model rule was developed and subjected to a comment period from participant states. The model rule sets a clear framework for states to "personalize" and adopt through their own administrative procedure.

The program is directed by a third party organization, RGGI, Inc., a non-profit created to support development and implementation of the RGGI program. The authority of RGGI, Inc. is tempered by constitutional limitations on the authority states can cede to a third party. EPA also plays a role in RGGI trading and enforcement as an independent monitor, overseeing the market to detect attempts of price manipulation or collusion during auctions and exchanges on secondary markets. Participants found in violation are subject to civil or criminal penalties imposed by Title V or the Clean Air Act.

All compliance falls to states. Most (but not all) states joined RGGI through legislation, though New York joined administratively through the approval of its Public Service Commission (though this led to a lawsuit, which was successfully defended). It should be noted that a majority of the original signatory states had Republican governors.

RGGI applies a mass-based standard to the region, subject to 3-year control periods and updates. A detailed Program Timeline of RGGI's development and ongoing administration shows that it took several years to develop, though we emphasize this should not discourage states from pursuing interstate approaches in the §111(d) context. Rather, considering the positive signals from EPA regarding allowable interstate approaches, it should encourage states to examine RGGI and other examples of regional coordination and begin the dialogue now for what makes sense in their context.

Charting a Path Forward

The example state implementation timeline below outlines a stakeholder process that would be structured to provide the state with sufficient time to collect relevant information, stakeholder perspectives, and structure that input into a proposed §111(d) compliance plan. Note that the first six steps in the proposed process are concluded prior to the issuance of the final rule from the EPA. This is done so to maximize the time available for the states to gather relevant information and stakeholder input prior to final development of the rule. Depending on the state's legislative session (see Appendix B), strategies for legislative approval or authorization will need to be done in accordance with the scheduled convening of the legislature and may take a variety of forms depending upon the legislature's schedule and statutory authority over plans submitted to the EPA. Extension requests should be evaluated.

Example Timeline for State §111(d) Plan Development

	2014				2015				2016			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q1	Q2	Q 3	Q 4
Emissions base lining and data collection	■	■										
Existing state policy mapping		■	■									
Draft rule expected from EPA			■									
Convene state 111(d) team			■									
Review PUC and AQR authority			■	■								
Compliance scenario modeling				■	■	■						
Stakeholder input process					■	■	■					
Draft and pass enabling legislation					■	■	■	■	■			
Final rule expected from EPA							■					
Final details of state plans assembled								■	■			
Initial Plans due to EPA Regional Office (with possible extension justification).										■		

Appendices

A. Clean Air Act §111(d) Text and Legal Interpretations

(d) Standards of performance for existing sources; remaining useful life of source

(1) The Administrator shall prescribe regulations which shall establish a procedure similar to that provided by section 7410 of this title under which each State shall submit to the Administrator a plan which

(A) establishes standards of performance for any existing source for any air pollutant

(i) for which air quality criteria have not been issued or which is not included on a list published under section 7408 (a) of this title or emitted from a source category which is regulated under section 7412 of this title but
(ii) to which a standard of performance under this section would apply if such existing source were a new source, and

(B) provides for the implementation and enforcement of such standards of performance. Regulations of the Administrator under this paragraph shall permit the State in applying a standard of performance to any particular source under a plan submitted under this paragraph to take into consideration, among other factors, the remaining useful life of the existing source to which such standard applies.

(2) The Administrator shall have the same authority—

(A) to prescribe a plan for a State in cases where the State fails to submit a satisfactory plan as he would have under section 7410 (c) of this title in the case of failure to submit an implementation plan, and

(B) to enforce the provisions of such plan in cases where the State fails to enforce them as he would have under sections 7413 and 7414 of this title with respect to an implementation plan.
In promulgating a standard of performance under a plan prescribed under this paragraph, the Administrator shall take into consideration, among other factors, remaining useful lives of the sources in the category of sources to which such standard applies.

Codified as US Code §7411

There have been numerous legal interpretations of the §111(d) language in the context of a GHG emissions standard for existing power plants. Some of the most widely-cited below:

- Congressional Research Service, *Climate Change and Existing Law: a Survey of Legal Issues Past, Present and Future*, March 2013.

- Environmental Law Institute, *Regulating Greenhouse Gases from Existing Sources: Section 111(d) and State Equivalency*, 2012.

- Institute for Policy Integrity, *Prevailing Academic View on Compliance Flexibility Under Section 111 of the Clean Air Act*, 2012.

- Harvard Law School, *Efficiency Rules: The Case for End-Use Energy Efficiency Programs in the Section 111(d) Rule for Existing Power Plants*, March 2014.

B. State Legislative SIP Approval Requirements[11]

State	2013-2014 Session Dates		2015 Session?	2016 Session?	Requires Legislative Approval of SIPs?
Alabama	January 14th	Early April (est.)	Yes	Yes	No
Alaska	January 21st	April 20th	Yes	Yes	No
Arizona	January 13th	Early April (est.)	Yes	Yes	No
Arkansas	February 10th	March 11th	Yes	Budget / Fiscal	Yes
California	January 6th	November 30th	Yes	Yes	No
Colorado	January 8th	May 7th	Yes	Yes	Yes
Connecticut	February 5th	May 7th	Yes	Yes	No
Delaware	January 14th	June 30th	Yes	Yes	No
DC	January 2nd	December 31st	Yes	Yes	No
Florida	March 4th	May 2nd	Yes	Yes	In some cases.
Georgia	January 13th	Late March (est.)	Yes	Yes	No
Hawaii	January 15th	Early May (est.)	Yes	Yes	No
Idaho	January 6th	Late March (est.)	Yes	Yes	Yes
Illinois	January 29th	May 31st	Yes	Yes	Yes
Indiana	January 6th	March 14th	Yes	Yes	No
Iowa	January 13th	April 22nd	Yes	Yes	No
Kansas	January 13th	Mid-May (est.)	Yes	Yes	No
Kentucky	January 7th	April 15th	Yes	Yes	No
Louisiana	March 10th	June 2nd	Yes	Budget / Fiscal	No
Maine	January 8th	April 16th	Yes	Yes	Yes
Maryland	January 8th	April 16th	Yes	Yes	No
Massachusetts	January 1st	December 31st	Yes	Yes	No
Michigan	January 8th	December 31st	Yes	Yes	No
Minnesota	February 25th	May 19th	Yes	Yes	No
Mississippi	January 7th	April 6th	Yes	Yes	No
Missouri	January 8th	May 30th	Yes	Yes	No
Montana	No 2014 Session		Yes	No	No
Nebraska	January 8th	Mid-April (est.)	Yes	Yes	No
Nevada	No 2014 Session		Yes	No	No
New Hampshire	January 8th	July 1st	Yes	Yes	No
New Jersey	January 14th	December 31st	Yes	Yes	No
New Mexico	January 21st	February 20th	Yes	Budget / Fiscal	No
New York	January 8th	December 31st	Yes	Yes	No
North Carolina	May 14th	Early July (est.)	Yes	Yes	No
North Dakota	No 2014 Session		Yes	No	No
Ohio	January 7th	December 31st	Yes	Yes	No
Oklahoma	February 3rd	May 30th	Yes	Yes	No
Oregon	February 3rd	March 9th	Yes	Yes	---
Pennsylvania	January 7th	December 31st	Yes	Yes	No
Rhode Island	January 7th	Early June (est.)	Yes	Yes	---
South Carolina	January 14th	June 5th	Yes	Yes	In some cases.
South Dakota	January 14th	March 31st	Yes	Yes	No
Tennessee	January 14th	Mid-April (est.)	Yes	Yes	Yes
Texas	No 2014 Session		Yes	No	No

[11] Data for this table was collected from EPA regional offices, State Statutes, and State Air Quality Agency pages and personnel.

Utah	January 27th	March 13th	Yes	Yes	No
Vermont	January 7th	Mid-May (est.)	Yes	Yes	---
Virginia	January 8th	March 8th	Yes	Yes	No
Washington	January 13th	March 13th	Yes	Yes	No
West Virginia	January 8th	March 8th	Yes	Yes	Yes
Wisconsin	January 14th	December 31st	Yes	Yes	Yes
Wyoming	February 10th	Early March (est.)	Yes	Budget / Fiscal	No

C. Previous §111(d) Emissions Guidelines

Year	Previous 111(d) Rulings	Source Addressed
1977	Final Guideline Document Availability, 42 Federal Regulation 12,022	Phosphate Fertilizer Plants
1977	Emissions Guideline for Sulfuric Acid Mist, 42Fed. Reg. 55, 796	Sulfuric Acid Plants
1979	Kraft Pulp Mills, Final Guideline Document, Notice of Availability, 44 Fed. Reg. 29,828	Kraft Pulp Mills
1980	Primary Aluminum Plants, Availability of Final Guideline Document, 45 Fed. Reg. 26,294	Primary Aluminum Reduction Plants
1991	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Municipal Waste Combustors, 56 Fed. Reg. 5523	Municipal Waste Combustors
1995	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Municipal Waste Combustors, 60 Fed. Reg. 65,387	Municipal Waste Combustors
1996	Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills, 61 Fed. Reg. 9,905	Municipal Solid Waste Landfills
1997	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Hospital/Medical/Infectious Waste Incinerators, 62 Fed. Reg. 48,348	Hospital/Medical/Infectious Waste Incinerators
2000	Emission Guidelines for Existing Small Municipal Waste Combustion Units, 65 Fed. Reg. 76,378	Municipal Waste Combustors
2000	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units, 65 Fed. Reg. 75,338	Municipal Waste Incinerators
2005	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Other Solid Waste Incineration Units, 70 Fed. Reg. 74,870	Stationary Source Emissions
2011	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units, 76 Fed. Reg. 15,372	Sewage Sludge Incineration Units

D. Annotated Bibliography of State Comments to EPA

1. **Alabama, Alaska, Arizona, Florida, Georgia, Indiana, Kansas, Kentucky, Michigan, Montana, Nebraska, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, West Virginia, and Wisconsin Attorney General (2013).** *Perspective of 18 States on Greenhouse Gas Emission Performance Standards for Existing Sources under § 111(d) of the Clean Air Act*.

   These 18 states question the EPA actions to regulate carbon from power plants and suggest it is not legally defensible. If the agency does decide to produce rules in this area, they also highlighted the fact that states are in charge of developing substantive plans and the EPA may only develop procedures for those states to produce those plans.

2. **California, Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington Attorney General (2013).** *Comments of the Attorneys General of New York, California, Massachusetts, Connecticut, Delaware, Maine, Maryland, New Mexico, Oregon, Rhode Island, Vermont, Washington, and the District of Columbia on the Design of a Program to Reduce Carbon Pollution from Existing Power Plants*.

   These 12 states and the District of Columbia support EPA actions to regulate carbon from power plants and illustrate that these regulations are legally defensible. They also suggest that current state level programs could provide a model for a system of emission reduction.

3. **California, Colorado, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New York, Oregon, Rhode Island, Vermont, and Washington (2013).** *States' §111(d) Implementation Group Input to EPA on Carbon Pollution Standards for Existing Power Plants*.

   15 states air, energy, and public utilities support EPA carbon regulations for power plants under Section 111(d). They call on the EPA to base the Best Emission Reduction Program on existing state level policy that utilizes all three emission reductions strategies including reducing carbon intensity, co-firing, and fuel switching. These states call for a system based mass emission approach that recognizes the different starting points of each state in terms of existing reductions. Finally, they argue the EPA should allow for flexibility in terms of state compliance options that include a regional emission reduction program.

4. **Florida Public Service Commission. (2013).** *Re: Considerations in the Design of a Program to Reduce Carbon Pollution from Existing Power Plants*.

The Florida Public Service Commission argues that the EPA should take into account previous emission savings, and provide wide flexibility to achieve reductions at existing facilities. EPA should not pick a one size fits all Best System of Emission Reduction, and rather provide guidelines to incorporate existing programs particularly demand side management. The Commission had no preference on performance level, but it should not be a uniform national rate as states have different end users.

5. **Iowa Utilities Board. (2013).** *Letter to Administrator Gina McCarthy, Janet McCabe and Rebecca Weber of EPA re: EPA Regulation of Carbon Dioxide Emissions from Existing Power Plants.*

   The Iowa Utilities Board calls on the EPA to take into account previous emission reductions produced at the state level, with a baseline somewhere between 2000 and 2005. They argue that placing a numeric limit on carbon has no real scientific basis and so the agency should instead require a program-and-action-based approach where states transition the utility industry away from carbon intensive fuels through ratemaking principles, energy efficiency, and renewable energy development among others. Compliance with the emission plan then should be measured statewide.

6. **Iowa Department of Justice, Office of Consumer Advocate (2014).** *Letter to Administrator Gina McCarthy, Janet McCabe and Rebecca Weber of EPA re: EPA Regulation of Carbon Dioxide Emissions from Existing Power Plants*.

   The Iowa Office of Consumer Advocate calls on the EPA to take into account rate increases on consumers, and urges the agency to reflect the activities of early mover states in their guidelines that include renewable and nuclear power, along with energy efficiency improvements. The EPA should also account for emission shifts from the transportation sector to the utility sector due to the proliferation of natural gas and electric vehicles. Utilities and utility customers should not be overly burdened with complying with an emission reduction program as end use shifts occur.

7. **Kentucky Energy and Environment Cabinet (2013).** *Greenhouse Gas Policy Implications for Kentucky under Section 111(d) of the Clean Air Act.*

   Kentucky's air regulators support a mass based emission approach, as a rate based approach would lead to significant coal facility closures causing rate shocks in the state. The EPA should develop an emission reduction goal based on an individual state's fossil fuel mix, existing life of affected units, market conditions, and available energy efficiency and renewable energy. Kentucky provides a framework with a 2005 baseline, to reduce emissions by Obama's stated goal of 17% reductions in

GHG emissions by 2020, and includes a range of compliance options such as interstate reduction programs among others.

8. **Lyons, J. (2013).** *Kentucky Electricity Portfolio Model*.

   Kentucky provides an overview of the model they used to compute least cost carbon reduction programs for the state, titled the *Kentucky Electricity Portfolio Model*. The model shows that in Kentucky transitioning away from coal will be difficult and may lead to electricity reliability issues along with higher costs.

9. **Midwestern Power Sector Collaborative (2013).** *Initial Recommendations to the U.S. Environmental Protection Agency Regulation of Existing Power Plant Sources under Section 111(d) of the Clean Air Act.*

   The Collaborative included state regulators from Michigan, Minnesota, and Illinois along with regulated utilities and environmental groups. The collaborative suggested the EPA should provide credit for early actions and provide an averaging or crediting program to comply with emission reductions based on adequately demonstrated technologies. In addition, these entities suggested the EPA should include two specific approaches to emission reduction, the portfolio or energy system approach, and the state average carbon dioxide emission rate approach, which sets a percentage emission reduction target that can be achieved through any means that reduces direct emissions from power plants.

10. **Missouri Public Service Commission (2013).** *Letter to Administrator Gina McCarthy re: Missouri Public Service Commission's Comments on Section 111(d) of the Clean Air Act.*

    The Missouri Public Service Commission documents the likely impact of regional energy markets in complying with Section 111(d) policy, as Missouri utilities provide electricity across 16 states and two Regional Transmission Organizations. The commission suggests that the EPA provide flexibility in developing the best system of emission reduction, and highlights the state activity to assess energy source potential, while promoting 2005 as a baseline to track early mover GHG reductions.

11. **Nevada Division of Environmental Protection (2013).** *Letter to Regional Administrator of EPA Jared Blumenfeld re: Nevada Comments on USEPA's "Consideration in the Design of a Program to Reduce Carbon Pollution from Existing Power Plants," September 23, 2013.*

    The Nevada Division of Environmental Protection in consultation with the Public Utilities Commission argues that EPA needs to define the best system of emission reduction as broadly as possible and from a system-based reduction perspective.

They call on the EPA to set 2005 as the baseline year to track early mover GHG reductions. Performance standards should then be measured on a state by state basis, with some attention to the remaining useful life of emission sources. Finally, they suggest that EPA should be very involved in developing multiple state programs.

12. **Public Utilities Commission of Ohio (2013).** *Comments on the U.S. EPA Carbon Paper, Submitted on Behalf of The Public Utilities Commission of Ohio*.

    The Ohio Public Utilities Commission (PUCO) documents the impact other EPA regulations have had in leading to coal power plant retirements in the state. PUCO suggests that EPA should understand its statutory limitations and provide only guidelines from which states can develop specific plans. PUCO supports the NARUC point source approach for managing emissions from power plants, but they are concerned that the regulation will lead to an overreliance on natural gas, increasing rate volatility. PUCO is also concerned about the lack of adequate natural gas pipeline infrastructure, which it believes would lead to higher rates. PUCO does not want EPA to produce a model rule or mandate interstate emission programs. Rather, it holds EPA should allow states broad flexibility in achieving the emission standard.

13. **Regional Greenhouse Gas Initiative (Vermont, Rhode Island, New York, New Hampshire, Massachusetts, Maryland, Maine, Delaware, Connecticut) (2013).** *Letter to EPA Administrator Gina McCarthy re: Emission Standards Under Clean Air Act Section 111(d)*.

    The Regional Greenhouse Gas Initiative (RGGI) asserts that a Cap and Invest program supports a wide range of compliance options both in and outside the fence line, while providing a system in which you can more easily track GHG reductions at both the state and regional level. This regional focus is particularly important because most electrical grids are region based and such a compliance program would be the best fit. The EPA should also recognize early mover states and provide longer compliance schedules for those who have yet to act. Finally, EPA should employ a mass-based program as rate-based programs do not reflect energy efficiency credits well.

14. **Snitchler, PUCO (2013).** *Testimony of Todd Snitchler, Chairman of Public Utilities Commission of Ohio before Ohio General Assembly, House Policy and Legislative Oversight Committee*.

    The Chairman of the Ohio Public Utilities Commission (PUCO) testified to the General Assembly regarding the EPA Section 111(d) rulemaking. The chairman suggests that PUCO has been effective in helping to transform the utility industry and has been dealing with the coal retirements mandated by other regulations that will lead to fewer GHG emissions. Staff at PUCO argue that rate impacts from

retirements of coal facilities along with reducing emissions from power plants to comply with Obama's climate action plan range anywhere from .3% to 28.35%. This does not include capital and infrastructure costs, which the chairman argues will be significant.

15. **Texas Commission on Environmental Quality (2013).** *Letter to Administrator Gina McCarthy re: Comments on CO2 emissions for EGUs, Section 111(d) of the Clean Air Act.*

    The Texas Commission on Environmental Quality and the Public Utility Commission of Texas are concerned with the impacts of retirements on electricity reliability. To reduce some of these impacts, they suggest that EPA should select a system-based approach at least for the state of Texas. They note that other states may prefer or require a rate-based program. Regardless of the emission rate selected, EPA should provide a means to translate a mass-based program into a rate-based program to compare emission reductions. These agencies also note that Texas is somewhat unique in that the electrical grid lies nearly entirely in the state, thus interstate programs will not be critical to the state. They do argue that for those interested in an interstate program, they should be given longer compliance schedules. The agencies are also concerned with using State Implementation Plan renewable energy and energy efficiency methodology, while calling for an energy emergency safety valve component of the rule to protect reliability when intermittent sources are not performing.

16. **West Virginia Department of Environmental Protection (2014).** *Principles to Consider in Establishing Carbon Dioxide Emissions Guidelines for Existing Power Plants*.

    The West Virginia Department of Environmental Protection suggested that the EPA regulate carbon dioxide under the public welfare provisions of the CAA to provide maximum flexibility to states in complying with a mass based guideline. They set 2005 as the baseline to track early mover state GHG reductions. The EPA should also establish targets that recognize variations across states and provide flexibility in compliance both in and outside the fence line. The agency also suggests that EPA broaden the deadline for developing a plan to three years, to match the State Implementation Plan program.

17. **Wisconsin Public Service Commission (2013).** *Letter to Administrator Gina McCarthy re: Comments regarding development of carbon dioxide regulations for existing power plants*.

    The Wisconsin Public Service Commission, in consultation with the Department of Natural Resources, the State Energy Office, and numerous stakeholder groups asserted that early mover states should be given credit for their actions with a base

year of 2000, and they highlight the importance of including biomass as a compliance tool. These groups are also very concerned that in-state utilities that contract or own out of state renewable energy facilities should have this production counted for their in-state electricity use. The document provides methodology regarding how the state measures compliance with its RPS to demonstrate how to measure these out of state emission savings, along with a similar discussion of their voluntary energy efficiency program. These entities would also like to see a source based emission standard as this has statutory precedence and is more likely to allow continued generation at existing facilities. They also call on the EPA to provide a longer deadline for developing a plan, and allow up to seven years to comply.

18. **Wyoming Public Service Commission (2013).** *Letter to EPA Acting Assistant Administrator McCabe re: Section 111(d) Guidelines.*

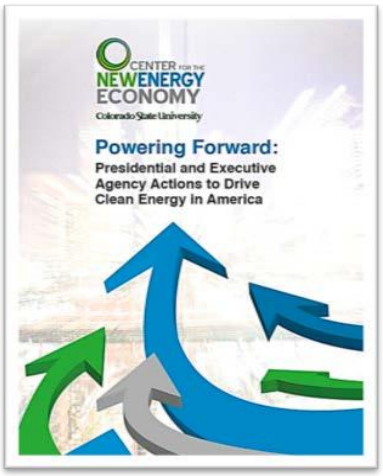
    The Wyoming PUC submitted these comments to the EPA after a formal meeting between the two parties to follow up on the concerns the PUC has regarding rate shocks from new Section 111(d) regulations. The PUC provides retirement and stranded cost scenarios to the EPA regarding several existing facilities in Wyoming. The Wyoming PUC also noted the role of their multistate protocol in determining cost allocations and suggested that system-based emission standards would be problematic for Wyoming in general and is further complicated by the protocol.

19. **North Carolina (2014).** *North Carolina 111(d) Principles*.

    The North Carolina Department of Environment and Natural Resources document discussed the roles of the EPA and state and local air agencies with respect to Section 111(d) Rulings. The document focused on the importance of cooperative federalism in regulating sources in state and local air agencies stating that these agencies have the primary responsibility and discretion to regulate sources in their jurisdictions; a discretion which has been given to them via the CAA. This authority should continue to be held by state and local air agencies when GHG emissions begin to be regulated under Section 111(d) as it has been in previous rulings.

E. Recommendations from CNEE's Powering Forward Report

CNEE's recent report, *Powering Forward: Presidential and Executive Agency Actions to Drive Clean Energy in America*, made several recommendations related to §111(d).



The *Powering Forward* project was conceived in March, 2013, following a meeting President Obama convened with 14 energy industry and thought leaders to discuss what can be done to advance clean energy, recognizing that new legislation from Congress is unlikely. Following the meeting, CNEE was asked to take the lead in bringing together many of the nation's energy experts to develop a comprehensive collection of executive policy options. CNEE engaged more than 100 experts and stakeholders during the summer and fall of 2013 around the following questions: What should President Obama do during the remainder of his term to help the United States transition to a clean energy economy? What presidential and executive agency actions could be taken without requiring action from Congress? What new ideas can help the President implement his Climate Action Plan and empower states to continue their leadership?

The result is more than 200 specific recommendations for President Obama and his Administration in five policy areas: energy efficiency, renewable energy financing, responsible natural gas production, electric utility business models for the 21st century, and alternative fuels and vehicles.

In each area, CNEE conducted an inventory of policy proposals from non-government and academic organizations, convened roundtables of key experts and stakeholders, and subjected the results to several rounds of peer review. CNEE has now submitted a full report to the White House and has briefed key members of the President's Cabinet and staff.

The President and his staff are inundated with ideas from policy advocates and interest groups on all manner of topics, including his energy policies. What makes this report unusual is the breadth and depth of the recommendations, the fact that it was inspired by a meeting convened by the President, and the involvement of more than 100 industry C-level executives, non-government organizations, and state officials from across the country. Below are some of the recommendations from *Powering Forward* that highlighted what federal agencies and states should do regarding the 111(d) legislation.

CNEE concluded that if EPA gives states, state utility regulators and electric utilities sufficient flexibility, including credit for emission reduction measures beyond power plant

fence lines, the regulation will be a market stimulus.[12] The Administrator of EPA should:

1. Look beyond the power plant. Work with DOE to assess the potential for cost-effective renewable energy programs and policies to reduce greenhouse gas emissions from any generation stations in a utility's fleet and beyond the fleet to other carbon-cutting investments such as qualified distributed generation using clean energy technologies. Cite DOE's findings in a Notice of Data Availability and use them in EPA's modeling (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 39).

2. Provide clear guidance to states. Provide clear guidance in the regulatory dockets about the kinds of flexible, state-initiated approaches EPA is prepared to approve as equivalent to whatever default federal performance standard it establishes as a guideline. Be explicit about how EPA will quantify emission reductions attributed to the use of clean energy resources. Establish national guidelines (rather than guidelines at the regional level where state SIPs are approved) on the emission reduction approaches EPA will consider acceptable and give all stakeholders the opportunity to comment on those alternatives before the federal regulations are finalized. Issue clear preliminary guidance to states as early as possible in the regulatory process to encourage early adoption of new energy efficiency and renewable energy measures with assurance that measures consistent with the guidance will be credited under Section 111(d). Encourage state PUCs to open relevant state dockets ahead of EPA's guidance(*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 40).[13]

3. Actively promote renewable energy technologies. Instruct EPA Regional Offices to actively promote the use of renewable energy programs and policies in compliance plans and to streamline the approval process for those measures (*Powering Forward*, Chapter 1: Doubling America's Energy Productivity, p. 25).

4. Quantify the value of renewable energy in Clean Air Act compliance. Develop information for states and PUCs on how renewable energy technologies can reduce the

[12] In general, "beyond the fence line" emission reduction efforts can take two forms. First, EPA could allow an electric utility to bring one existing plant into compliance by reducing greenhouse gas emissions in one or more of its other power plants. Second, a utility might achieve compliance in part by sponsoring programs that reduce emissions outside the company's generation system—for example, demand-side management programs that reduce power consumption or distributed solar and wind energy systems that replace fossil-fired power with zero-carbon electric generation. As in other EPA regulations, compliance measures would have to be verifiable and enforceable.

[13] This is a timing issue. If state PUCs wait until after EPA issues its draft guidance next summer, it could be another year or more before PUCs approve energy efficiency and renewable energy programs and measurement and verification methodologies. PUC approval is crucial because they oversee all utility demand side management. If PUCs could anticipate EPA's ruling and have dockets opened to discuss the issue while EPA is completing its guidance, months and perhaps years of time could be saved. EPA and the White House would encourage this head start if it provided states and PUCs with cover by communicating that energy efficiency and renewable energy measures that reduce greenhouse gas emissions at or outside power plants will count in SIPs.

cost of compliance with Clean Air Act requirements and how states might count renewable energy systems as avoided costs in utility regulation (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 40).

5. Help states incorporate renewable energy in Section 111(d) plans. Collaborate with DOE to provide states with technical assistance and information to help them incorporate renewable energy into compliance programs under Section 111(d) (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 40).

6. Streamline solar development in nonattainment areas. Qualify solar energy projects as a LAER (lowest achievable emission rate) compliance tool under the Clean Air Act 1990 amendments, in order to streamline the development of solar projects in nonattainment areas(*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 40).

7. Give investors economic assessment tools: Direct DOE to inform the energy investment community about the availability of EPA tools that states use to estimate the economic benefits of energy efficiency and renewable energy programs.[14] These tools can be helpful to investors and financiers if EPA allows states to meet power plant emission targets with energy efficiency and renewable energy programs. Section 111(d) would be a market driver; the EPA's tools will help investors evaluate project benefits (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 66).

8. Coach the states. Direct EPA's Regional Offices to serve as "coaches" to help states incorporate energy efficiency and renewable energy into SIPs and Section 111(d) plans, as well as New Source Review and Prevention of Significant Deterioration permitting. Equip EPA's Regional Offices to help states calculate the economic as well as environmental benefits of energy efficiency measures in their SIPs (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 35).

9. Help utilities comply with greenhouse gas limits. Direct DOE and its national laboratories to provide technical assistance, as requested, to utilities as they comply with greenhouse gas emission regulations under Section 111(d) of the Clean Air Act (*Powering Forward*, Chapter 2: Developing Renewable Energy Markets, p. 115)

10. Create larger and more stable markets for renewable energy technologies: For example, design EPA's upcoming power plant regulations under Section 111(d) to allow renewable energy investments to be credible compliance measures (*Powering Forward*, Chapter 1: Doubling America's Energy Productivity, p. 21).

[14] EPA's tools include the Co-Benefits Risk Assessment Screening Model (COBRA), which assess the economic and health benefits of energy efficiency and renewable energy in public buildings and an energy impact calculator that estimates the annual energy savings that can be achieved by different state policies.

About the Center for the New Energy Economy

The Center for the New Energy Economy (CNEE) provides policy makers, governors, planners and other decision makers with a roadmap that will accelerate the nationwide development of the new energy economy. That economy will create and keep jobs in the United States; encourage development and use of clean and affordable domestic energy; protect our environment and climate; and keep America on the leading edge of global competition.

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