Comments of the American Council for an Energy-Efficient Economy (ACEEE) On the Environmental Protection Agency's Proposed Clean Power Plan

November 2014

Contents

Introduction

The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit 501(c)(3) organization, acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. We believe that the United States can harness the full potential of energy efficiency to achieve greater economic prosperity, energy security, and environmental protection for all of its people. We appreciate the opportunity to comment on the proposed rule *Carbon Pollution Emission Guidelines for Existing Sources: Electric Utility Generating Units*, Docket ID No. EPA-HQ-OAR-2013-0602.

We commend the Environmental Protection Agency (EPA) for proposing a rule that recognizes the low-cost emissions benefits that can be attained by the power sector through end-use energy efficiency. Efficiency is proven to be good for the environment and the economy, saving consumers money and creating jobs. While the proposed Clean Power Plan provides a mechanism for the power system to take advantage of one of its greatest tools for reducing emissions, there are some ways that the proposal could be strengthened. Our comments below make a number of recommendations for improving the rule as it relates to end-use energy efficiency. Broadly, we support flexibility for states but request that EPA provide additional clarity on a number of specific issues so that regulatory uncertainty does not deter states from taking advantage of energy efficiency to reduce pollution and the cost of implementation. A lack of regulatory certainty may cause states to choose more expensive compliance options, increasing the cost of EPA's rule.

We also believe more low-cost efficiency than has been identified in the best system of emission reductions (BSER) has been well demonstrated in states and should be fully incorporated in the emissions standard. Significant energy savings have been documented from building energy codes and combined heat and power (CHP), and the future savings from these policies, programs, and measures should be recognized in the emissions targets. Furthermore, savings from appliance standards are already slated to happen and could account for a significant amount of a state's overall goal. We make suggestions for addressing these issues in our comments.

The impact of EPA's proposal would be wide-ranging, and we have limited our comments here to a small subset of priority issues. We invite additional dialogue and intend to continue our work to help states and stakeholders understand the potential for energy efficiency to reduce carbon dioxide emissions from the power sector. Our comments herein are limited to the following broad topics:

- BSER: expanding the fourth building block
- Balancing clarity and flexibility: providing states with adequate guidance on creditable policies, programs, and projects
- Crediting end-use energy efficiency: specific recommendations for calculating and attributing efficiency
- The modeling: recommendations on specific assumptions and calculations related to end-use energy efficiency

We also include appendices that provide additional specifics on evaluation, monitoring, and verification (EM&V); savings from federal appliance standards; and crediting of emissions that are avoided by using combined heat and power.

Best System of Emission Reduction: Expanding the Fourth Building Block

Pursuant to Title 42 U.S. Code § 7411 (a)(1), in setting a standard of performance for stationary sources of air pollution, EPA must set a standard that "reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air-quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated."

We believe several energy efficiency policies, programs, and projects that sufficiently satisfy the legal requirements of Section 111(d) of the Clean Air Act were excluded from the determination of the BSER. The nature of each of these policies is delineated in the following sections, as well as how they may satisfy the requirements to be included in the BSER.

Utility Energy Efficiency Savings of 1.5% Per Year Should Be Maintained in the BSER

Key recommendation: The BSER should include energy efficiency savings from utility programs of 1.5% per year or greater by 2030.

In the draft rule, EPA establishes Building Block 4 targets by taking each state's current savings from utility-sector energy efficiency programs and gradually ramping them up to 1.5% savings per year. We believe the 1.5% is a reasonable target, but state utility efficiency programs can achieve much more. The ACEEE *2014 State Energy Efficiency Scorecard* finds that six states achieved or exceeded this level of savings in 2013 (Arizona, Hawaii, Massachusetts, Michigan, Rhode Island, and Vermont). Several additional states are between 1% and 1.5% savings per year. Table 1 lists the states with savings greater than 1%. Note that Illinois saved 0.99%.

Table 1. Annual utility energy efficiency savings greater than 1% by state. ***Source:*** **Gilleo et al. 2014**

State	Electricity savings as a % of retail sales (2013)
Rhode Island	2.09%
Massachusetts	2.05%
Vermont	1.78%
Arizona	1.74%
Hawaii	1.67%
Michigan	1.51%
Oregon	1.43%
Washington	1.35%
New York	1.13%

State	Electricity savings as a % of retail sales (2013)
Iowa	1.06%
Minnesota	1.04%

Even more states are on record as planning to ramp up to this level of savings, including Maine, Maryland, Minnesota, and Colorado, with several more states approaching 1.5% per year (table 2).

Table 2. Annual utility energy efficiency savings targets by state

State	Approximate annual electric savings target (2014–2020)
Massachusetts	2.6%
Arizona	2.4%
Rhode Island	2.3%
Vermont	2.0%
Maryland	1.6%
Maine	1.6%
Minnesota	1.5%
Colorado	1.5%
Oregon	1.4%
Connecticut	1.4%
Washington	1.4%
Hawaii	1.4%
Iowa	1.3%

Source: Gilleo et al. 2014

Experience shows that this level of savings can be achieved for many years in a row. For example, Vermont first achieved 1.5% per year savings in 2007 and has sustained at least this level of savings since then. The state recently reviewed efficiency opportunities still available, and based on this, Efficiency Vermont (the program operator) and the Vermont Public Service Board recently decided to establish savings goals for 2015–2018 averaging over 2% per year (Scott Johnstone, executive director, Vermont Energy Investment Corporation, pers. comm., September 23, 2014). Similarly, both Massachusetts and Rhode Island recently decided to increase their savings targets above 2% per year (see table 2 above), even though they have been aggressively implementing energy efficiency programs since the late 1980s.

Many new efficiency program approaches are emerging that will allow this level of savings to be sustained. For example, ACEEE's 2013 report *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings* examined 20 different program areas that collectively could reduce 2030 electricity use by about 27% relative to EIA's *Annual Energy Outlook* forecast (York et al. 2013).

Importantly, these savings targets are typically limited to ratepayer-funded, utility energy efficiency programs. These programs represent only a subset of the cost-effective, adequately demonstrated, technologically feasible end-use energy efficiency that can be used to reduce CO_2 emissions from the power sector. For example, we discuss below potential savings from the adoption of building energy codes and CHP. The savings from these types of policies are different from and largely additional to the savings that utility energy efficiency programs have achieved. Although states are beginning to explore utility support for increased compliance with building codes, this is a new and emerging practice and does not result in any significant overlap in our calculations of potential savings from building energy codes and utility programs. Many new efficiency measures are also emerging. All of these energy savings opportunities mean that the 1.5% per year savings level is actually a conservative estimate of what states have demonstrated can be achieved

A Faster Ramp-Up of the 1.5% Efficiency Standard Is Achievable by States

Key recommendation: EPA should adjust the annual ramp-up rate for efficiency in states from 0.20% per year to 0.25% per year.

In calculating emissions rate goals for states, EPA assumed state energy efficiency savings ramp up from their current levels incrementally at a rate of 0.20% annually until reaching 1.5% annual energy savings. In the proposed rule, EPA specifically solicits comment on raising the rate of increase to 0.25% per year. A substantial amount of evidence exists to support a rate of incremental increase in energy savings of 0.25% annually.

EPA's own assessment of the historic energy savings of 73 separate efficiency programs found average annual first-year energy savings of 0.3–0.38%, well above the 0.2% that was assumed in EPA's calculations (GHG Abatement Measures TSD, 5-70).[1] Currently, several states have energy efficiency resource standards (EERS) in place that require increases in incremental energy savings greater than 0.2% annually. Rhode Island's current EERS requires utilities operating in the state to increase energy savings by 0.4% between 2012 and 2013, then again by 0.4% from 2013 to 2014. In Massachusetts an EERS requires utilities to increase energy savings incrementally by 0.6% from 2010 to 2011, and by 0.4% from 2011 to 2012. Utilities in Arizona are subject to an EERS that requires incremental increases in energy savings of 0.25% each year from 2011 to 2014. Michigan's EERS requires incremental increases in energy savings of 0.23% annually from 2009 to 2012 (ACEEE 2014).

Furthermore, a number of states have recently achieved incremental increases in annual energy savings at or above 0.25%. Tables 3 and 4 below illustrate that across multiple regions, energy mixes, and levels of experience with energy efficiency, states can achieve incremental annual increases in energy savings above 0.25%.

---

[1] http://www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf.

Table 3. Increase in incremental energy savings 2011–2012

State	Increase in incremental energy savings
Arizona	0.28%
Illinois	0.35%
Maryland	0.29%
Massachusetts	0.37%
Rhode Island	0.30%

Source: Downs et al. 2013; Gilleo et al. 2014

Table 4. Increase in incremental energy savings 2012–2013

State	Increase in incremental energy savings
District of Columbia	0.26%
Hawaii	0.43%
Massachusetts	0.25%
Michigan	0.36%
Missouri	0.37%
Nevada	0.27%
Oregon	0.33%
Rhode Island	0.54%
Washington	0.43%

Source: Gilleo et al. 2014

Building Codes Should Be Included in the BSER

Key recommendation: The BSER should include energy efficiency that could occur due to the adoption of, updating, and increased compliance with building energy codes. State-specific estimates of the cost-effective savings available should be added to Building Block Four.

There is a tremendous potential for additional CO_2 reductions to be achieved by the implementation of national model building energy codes. A recent report by ACEEE found the potential for energy savings from both residential and commercial building codes to be dispersed across all states, with cumulative energy savings between the years 2016–2030 ranging from 953,000 million megawatt-hours (MWh) to 133,768,000 MWh (Hayes et al. 2014). These calculations of the potential savings from adoption of building codes are being updated based on modification of some assumptions so that our analysis conforms to the Clean Power Plan. These updated numbers will be available in early January 2015 and will be submitted to EPA directly in a separate filing.

A 2009 econometric study examined residential energy code adoption across 48 states from 1970 to 2006 and found that the establishment of residential building energy codes alone reduced state per capita residential energy consumption by 0.3–5% in 2006 (Aroonruengsawat, Auffhammer, and Sanstad 2009). At the national level the study found residential energy consumption savings of 2.09–4.98% in 2006 from the adoption of building energy codes. The study asserts that the energy savings experienced over the examined period may only represent a lower bound of the potential energy savings from residential codes.[2]

Similarly, a second econometric study published in 2011 by the Climate Policy Initiative used a regression analysis to examine the residential energy consumption of states with building energy codes as compared to those without (Deason and Hobbs 2011). This study found residential energy codes reduced primary energy consumption in the sector by 1.3% in 2008. These energy savings were found to be responsible for a 1.8% reduction in energy-related emissions from the residential sector in 2008 as well.

The adoption of building energy codes, as well as code-compliance improvement activities, have already accounted for a great deal of quantifiable energy savings and emission reductions across many states and jurisdictions. The Department of Energy-sponsored Building Energy Codes Program (BECP) has worked since 1992 to aid states in improving building energy efficiency through the adoption and implementation of building energy codes and standards. A 2013 assessment of the BECP found program activities to have contributed 2 quads of cumulative site energy savings over the 1992–2012 time period. These energy savings were calculated to have resulted in 344 trillion tons of avoided CO_2 emissions from the electric power sector over that same time period (PNNL 2014a).

A 2009 study completed by the Northwest Energy Coalition examined historic and future projections of energy savings in the electric power sector attributable to energy efficiency in Washington, Oregon, and California. This study found that in 2006, state building energy codes accounted for an average of roughly 900 MW of energy savings from the electric power sector (NW Energy Coalition 2009).

Remarkable advances in the energy efficiency achieved by new versions of both residential and commercial energy codes have led to significant continued reductions in the energy consumption of newly constructed buildings subsequent to these studies. Figure 1 shows this trend.

---

[2] For example, a 2013 study completed by the Institute for Market Transformation (IMT) found that future improvements in code compliance could yield as much as 7.88 quadrillion Btu of energy savings in the first year (Stellberg 2013).

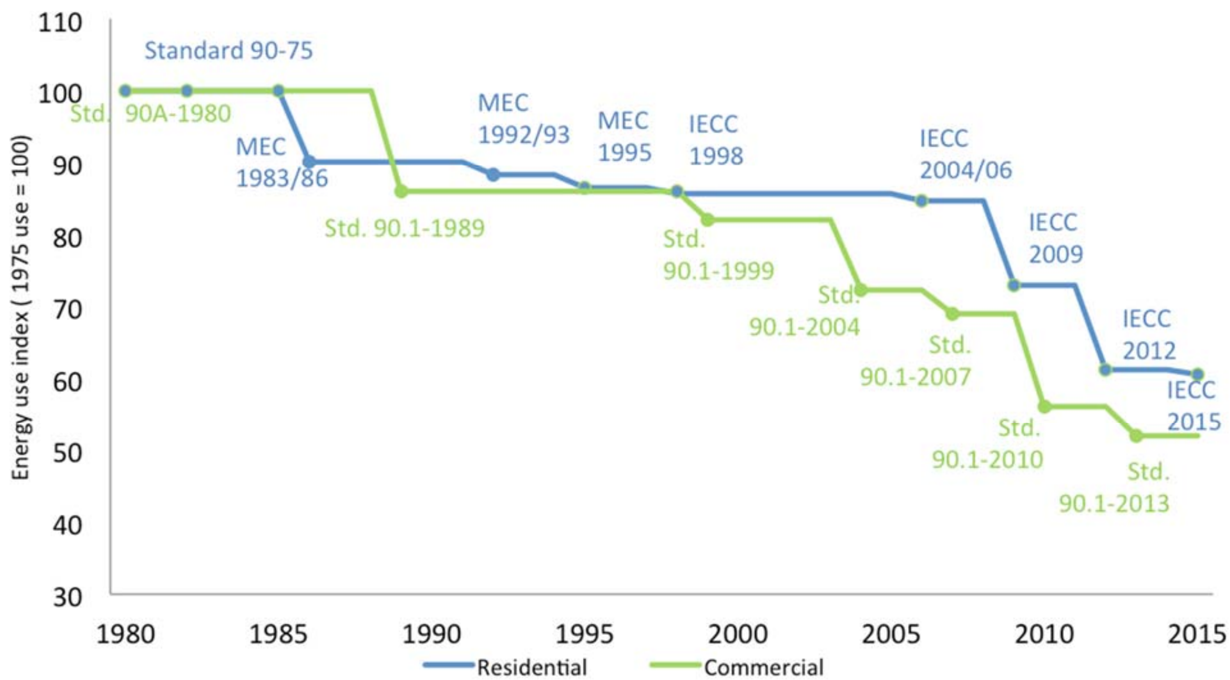

Figure 1. History of residential and commercial energy code efficiency improvements. *Source:* ACEEE calculation.

With each new iteration of the International Energy Conservation Code (IECC) for residential buildings and the ASHRAE Standard 90.1 for commercial and high-rise multifamily buildings, the energy consumption of newly constructed buildings and those undergoing major retrofits or renovations further decreases. The Department of Energy (DOE) calculated a national average source-energy-use intensity reduction for new commercial construction of 3.9% in moving from ASHRAE 90.1-2004 to ASHRAE 90.1-2007 (PNNL 2011a) and a further 18.2% in moving from ASHRAE 90.1-2007 to ASHRAE 90.1-2010 (PNNL 2011b). The recently released ASHRAE 90.1-2013 standard for commercial new construction will continue this trend, reducing the source-energy-use intensity of new buildings by 7.2% when compared to the 2010 code (PNNL 2014b).

With regard to single family and low-rise multifamily new residential construction, a 2012 study by the DOE found average site energy savings of 32.1% when comparing buildings that meet the 2012 IECC with buildings that meet the 2006 IECC (DOE 2012b).

As previously mentioned, many states' energy code compliance rates are below 100%, leaving additional energy savings from current codes yet to be realized. States, DOE, and utilities are increasingly focused on improving compliance with building energy codes (historically the province of local governments) and on accurately measuring compliance rates. Demonstrated savings from improved compliance with codes should be included in the BSER along with savings from improved codes.

Building energy codes are already in place and common across the majority of the United States. As of September 2014, 40 states have in place mandatory statewide residential energy codes, 42 states have in place mandatory statewide commercial codes, 9 states and the District of Columbia have adopted the 2012 IECC for residential buildings, and 13 states and the District of Columbia already have the ASHRAE 90.1 2010 in place for commercial buildings.[3] Figures 2 and 3 below illustrate the code adoption status of the states.

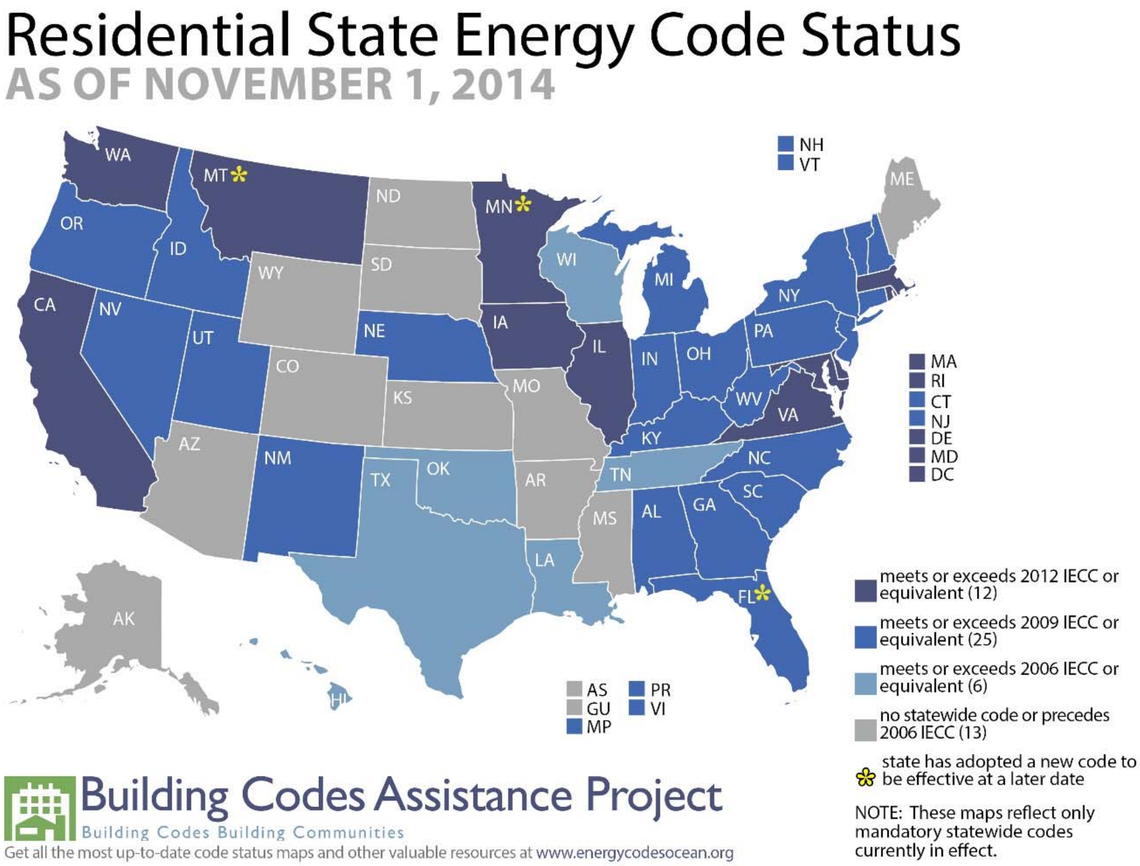

Figure 2. Residential state energy code status as of November 2014. *Source:* Building Codes Assistance Project http://energycodesocean.org/code-status-residential.

[3] http://energycodesocean.org/code-status-residential. http://energycodesocean.org/code-status-commercial.
http://energycodesocean.org/code-status-residential. http://energycodesocean.org/code-status-commercial.

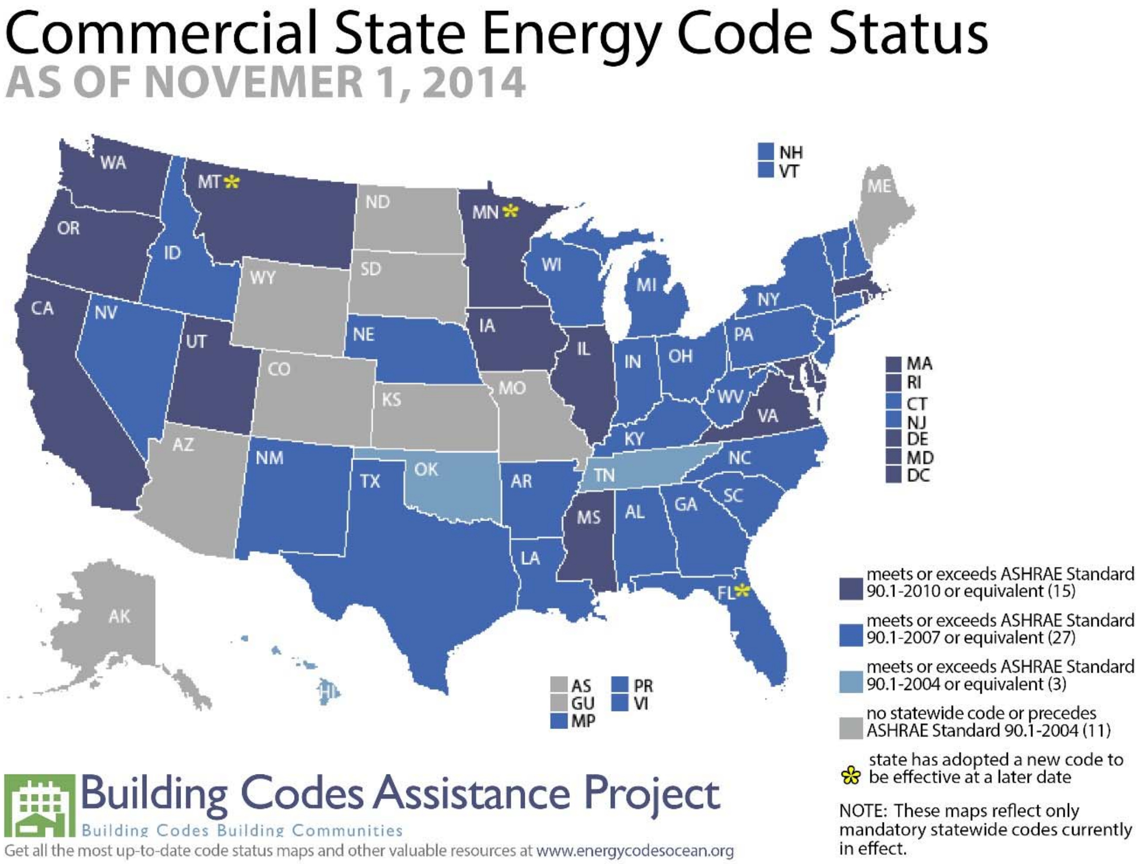

Figure 3. Commercial state energy code status as of November 2014. *Source:* Building Codes Assistance Project http://energycodesocean.org/code-status-commercial.

Additionally, the Cadmus Group found in a 2013 report that 17 states[4] are already working toward increasing utility involvement and reliably quantifying the energy savings from building energy codes. Through its Building Technologies Program, the DOE has also awarded millions of dollars to states to implement training and education programs and provide technical assistance on building codes through state and federal partnerships. Four states (Arizona, California, Massachusetts, and Rhode Island) have already made significant progress in implementing robust utility-run energy code programs for which utilities may take some form of energy savings credit (Cadmus Group Inc. 2013). These state efforts have established reliable mechanisms for ensuring compliance with building codes and for evaluating, measuring, and verifying the energy savings that code adoptions produce.

In addition to the tremendous potential to reduce emissions, we discuss below how building energy codes are a cost-effective and well-demonstrated policy mechanism. In determining the

[4] Arizona, California, Colorado, Connecticut, Georgia, Illinois, Iowa, Maryland, Massachusetts, Minnesota, New Hampshire, New York, Ohio, Oregon, Rhode Island, Vermont, and Washington.

best system of emission reduction, EPA is obligated to consider the cost of each measure included. Building energy codes provide cost-effective energy savings and emission reductions that last for decades in both the residential and commercial sectors. The added up-front investment for new construction building energy codes is repaid in the form of energy savings and reduced energy bills over the life cycle of a building. As discussed below, this has been demonstrated through multiple studies spanning several editions of both the IECC and ASHRAE Standard 90.1.

At the state level, multiple studies have demonstrated the cost effectiveness of building energy codes for residential and commercial new construction. PNNL has completed studies on 21 states and the District of Columbia and found ASHRAE standard 90.1-2010 for commercial buildings to yield cost-effective energy savings in each state examined with the average simple payback for added construction costs ranging from 1.2 to 8.1 years (PNNL 2013).[5] A similar set of state-specific studies completed by the DOE for single-family and low-rise multifamily buildings analyzed the cost effectiveness of the 2012 IECC in 43 states and the District of Columbia. The studies found cost-effective energy savings in each state as well, with the average simple payback period for added construction costs ranging from 2.6 to 8.4 years (DOE 2012a).[6]

Given the volume of evidence demonstrating the effective implementation, cost effectiveness, and emissions avoided through the adoption of building codes in a large number of states, we recommend that building energy codes be included in the best system of emissions reductions and that Building Block 4 be adjusted to reflect the potential carbon reductions that can be achieved through building energy codes.

Combined Heat and Power Should Be Included in the BSER

Key recommendation: The BSER should include energy efficiency that could be gained as a result of the construction of cost-effective combined heat and power. State-specific estimates of the cost-effective savings available should be added to Building Block 4.

In a recent report, ACEEE found that more than 68 million MWh of energy could be saved in 2030 from installing CHP, which represents approximately 18 GW of avoided capacity (Hayes et al. 2014). These energy savings could cut carbon dioxide emissions and offset the need for about 36 power plants. Table 5 shows savings by state.

---

[5] Series of studies released simultaneously in November 2013, collectively cited as PNNL 2013. http://www.energycodes.gov/development/commercial/cost_effectiveness.

[6] Series of studies released over several months in 2012, collectively cited as DOE 2012a http://www.energycodes.gov/development/residential/iecc_analysis.

Table 5. Potential energy savings from CHP technologies (MWh)

State	Annual energy savings in 2020	Annual energy savings in 2030	Cumulative energy savings by 2030
Alabama	92,000	153,000	1,888,000
Alaska	177,000	532,000	4,367,000
Arizona	89,000	271,000	2,212,000
Arkansas	85,000	262,000	2,103,000
California	4,457,000	13,533,000	110,322,000
Colorado	132,000	413,000	3,289,000
Connecticut	794,000	2,438,000	19,698,000
Delaware	0	0	0
District of Columbia	11,000	31,000	263,000
Florida	1,081,000	3,221,000	26,666,000
Georgia	544,000	946,000	10,228,000
Hawaii	274,000	801,000	6,736,000
Idaho	0	0	0
Illinois	433,000	1,351,000	10,767,000
Indiana	140,000	432,000	3,482,000
Iowa	32,000	92,000	783,000
Kansas	105,000	324,000	2,597,000
Kentucky	334,000	1,065,000	8,332,000
Louisiana	511,000	1,624,000	12,738,000
Maine	12,000	34,000	293,000
Maryland	117,000	337,000	2,868,000
Massachusetts	1,209,000	3,690,000	29,956,000
Michigan	282,000	471,000	4,912,000
Minnesota	256,000	797,000	6,372,000
Mississippi	258,000	802,000	6,412,000
Missouri	62,000	179,000	1,519,000
Montana	9,000	25,000	212,000
Nebraska	75,000	231,000	1,855,000
Nevada	29,000	84,000	711,000
New Hampshire	262,000	804,000	6,499,000
New Jersey	1,387,000	4,278,000	34,424,000
New Mexico	38,000	118,000	948,000

State	Annual energy savings in 2020	Annual energy savings in 2030	Cumulative energy savings by 2030
New York	6,163,000	18,423,000	152,164,000
North Carolina	98,000	163,000	2,008,000
North Dakota	23,000	65,000	556,000
Ohio	307,000	949,000	7,613,000
Oklahoma	29,000	83,000	709,000
Oregon	0	0	0
Pennsylvania	174,000	504,000	4,284,000
Rhode Island	92,000	284,000	2,281,000
South Carolina	231,000	624,000	5,562,000
South Dakota	12,000	31,000	276,000
Tennessee	477,000	632,000	7,432,000
Texas	1,273,000	3,959,000	31,636,000
Utah	12,000	6,000	156,000
Vermont	120,000	368,000	2,972,000
Virginia	291,000	766,000	6,624,000
Washington	0	0	0
West Virginia	94,000	299,000	2,351,000
Wisconsin	562,000	1,786,000	14,010,000
Wyoming	26,000	27,000	372,000
National	**23,270,000**	**68,309,000**	**564,459,000**

Source: Hayes et al. 2014

EPA has already recognized the value of CHP as a proven cost-effective technology to reduce greenhouse gas emissions by incorporating CHP in its BACT guidance and its 111(b) rule and by issuing awards to various CHP ENERGY STAR® projects in recognition of their emissions reductions. Of particular note, the Proposed Standards of Performance for Greenhouse Gas Emissions from New Electric Generating Units explicitly recognizes the greenhouse gas benefits provided by the thermal energy produced from CHP systems (Alliance for Industrial Efficiency 2014).

Additionally, several studies have shown that CHP is a low-cost-generation option when compared with the cost of reducing emissions from other sources (Chittum and Farley 2013). Further, in many parts of the country, CHP not only provides cost-effective emissions reductions and operating savings for the CHP owner or operator, but it also represents an economical supply of new generation. A comparison of the cost of electricity generated from small, medium, and large CHP projects with delivered electricity costs in New Jersey indicated that CHP represents a cost-effective source of new generation capacity for the state as a whole and that these conditions exist in other regions (DOE and EPA 2012).

The amount of CHP currently installed is far below its estimated potential. CHP currently provides about 83 GW of capacity, representing 8% of installed U.S. electric generating capacity and over 12% of total electricity generation. But CHP has the potential to achieve much more and remains a largely untapped resource. Recent estimates indicate an additional 130 GW of capacity is viewed as technically feasible at existing industrial and commercial/institutional facilities (ICF International 2013).

CHP is a distributed energy resource located at the point of use that can be deployed quickly and in every region of the country. Twenty-three states recognize CHP in one form or another as part of their Renewable Portfolio Standards or Energy Efficiency Resource Standards (EIA 2012). A handful of states including New York, California, Massachusetts, Connecticut, and others have developed innovative approaches to increase deployment of CHP for its energy savings and emissions benefits. States with policies that encourage CHP growth generally have more installed capacity than states without such policies. Figure 4 shows CHP capacity by state.

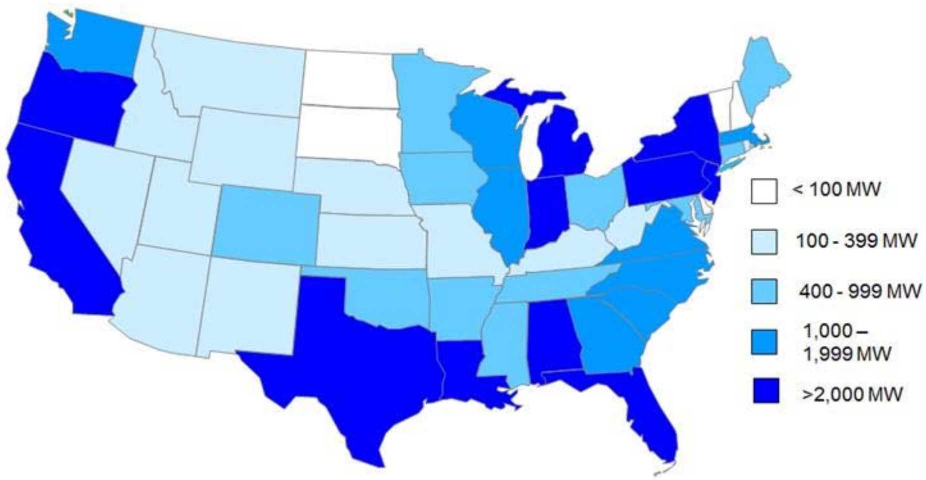

Figure 4. Existing CHP capacity by state. *Source:* ICF International and American Gas Association.

CHP is a well-established resource with a long history of use in every state of the nation. Today, there are CHP installations at over 4,300 facilities in the United States (ICF International 2013). About 87% of the current installed CHP capacity is in the industrial sector, with the most CHP capacity in chemicals, refining, and paper (Hampson and Rackley 2014; DOE and EPA 2012). The remaining CHP applications are located at commercial or institutional facilities such as hospitals, universities, and other large complexes. Compared to the average fossil-based electricity generation, the entire existing base of CHP saves 1.8 quads of energy annually and eliminates 240 million metric tons of CO_2 emissions each year (equivalent to the emissions of over 40 million cars) (DOE and EPA 2012).

In recognition of the demonstrated benefits of CHP, President Obama established a national goal of 40 gigawatts of new CHP capacity by 2020 (Executive Order No. 13,624, 2012). According to the 2012 Executive Order, achieving this goal would result in real energy savings of 1 quad (1% of total U.S. energy use) and real cost savings of $10 billion for U.S. manufacturers, while reducing emissions by 150 million metric tons of CO_2 per year.

Given the volume of evidence demonstrating the cost effectiveness and technical feasibility of combined heat and power in a large number of states, we recommend that combined heat and power be included in the BSER and that Building Block 4 be adjusted to reflect the potential carbon reductions that can be achieved through the construction of cost-effective facilities.

Treating Savings from Federal Appliance and Equipment Energy Efficiency Standards

Key recommendation: States using the Energy Information Administration's Annual Energy Outlook Reference Case as a method to forecast emissions rates in their compliance plans should not be allowed to claim credit for federal appliance and equipment standards to avoid double counting of those emissions reductions. For cases where this does not apply, if states seek credit for emissions reductions that occur due to the adoption, updating, and increased compliance with federal appliance standards, then those states should work with EPA regional offices to adjust their emissions targets to reflect this increased potential.

A tremendous amount of end-use energy efficiency is achieved throughout the United States each year. These energy savings and greenhouse gas reductions come about because of state policies such as those recognized in EPA's proposed BSER, but also because of activities beyond state control. For example, significant energy savings and emissions reductions are achieved because of federal appliance standards. DOE has established many new efficiency standards in recent years, standards that will continue to save energy over the 2020–2030 compliance period under the proposed rule. In addition, DOE is now working on more than a dozen new standards that will add substantially to the energy savings during the compliance period. We estimate that the savings from existing and pending standards average about 0.82% of electricity sales for each year over the 2020–2030 period (ACEEE's estimates can be found in Appendix A).

There is some ambiguity regarding how federal appliance and equipment standards will be treated and how states should account for them in their compliance plans. We make the following recommendations for addressing these standards.

Current federal appliance and equipment standards have already been accounted for in the Energy Information Administration's Annual Energy Outlook Reference Case (AEO). Therefore, states using AEO as a method to forecast emissions rates in their compliance plans should not be allowed to claim credit for federal appliance and equipment standards to avoid double counting of those emissions reductions.

For cases where this does not apply, we recommend that EPA provide guidance for states that seek to take credit for carbon reductions associated with federal appliance and equipment standards. States that opt to obtain such credit should work with EPA to determine an adjusted BSER and state goal reflecting this expanded scope of potential reductions.

Alternatively, in the final rule EPA could set the BSER and state goals for all states to reflect the emissions reductions that will occur as a result of federal appliance and equipment standards that have already been finalized or that are pending and will take effect before 2030.

Balancing Clarity and Flexibility: Providing States with Adequate Guidance on Creditable Policies, Programs, and Projects

Guidance on Crediting Building Codes

Key recommendation: EPA should issue guidance detailing examples of how states may obtain credit in their 111(d) compliance plans for carbon dioxide reductions from adoption of, and increased compliance with, building energy codes.

The adoption and implementation of building energy codes have the potential to yield massive, cost-effective energy savings and emissions reductions for states. Historically, the adoption of building energy codes has varied widely among states and smaller jurisdictions, such as counties and municipalities. Each state is unique in its administration of building energy codes, the rate of new commercial and residential construction, climate zone, level of utility involvement, and compliance practices.

ACEEE suggests EPA offer guidance detailing a flexible approach, with specific examples concerning how a state may take credit for the energy savings resulting from building energy code adoption and other code-related activities. This guidance should provide states information on code implementation, enforcement, EM&V, compliance verification, and potential structures of utility involvement, all of which can be based on real-world practices already employed in a number of states. Some specific recommendations are included in Appendix B to these comments.

Guidance on Crediting Combined Heat and Power

Key recommendation: EPA should issue guidance detailing examples of how states may obtain credit in their 111(d) compliance plans for carbon dioxide reductions from combined heat and power.

CHP represents a rapidly deployable option for achieving state emissions reduction targets and energy savings goals. To ensure CHP is effectively utilized as an emissions reduction measure, ACEEE suggests EPA offer guidance on the types of CHP systems and policies eligible for credit and guidance on how credit may be obtained in a 111(d) compliance plan.

There may be multiple viable methods for a state to obtain credit for CHP in a 111(d) compliance plan, depending on whether the CHP system is new or existing and whether it is large enough to be covered by greenhouse gas regulations. A CHP system may be eligible for credit for reducing an overall emissions rate for power generation (pounds CO_2/MWh) or as an end-use energy efficiency measure by contributing energy savings (MWh). Specific guidance is also needed to help states account for the benefits of the thermal energy output of CHP.

EPA should specify some examples of how CHP can qualify for credit for achieving emission reductions. Guidance should demonstrate scenarios in which CHP is an eligible pathway to compliance, both for CHP systems that are regulated power plants under a 111(d) rule-making and for CHP systems that are not.

A more detailed discussion of how crediting emissions reductions from CHP could be handled is provided in Appendix C.

Guidance on Crediting Behavioral Programs

Key recommendation: EPA should issue guidance identifying the DOE/EPA SEE Action guide entitled Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations *as an approved protocol for how states may obtain credit in their 111(d) compliance plans for carbon dioxide reductions from behavior-based programs.*

Programs that seek to achieve savings by changing how people use energy, be this in the home or workplace, can be a substantial source of energy savings. Behavior programs can be more difficult to evaluate than programs that evaluate installations of energy-saving widgets. Fortunately, the DOE/EPA SEE Action project has recently issued a guide called *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations*. We recommend that EPA specifically reference this guide as an acceptable evaluation practice for residential behavior programs. We also recommend that a similar guide be commissioned for commercial programs that will cover program approaches with large enough sample sizes that savings can be determined statistically. We also understand that the DOE Uniform Methods Project is working on this issue and may also have something to recommend on procedures for evaluating behavior programs.

Guidance on Crediting Non-Utility Third-Party Actors

Key recommendation: EPA should issue guidance identifying an approved protocol or protocols for how states may obtain credit in their 111(d) compliance plans for energy efficiency delivered through private and nonutility providers.

More than half of the nation's energy efficiency is delivered through private and nonutility programs, projects, and measures. We request that EPA issue clear guidance for crediting efficiency programs, projects, and measures delivered through private and nonutility providers. In addition to building energy codes and combined heat and power (discussed above), this includes efficiency generated by Energy Savings Performance Contracting, state and locally run efficiency programs, residential contractors operating outside of state programs, other third parties, and efficiency projects implemented by building and industrial facility owners. There might be a general protocol and perhaps additional protocols for specific types of programs; for example, a group of energy service companies is preparing specific recommendations for how to count savings from guaranteed savings projects implemented under energy savings performance contracts. In general, savings from third-party efforts should be counted in ways comparable to the ways in which savings from utility-sector programs will be counted. Methodologies may differ, but savings should be counted relative to similar baselines and with similar levels of certainty.

It is important for EPA to expressly provide that a state plan can include privately delivered energy efficiency outside of the ratepayer programs. We encourage EPA to provide guidance on how this crediting should work and how emissions impacts can be quantified. We also request guidance addressing enforceability, including clarification of the relationship between enforceable requirements in a plan and the broad measures that may be used to meet such requirements. Additional recommendations on evaluation of nonutility efforts are provided in Appendix B to these comments.

Guidance on Crediting Water and Energy Efficiency Programs

Key recommendation: EPA should issue guidance identifying an approved protocol for how states may obtain credit in their 111(d) compliance plans for water efficiency programs.

There are many opportunities to reduce water use through water efficiency measures, which in turn directly reduce the electricity used to pump and treat water and wastewater. EPA should provide guidance on acceptable methods for translating water savings into energy savings, building on several published and forthcoming studies on this issue.[7]

Credit for Early Action

Key recommendation: EPA should consider providing states an early compliance opt-in option so that states can take credit for efficiency savings in the years 2017–2019.

States are currently making major investments in energy efficiency. We are concerned that the future compliance dates in the proposal (2020–2030) could cause some states to suspend these investments in the years 2015–2019. In order to recognize the early efforts of states and avoid chilling current energy efficiency investment, we suggest that EPA consider an early compliance opt-in option for states. An early opt-in option could allow states to begin demonstrating compliance with a savings target as early as 2017 in an extended 2017–2029 compliance period. This earlier target could be calculated using the same approach outlined in the proposal, and states that opt for an earlier target would have an opportunity to take credit for the efficiency investments made in the 2017–2020 time period.

Crediting End-Use Energy Efficiency: Specific Recommendations for Calculating and Attributing Efficiency

Evaluating, Measuring, and Verifying End-Use Energy Efficiency

Key recommendation: EPA should provide enough guidance and clarity on how to evaluate, measure, and verify energy savings from efficiency such that states can have some certainty that the savings they calculate from end-use energy efficiency will receive credit in their 111(d) compliance plans.

Accurate EM&V of energy savings is needed to determine the emissions impacts of energy efficiency policies and programs. Some potential approaches to EM&V that states can use for compliance should be clearly described so that states can reduce or eliminate the risk that their compliance plans will be rejected. In determining the example EM&V options, EPA should strive for approaches that maintain accuracy without unduly burdening states or other efficiency implementers, ultimately improving and standardizing EM&V approaches over time. Overly burdensome requirements or the risks that come with a lack of regulatory certainty may cause states to choose more expensive compliance options, increasing the cost of EPA's rule.

ACEEE worked with several other energy efficiency groups to prepare joint comments on EM&V issues. These joint comments, which are at a medium level of detail, are being submitted

---

[7] See CPUC 2011, CPUC 2013, Cooley et al. 2012, Goldstein & Smith 2002, ISAWWA 2012, Stillwell 2010, CDM 2011, Young 2013, Young and Mackres 2013. In addition, ACEEE and the National Association of Water Companies are about to begin work on a project to compile data on electricity use per gallon by water and wastewater utilities that might be of aid to EPA in addressing this recommendation.

separately. Below we provide a summary of our key comments. Appendix B provides additional detail on some EM&V issues that are not covered in the joint EM&V comments.

We recommend that EPA identify several widely used EM&V protocols as suitable for states to use in their 111(d) compliance plans. We recommend placing International Performance Measurement and Verification Protocol (IPMVP), DOE Uniform Method Project, Northwest Regional Technical Forum, ISO New England, and PJM-approved methods on this list. A process should also be established to add to this list of approved methods. In developing such a list, EPA should specify the types of energy efficiency requirements, programs, or measures for which each preapproved EM&V protocol is appropriate. However, while these protocols provide a good foundation, many omit some critical assumptions, and in some cases they make assumptions that are inconsistent from protocol to protocol. In these cases EPA should provide guidance on recommended assumptions and procedures so that the protocols will be easy to use and will provide reasonable and consistent results. To assist with this process, we recommend that EPA, or an organization designated by EPA, such as DOE, convene a working group to provide input and advice on the particulars of designating acceptable protocols. Such a working group can also provide input on the issues raised in the paragraphs below.

EPA should provide guidance on an approach for calculating the baseline that states and program and project implementers use to calculate energy savings, as various states and implementers use different baselines, making for an uneven playing field. One recommended method is to determine baselines in accordance with Table 7.1 of the SEE Action *Energy Efficiency Program Impact Evaluation Guide.*[8] There may also be some equivalent approaches. We suggest one such equivalent approach for guaranteed energy savings performance contracts in Appendix B.

We recommend that EPA issue draft guidance on EM&V issues prior to publication of the final rule so that states can begin planning their compliance efforts and EM&V activities. Also, comments should be solicited on this draft guidance and addressed in any final guidance EPA issues. This guidance should clarify several critical parameters for EM&V efforts including acceptable baselines, ways to estimate measure persistence, and the role of deemed savings and impact evaluations.

We also suggest that EPA work with DOE, the SEE Action Network, or another appropriate entity to develop a model EM&V plan that states can work from to develop their own submissions. Such a model plan would show the level of detail EPA is looking for and provide information on the methodologies it will find acceptable. It should also clarify appropriate methods for evaluating savings from key types of programs and policies, including building codes, equipment efficiency standards, energy performance contracting, other third-party programs, behavior programs, and CHP systems.

Finally, we suggest that EPA offer to review drafts of state EM&V plans in order to provide

---

[8] Available at https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-program-impact-evaluation-guide.

comments and suggestions that states can address in their final submission.

Effect of Interstate Trading on Crediting of End-Use Energy Efficiency

Key recommendation: State emissions goals should not be based on discounted efficiency due to electricity imports. Instead, goals should reflect efficiency achieved within a state, and guidance should be issued so that states can take full credit for the efficiency that is accomplished within their borders.

In the technical support documents to its proposal, EPA outlines an approach to discounting efficiency savings due to electricity imports and exports.[9] If states seeking credit for the emission reductions generated by their efficiency programs and policies were to follow this approach to calculate the impact of these savings in their compliance plans, it would result in a very unfair outcome. Table 6 lists states that would be negatively impacted and the extent of that impact.

Table 6. Efficiency savings discounted due to electricity imports by state

State	Amount that EE savings would be discounted
Delaware	54.91%
Idaho	53.17%
Virginia	41.99%
Maryland	39.18%
California	28.93%
Tennessee	28.19%
Massachusetts	25.23%
New Jersey	23.81%
South Dakota	17.68%
Minnesota	17.16%
Wisconsin	16.03%
Ohio	14.03%
North Carolina	13.88%
Georgia	12.25%
Colorado	10.92%

[9] See Technical Support Document: Goal Computation, Appendix 1: "State Level Goals, Underlying State Level Data, and Calculations for the Proposed State Goals." Data file available here: http://www2.epa.gov/sites/production/files/2014-06/20140602tsd-state-goal-data-computation_1.xlsx.

State	Amount that EE savings would be discounted
Louisiana	9.92%
Florida	9.80%
New York	6.95%
Alaska	4.42%
Hawaii	3.76%
Nevada	3.33%
Kentucky	2.82%
Rhode Island	2.37%
Texas	1.88%
Mississippi	1.37%
Missouri	0.53%

Source: ACEEE calculation based on EPA technical support documents

We estimate these discounts would result in approximately 41 million MWh of state energy savings that would go unclaimed using this approach. States that make investments in energy efficiency, successfully implement policies to achieve savings, and appropriately measure and verify those savings should receive 100% of the credit for their efforts.

We believe that EPA's concern that states will double count these savings can be addressed by requiring any states that opt for a mass-based target and that export electricity to rate-based states to adjust the baseline generation they use to set the mass-based target to ensure that no double counting occurs.

A National Registry

Key recommendation: We recommend that EPA recognize an energy efficiency registry as a tool for state compliance.

We encourage EPA to recognize an energy efficiency registry as a tool for state compliance with Section 111(d) obligations. A flexible energy efficiency registry would provide a centralized, transparent vehicle for projecting, estimating, reporting, and auditing savings from energy efficiency measures. This would allow states to demonstrate their compliance in a meaningful way, and would also enable and expand energy efficiency programs across the United States.

The Modeling: Recommendations on Specific Assumptions and Calculations Related to End-Use Energy Efficiency

Cost Assumptions

Key recommendation: EPA should update cost estimates to more accurately reflect state experiences and the most recent data.

In the technical support document titled "GHG Abatement Measures," EPA outlines its approach for calculating the costs of end-use energy efficiency.[10] We believe actual data and state experience do not support some of EPA's key assumptions regarding energy efficiency costs per saved kWh. Primarily, EPA's assumption that program and participant costs rise as incremental annual energy savings increase is not adequately supported by state experiences. Also, EPA's assumption for program acquisition and participant costs, and, therefore EPA's calculated levelized costs of saved energy (LCSE), should be updated to reflect the most recent data available.

As the base cost for its calculations, EPA uses a national average program acquisition cost of $0.275/kWh (in 2011 dollars, net kWh at meter). EPA based this assumed program cost on the results of a 2009 ACEEE review of utility program costs across 14 states (Friedrich et al. 2009). However, in 2014 ACEEE updated and expanded this 2009 report by completing a review of costs for utility efficiency programs across 20 different states (Molina 2014). This 2014 review found program acquisition costs to average $0.23/kWh (in 2011 dollars, net kWh at site) nationally between 2009 and 2012, 4.5 cents less than the assumed first-year program cost EPA used. ACEEE urges EPA to use these more recent data in order to begin to determine the first-year program costs of energy efficiency.

Also, very recently Lawrence Berkeley Laboratory released the draft results of a study on the cost of utility energy efficiency programs (Hoffman et al. 2014). This study is looking at costs to both the program administrator and the end user and finds that on average the costs to the program administrator average 2.3 cents per kWh saved (similar to ACEEE's average 2.8 cents per kWh) and that average costs to both the utility and end users total 4.4 cents per kWh. EPA should use and reference this study when the results are finalized in December.

EPA assumes program costs will rise to 120% of the base cost when incremental annual energy savings are between 0.5% and 1%, and then again rise to 140% of the base cost when savings surpass 1% annually. A 1:1 ratio between program acquisition costs and participant cost is assumed, resulting in *total* program costs of $0.55/kWh of saved energy from 0% to 0.5% annual energy savings, rising to $0.66/kWh of saved energy between 0.5% and 1% annual energy savings, then rising again to $0.77/kWh of saved energy when savings surpass 1% annually. Using these assumptions EPA calculated a national levelized cost of saved energy (LCSE) of 8.5 cents per kWh in 2017, rising to 9.03 cents/kWh of saved energy in 2030.[11]

---

[10] http://www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf.

[11] Assumes a 3% real discount rate.

ACEEE's work has found no evidence suggesting a strong correlation among acquisition costs of efficiency programs or LCSE and attained levels of annual energy efficiency savings. As figure 5 shows, we have not found a strong linear association between electricity savings as a percentage of retail sales and the cost of saved energy (CSE). In the states ACEEE examined, the LCSE of efficiency program portfolios never surpasses $0.06/kWh, even when savings exceed 2% of retail electricity sales.

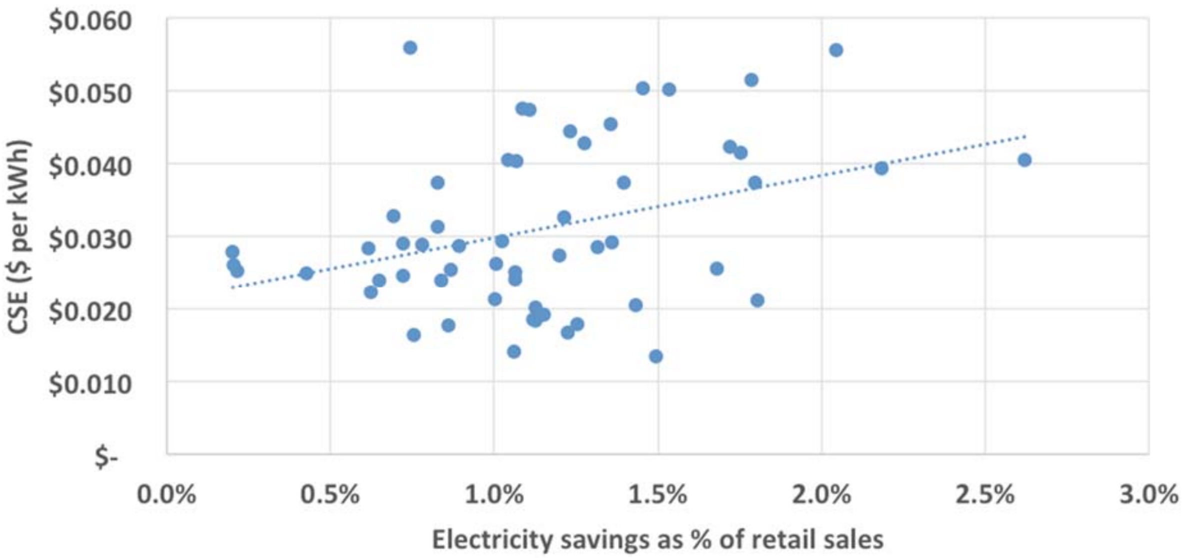

Figure 5. Cost of saved energy values relative to electricity savings as a percentage of sales. Source: Molina 2014.

Furthermore, an examination of utility LCSE from 2005 to 2012 shows a relatively flat average LCSE over eight years. (See figure 6; note that the 2005–2008 data set examined a different set of states than the 2009–2012 data set and had a slightly different methodology, which explains the fluctuation in maximum LCSE values.) This suggests that even as programs progress and achieve deeper energy savings, costs remain relatively constant and stable, hovering around 2.5 to 3 cents per kWh for utility costs (which by EPA's assumption on participant costs would yield total costs around 5 to 6 cents per kWh).

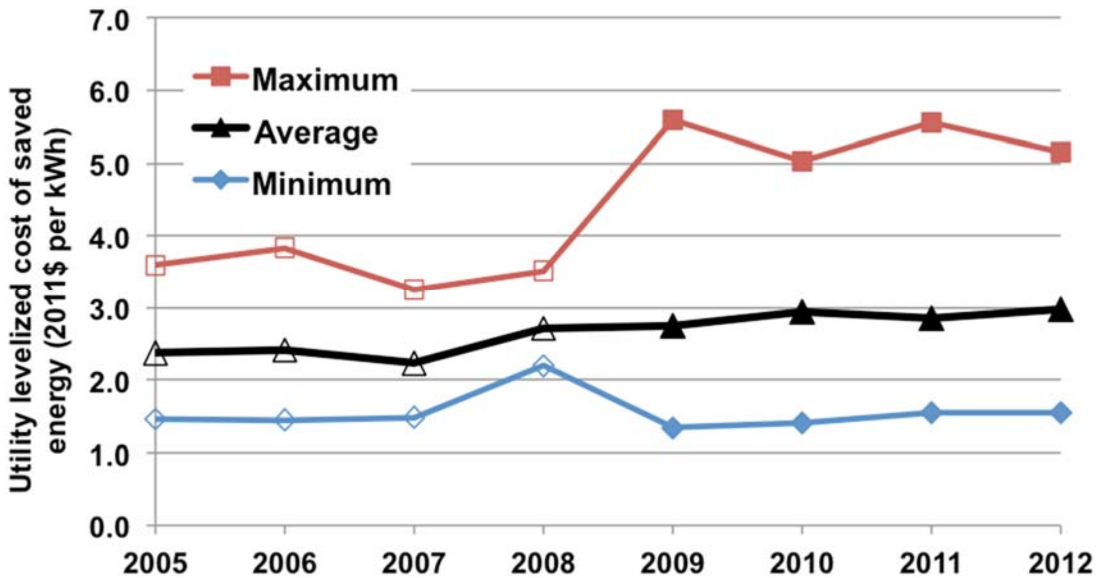

Figure 6. Utility cost of saved energy 2005–2012. *Source:* Molina 2014.

With a lack of compelling data to draw a correlation between the cost escalation of efficiency programs and higher levels of incremental energy savings, it is inappropriate for EPA to assume an increase in costs of 120–140% over time.

Using the Best Data for Ramp-Up of Energy Savings

Key recommendation: EPA should use 2013 energy savings as the starting place in determining state ramp-ups to the 1.5% annual savings target.

EPA should use the most recent data available as the place to begin ramping up energy efficiency savings. Many states increased savings in 2013 relative to 2012, and therefore the 2013 savings are a more appropriate base for ramping up savings to 1.5% per year.

How Energy Efficiency Savings Are Credited in the Emission Rates

Key recommendation: In setting rate targets, EPA should subtract emissions reductions due to energy efficiency (and renewable energy) from emissions in the numerator of the rate. When states are calculating rates from actual generation and emissions, electricity savings due to energy efficiency (and renewable energy) should be added to generation in the denominator of the rate.

The draft rule adds energy efficiency savings and renewable generation to the denominator of the rate, as if the covered plants had generated extra electricity without carbon emissions (Goal Computation TSD, 17-18). This seems appropriate in instances when states will later calculate a rate based on actual generation and emissions after the efficiency measures have been taken—it is adding the generation that would have been needed, absent the efficiency measures, back into the rate.

However, as recognized in the October Notice of Data Availability, in setting the targets for states, the draft rule adds the electricity saved due to efficiency to 2012 covered generation (and nuclear generation) before the efficiency and renewables have reduced it. This essentially treats efficiency and renewables as adding generation to the baseline rather than as reducing covered generation and emissions. To the extent efficiency and renewables reduce use of the covered plants, adding them to the denominator of the rate undercounts them.[12]

Instead, in setting the targets, the emissions reduction due to efficiency and renewables (beyond renewables in 2012) could be subtracted from the numerator. When calculating the emissions after redispatch (the numerator of the target rate), the generation would be reduced by the amount of efficiency and renewables available. As the calculation in the draft rule maximizes use of natural gas, this will first reduce the assumed use of coal generation. Of course the efficiency and renewables cannot result in negative covered generation, and one could assume a minimum amount of covered fossil generation will remain to help ensure grid reliability.

A simpler alternative might be to calculate the emissions reduction from efficiency and renewables using the emissions rate after Blocks 1 and 2 have been applied. This will in effect assume the reduced covered generation is from the mix of coal and natural gas after redispatch. Again, one would prevent emissions from being reduced below zero or another minimum.

We can illustrate the impact of this recommendation using the same test case of South Carolina that was used to demonstrate the energy efficiency estimate in the GHG Abatement Measures TSD. If new renewables and efficiency cut carbon emissions at the average emissions rate of covered power plants after heat rate improvements and redispatch, we believe the target rate would be 602 rather than 772. (Note that this level of reduction is exceptional; we assumed they would reduce covered plant generation but not nuclear generation, which is a large part of the state's generation.) If we instead assume efficiency and renewables cut emissions at the emissions rate of coal generation (after heat rate improvements), the South Carolina target rate would be 482.[13]

The draft rule suggests that in calculating actual rates states might either add efficiency to the denominator or subtract the resulting emissions reductions from the numerator (p. 483). As indicated above, the projection from a base year and calculation of a rate from actual emissions are not the same. If states subtract savings from actual emissions after the efficiency measures have been taken, they are in effect double-counting the impact of the savings. If South Carolina achieved the generation mix on which the target is based but proportionally reduced covered generation by the amount of efficiency and new renewables, it would calculate a rate of 602 by adding the avoided generation into the denominator (per above discussion), but a rate of 238 if

---

[12] If efficiency and renewables were offsetting increased use of covered (existing) fossil sources that would otherwise occur, adding generation to the baseline might make sense. It also would be possible for some efficiency to replace 2012 generation and other efficiency to replace new generation. But there is no reason to assume a baseline of increased covered generation in general; it seems at least as likely that covered generation would decrease in most states as it is replaced by new plants. If EPA did wish to consider a baseline change in covered generation, it could affect treatment of Blocks 1 and 2 and the rest of the rate formula as well.

[13] Adjusting EPA's target rate formula using numbers for South Carolina from the GHG Abatement Measures TSD, this assumes avoided emissions rate is: Emissions after redispatch / 2012 Covered generation = 60,706 million pounds / 40.089 million MWh = 1514 pounds/MWh. New RE is 6.112 and EE is 8.553 million MWh. Then the target rate would be (Emissions after redispatch – New RE + EE * Avoided rate) / (2012 Covered generation + Nuclear + 2012 RE) = (60,706 – 14.665 * 1514) / (40.089 + 20.341 + 3.564) = 602.

it subtracted the avoided emissions from the numerator. Several states in the Northwest and Northeast would calculate a *negative* rate if they subtracted from the numerator, as their estimated emissions reductions due to efficiency and renewables are greater than remaining emissions.

Year of Energy Savings Potential Used in Final Target Rate

Key recommendation: EPA should use the electricity savings (and renewable energy) potential in 2030 in calculating the target rate for 2030.

The draft rule bases the final target on 2029 energy efficiency and renewable energy potential (Goal Computation TSD, p. 18). But the target is for 2030. And while the state plans are to show how they will meet the target in 2030, actual demonstration of compliance with the final target is over the rolling three-year period of 2030–2032. Therefore states will have even longer to meet the final targets. Although the Goal Computation TSD also refers to renewables and energy efficiency "by start of 2030 and thereafter" and "by start of 2030 and each year thereafter" (p. 3), the draft rule just refers to the final performance period as "2030 and thereafter" (p. 620). The targets for 2030 and later should be based on the energy efficiency potential in those years.

Returning to the example of South Carolina, we can project the potential beyond 2029 using the method in the GHG Abatement Measures TSD. For 2030, energy efficiency is 10.7% (rather than 10.2%) of business-as-usual (BAU) sales, and the target rate would be 768. For 2030–2032, the efficiency is 11.1% on average, and the target rate would be 765. However, if other issues described here were also addressed, the impact of an extra year or two would be greater, and this would also increase the amount of renewables counted.

Energy Efficiency Savings Percentage Calculation

Key recommendation: If EPA uses a savings percentage of sales from energy efficiency, it should be based on estimated actual electricity sales.

The draft rule estimates potential energy savings in the target years and uses that to adjust an emissions rate that is based on 2012 generation levels. The savings potential estimate starts from a BAU sales estimate that is based on 2012 actual sales and estimated growth from the AEO 2013 Reference Case (GHG Abatement Measures TSD, 5-40). The incremental savings are calculated by taking a percentage of BAU sales minus net cumulative savings ("sales after net EE" on p. 5-41). But as the draft rule recognizes elsewhere, the AEO projections implicitly incorporate some savings that states are achieving that would qualify under this rule. Those savings are being double-counted in the sales after net EE, decreasing the estimated sales and thus decreasing the estimated savings potential.

Then, in order to add the savings to 2012 generation, the draft rule divides the target year savings by BAU electricity sales in that year (for a percent savings), and multiplies by 2012 sales (p. 5-43 and Goal Computation TSD, p. 17). However, the savings potential is initially calculated based on an incremental savings percentage of actual sales after the savings. The cumulative savings percentage should be calculated using the same denominator, sales after net EE.

In South Carolina, for example, in 2029 the potential savings are 10.2% of BAU sales but 11.4% of sales after net EE. Using percentage of actual sales, the target rate would be 763 rather than 772.[14]

The state rate calculations to demonstrate compliance will use actual generation and savings for the target years, so this issue does not apply in those cases.

Set the Targets Based on Existing Measures

Key recommendation: In setting target rates, EPA should count electricity savings from energy efficiency measures starting in June 2014. Estimates of the potential savings states can achieve during the ramp-up of energy efficiency should be based on the latest available information.

The draft rule says that energy savings from measures starting on the date of the draft rule (June 18, 2014) that occur during the compliance period can be counted for compliance purposes if the measures meet EPA's criteria. However, in calculating the target rates, the draft only includes energy efficiency measures starting in 2017, with incremental savings in 2017 assumed to be at the same percentage as reported to the Energy Information Administration (EIA) in 2012. Qualifying savings that states are already achieving from measures starting June 2014 should be included. Also, EPA should update the savings potentials based on the latest EIA information available when the analysis is completed.

For our previous example state of South Carolina, this effect will be small. But states with significant current programs may have noticeable savings from 2014 to 2016. If Maine maintains its 1.96% incremental savings reported for 2012, and if those savings met M&V requirements, it would have roughly 5% incremental savings for June 2014–December 2016, of which roughly 1.5% would persist until 2029.[15] This would bring its 2029 potential from 12.1% to 13.6%.

Mass-Based Targets Should be Comparable to Rate-Based Targets

Key recommendation: EPA should provide guidance to states on how to convert rate-based targets to mass-based targets, including periodic adjustments to correct for imperfect load-growth forecasts.

We recommend that EPA provide guidance to states on how to convert rate-based targets to mass-based targets. We encourage EPA to issue guidance that ensures that mass-based targets are comparable to rate-based targets. In November 2014, EPA released draft guidance on state targets using a mass-based approach. In general we find the approaches outlined to be reasonable. In particular, we agree with EPA that where load growth is included, it should

---

[14] Adjusting EPA's target rate formula using numbers for South Carolina from the GHG Abatement Measures TSD, this assumes actual covered generation is 2012 Covered generation – (New RE + EE) = 40.089 – 14.665 = 25.425 million MWh, and actual emissions are Emissions after redispatch – New RE + EE * Avoided rate = 60,706 – 14.665 * 1514 = 38,499 million pounds. Then if a state subtracted Blocks 3 + 4 from the numerator, the rate would be [Actual emissions – (New RE + 2012 RE + EE) * Avoided rate] / (Actual generation + Nuclear) = (38,499 – 18.229 * 1514) / (25.425 + 20.341) = 238.

[15] Maine's 1.96% incremental savings number for 2012 is from table 5-4 of the "Greenhouse Gas Abatement" technical support document.

generally be based on EIA's *Annual Energy Outlook*. However, instead of using the 2013 AEO as EPA proposes, we recommend that the final rule be based on the most recent AEO, which will be the 2015 version due to be published around the beginning of the year. If the load forecast overestimates load growth, then the mass-based targets could be easier to meet than the rate-based targets. These types of disparities could lead to gaming and provide incentives to use exaggerated forecasts. Forecasting is an imperfect science. Therefore we recommend that a state forecast of electricity load growth should be considered reasonable if it is no greater than what EIA estimates.[16] Furthermore, to correct for imperfect forecasts, states that opt for mass-based targets should periodically revise their mass-based targets to reflect actual electric load growth.

[16] If a state forecasts higher electricity growth, EPA could provide for a process in which the state demonstrates why its forecast is reasonable.

References

40 CFR Part 60. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule. *Federal Register* 79 (117): 34914.

ACEEE. (American Council for an Energy-Efficient Economy). 2014. "State Energy Efficiency Standards Policy Brief." Washington, DC: American Council for an Energy-Efficient Economy. http://aceee.org/files/pdf/policy-brief/eers-04-2014.pdf.

Alliance for Industrial Efficiency. 2014. "RE: Recommendations for Advancing Combined Heat and Power and Waste Heat to Power Under 111(d). February 5, 2014." Washington, DC: Alliance for Industrial Efficiency. http://www.dgardiner.com/wp-content/uploads/2014/02/AIE-111d-White-Paper_Final_2_5_2014.pdf.

Aroonruengsawat, A., M. Auffhammer, and A. Sanstad. 2009. "The Impact of State Level Building Codes on Residential Electricity Consumption." Paper presented at Green Building, the Economy and Public Policy conference. Berkeley. December 2–3. http://urbanpolicy.berkeley.edu/greenbuilding/auffhammer.pdf.

Cadmus Group. 2013. *Attributing Building Energy Code Savings to Energy Efficiency Programs.* Portland: The Cadmus Group, Inc. http://www.imt.org/uploads/resources/files/NEEP_IMT_IEE_Codes_Attribution_FINAL_Report_02_16_2013.pdf.

CPUC (California Public Utility Commission). 2011. *Embedded Energy in Water Pilot Programs*. ECONorthwest. California Public Utilities Commission.

——. 2013. P.13-05-008; R. 13-12-011 Commission Rule Making. http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M084/K481/84481715.pdf.

CDM (Camp, Dresser & McKee, Inc.). 2011. *Water Efficiency Potential Study for Wisconsin*. Prepared for the Public Service Commission of Wisconsin and Wisconsin Department of Natural Resources. http://psc.wi.gov/conservation/documents/waterEfficiencyDec2011.pdf.

Chittum, A., and K. Farley. 2013. *Utilities and the CHP Value Proposition*. Washington, DC: American Council for an Energy-Efficiency Economy. http://aceee.org/research-report/ie134.

Cooley, H., L. Allen, M. Heberger, and R. Wilkinson. 2012. *WESim–The Water-Energy Simulator–Helps Water and Energy Managers Plan for Change*. Oakland: Pacific Institute. http://pacinst.org/publication/wesim/.

Deason, J., and A. Hobbs. 2011. *Codes to Cleaner Buildings: Effectiveness of U.S. Building Energy Codes*. Climate Policy Initiative. http://climatepolicyinitiative.org/wp-content/uploads/2011/12/Codes-to-Cleaner-Buildings-Effectiveness-of-US-Building-Energy-Codes.pdf.

Downs, A., A. Chittum, S. Hayes, M. Neubauer, S. Nowak, S. Vaidyanathan, K. Farley, and C. Cui. 2013. *The 2013 State Energy Efficiency Scorecard.* Washington, DC: American Council for an Energy-Efficient Economy.

DOE (U.S. Department of Energy). 2012a. *Energy and Cost Savings for New Single- and Multifamily Homes: 2009 and 2012 IECC as Compared to the 2006 IECC.* Washington, DC: U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program. 43 separate studies cited collectively. States studied include: Alabama, Alaska, Arizona, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. http://www.energycodes.gov/development/residential/iecc_analysis.

———. 2012b. National Energy and Cost Savings for New Single- and Multifamily Homes: 2009 and 2012 IECC As Compared to the 2006 IECC. Washington, DC: U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program. http://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf.

———. 2014a. "Commercial Energy and Cost Analysis Methodology." Washington, DC: U.S. Department of Energy, Building Energy Codes Program. Accessed November 17, 2014. http://www.energycodes.gov/development/commercial/methodology.

———. 2014b. "Utility Savings Estimators." Washington, DC: U.S. Department of Energy, Building Energy Codes Program. Accessed November 17, 2014. https://www.energycodes.gov/resource-center/utility-savings-estimators.

DOE and EPA. (U.S. Department of Energy and U.S. Environmental Protection Agency). 2012. *Combined Heat and Power: A Clean Energy Solution.* Washington, DC: U.S. Department of Energy and U.S. Environmental Protection Agency. http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_clean_energy_solution.pdf.

EIA (Energy Information Administration). 2012. "Combined Heat and Power Technology Fills an Important Energy Niche." October. Washington DC: U.S. Department of Energy, Energy Information Administration. http://www.eia.gov/TODAYINENERGY/DETAIL.CFM?ID=8250.

EPA (U.S. Environmental Protection Agency). Greenhouse Gas Abatement Technical Support Document. 2014. Washington, DC: U.S. Environmental Protection Agency.

Executive Order 13624 of September 5, 2012, Accelerating Investment in Industrial Energy Efficiency. *Federal Register* 77 (172): 54779–54781. http://www.gpo.gov/fdsys/pkg/FR-2012-09-05/pdf/2012-22030.pdf.

Friedrich, K., M. Eldridge, D. York, P. Witte, and M. Kushler. 2009. *Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs*. Washington, DC: American Council for an Energy-Efficient Economy. http://aceee.org/research-report/u092.

Gilleo, A., A. Chittum, K. Farley, M. Neubauer, S. Nowak, D. Ribeiro, and S. Vaidyanathan. 2014. *The 2014 State Energy Efficiency Scorecard.* Washington, DC: American Council for an Energy-Efficient Economy (ACEEE). http://www.aceee.org/research-report/u1408.

Goldstein R., and W. Smith. 2002. *Water & Sustainability (Volume 4): U.S. Electricity Consumption for Water Supply & Treatment – The Next Half Century*. Concord, CA: Electric Power Research Institute, Inc. (EPRI). http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001006787

Hampson, A., and J. Rackley. 2014. *From Threat to Asset: How Combined Heat and Power (CHP) Can Benefit Utilities.* Washington, DC: ICF International. http://www.icfi.com/insights/white-papers/2014/how-chp-can-benefit-utilities.

Hayes, S., G. Herndon, J. Barrett, J. Mauer, M. Molina, M. Neubauer, D. Trombley, and L. Ungar. 2014. *Change Is in the Air: How States Can Harness Energy Efficiency to Strengthen the Economy and Reduce Pollution*. Washington, DC: American Council for an Energy-Efficient Economy. http://aceee.org/research-report/e1401.

Hoffman, I. 2014. "The Total Cost of Saving Energy Through Utility Customer-Funded Energy Efficiency Programs." Draft report. Berkeley: Lawrence Berkeley National Laboratory.

ICF International. 2013. *The Opportunity for CHP in the United States*. Prepared for the American Gas Association. Washington, DC: ICF International. http://www.aga.org/Kc/analyses-and-statistics/studies/efficiency_and_environment/Pages/TheOpportunityforCHPintheUnitedStates.aspx.

ISAWWA (The Illinois Section American Water Works Association). 2012. *Water-Energy Nexus Survey Summary Report*. Chicago Metropolitan Agency for Planning (CMAP). St. Charles, IL: The Illinois Section American Water Works Association. www.isawwa.org.

LBNL (Lawrence Berkeley National Laboratory). 2012. *Superior Energy Performance: Measurement and Verification Protocol for Industry.* Berkeley: Lawrence Berkeley National Laboratory. http://www.energy.gov/sites/prod/files/2014/07/f17/sep_mv_protocol.pdf.

Molina, M. 2014. *The Best Value for America's Energy Dollar: A National Review of the Costs of Utility Energy Efficiency Programs.* Washington, DC: American Council for an Energy-Efficient Economy. http://www.aceee.org/sites/default/files/publications/researchreports/u1402.pdf.

National Building Community Stakeholders. 2009. *Explanatory Statement on Section 410, Recovery Act (HR1).*

http://www.usgbc.org/Docs/News/State%20Bldg%20Codes%20White%20Paper%2012-1-09%20REV2-usgbc.pdf.

NW Energy Coalition. 2009. *The Power of Efficiency: Pacific Northwest Energy Conservation Potential Through 2020.* Seattle: NW Energy Coalition. http://www.nwenergy.org/wp-content/uploads/Power-of-Efficiency-050109.pdf.

PNNL (Pacific Northwest National Laboratory). 2011a. *ANSI/ASHRAE/IES Standard 90.1-2007 Final Determination Quantitative Analysis*. Prepared for U.S. Department of Energy. Richland, WA: Pacific Northwest National Laboratory. https://www.energycodes.gov/sites/default/files/documents/BECP_FinalQuantitativeAnalysisReport901-2010Determination_Oct2011_v00.pdf.

——. 2011b. *ANSI/ASHRAE/IES Standard 90.1-2010 Final Determination Quantitative Analysis.* Prepared for U.S. Department of Energy. Richland, WA: Pacific Northwest National Laboratory. https://www.energycodes.gov/sites/default/files/documents/BECP_FinalQuantitativeAnalysisReport901-2010Determination_Oct2011_v00.pdf.

——. (Pacific Northwest National Laboratory). 2012. *Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes.* Richland, WA: Pacific Northwest National Laboratory. http://www.energycodes.gov/sites/default/files/documents/residential_methodology.pdf.

——. 2013. *Cost-Effectiveness of ASHRAE Standard 90.1-2010 for the State of __.* Washington, DC: U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program.
22 separate studies cited collectively. States studied include Alabama, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Georgia, Iowa, Kentucky, Massachusetts, Montana, Nebraska, New Jersey, New York, North Carolina, Oklahoma, Rhode Island, South Carolina, Texas, Utah, Virginia, and Wisconsin.
http://www.energycodes.gov/development/commercial/cost_effectiveness.

——. 2014a. *Building Energy Codes Program: National Benefits Assessment, 1992–2040.* Prepared for U.S. Department of Energy. Richland, WA: Pacific Northwest National Laboratory. http://www.energycodes.gov/sites/default/files/documents/BenefitsReport_Final_March20142.pdf.

——. 2014b. *ANSI/ASHRAE/IES Standard 90.1-2013 Determination of Energy Savings: Quantitative Analysis.* Prepared for U.S. Department of Energy. Richland, WA: Pacific Northwest National Laboratory. https://www.energycodes.gov/sites/default/files/documents/901-2013_finalCommercialDeterminationQuantitativeAnalysis_TSD.pdf.

SEE Action (State and Local Energy Efficiency Action Network). 2012. *Energy Efficiency Program Impact Evaluation Guide.* Washington, DC: U.S. Department of Energy and U.S. Environmental Protection Agency.

https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf.

Stellberg, S. 2013. *Assessment of Energy Efficiency Achievable from Improved Compliance with U.S. Building Energy Codes: 2013–2030*. Washington, DC: Institute for Market Transformation. http://www.imt.org/uploads/resources/files/IMT_Report_Code_Compliance_Savings_Potential_FINAL_2013-5-2.pdf.

Stillwell A. 2010. "The Energy-Water Nexus in Texas." Master's thesis, Environmental and Water Resource Engineering and LBJ School of Public Affairs, University of Texas at Austin. http://www.webberenergygroup.com/publications/the-energy-water-nexus-in-texas-2/.

York, D., M. Molina, M. Neubauer, S. Nowak, S. Nadel, A. Chittum, N. Elliot, K. Farley, B. Foster, H. Sachs, and P. Witte. 2013. *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings.* Washington, DC: American Council for an Energy-Efficient Economy. http://www.aceee.org/research-report/u131.

Young, R. 2013. *Saving Water and Energy Together: Helping Utilities Build Better Programs.* Washington, DC: American Council for an Energy-Efficient Economy. http://aceee.org/research-report/e13h.

Young R., and E. Mackres. 2013. *Tackling the Nexus: Exemplary Programs That Save Both Energy and Water*. Washington DC: American Council for an Energy-Efficient Economy. http://aceee.org/research-report/e131.

Appendix A: Estimate of Savings Over the 2020–2030 Period from Federal Equipment Efficiency Standards

DOE has established many new efficiency standards in recent years, standards that will continue to save energy over the 2020–2030 compliance period under the proposed rule. In addition, DOE is now working on more than a dozen new standards that will add substantially to the energy savings during the compliance period. ACEEE and the Appliance Standards Awareness Project (ASAP) have estimated the savings achieved by both the standards that have already been finalized as well as from the pending standards. Our methodology and most of our assumptions are documented in a 2012 report entitled *The Efficiency Boom*.[17] The tables below document savings from federal standards that will be achieved over the 2020–2030 period from both already finalized standards (table A1) and many of the pending standards (table A2). We include only savings from equipment installed in 2015 and later years (e.g., after publication of the draft EPA rule). This compilation does not include all of the new standards that DOE is working on; additional energy will be saved by standards on products not included in table 2 such as air compressors, dishwashers, ceiling fans, portable air conditioners, and wine chillers. Together the savings from existing and pending standards average 0.82% of electricity sales for each year over the 2020–2030 period.[18]

[17] Available at http://aceee.org/research-report/a123 .

[18] Overall savings over the 2020 period are 4150 TWh (3330 TWh from table 1 and 820 TWh from table 2). Dividing by total projected electricity sales over this period from EIA (45,862 TWh) means 9.0% savings over this period. We divide this by the 11 years contained in the 2020–2030 period to obtain average incremental savings per year.

Table A1. Savings from existing federal standards for products purchased in 2015 and later years

	Electricity Savings (TWh)											
Product	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Sum 2020-2030
NAECA	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	28.76
Ballasts	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	16.05
NAECA Updates	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	26.09
Showerheads	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Faucets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EPAct Lamps	5.47	5.47	5.47	5.47	5.47	5.47	5.47	5.47	5.47	5.47	5.47	60.20
EPAct Others	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	17.39
Refrigerator/Freezer Update	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	93.44
Room Air Conditioner Update	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	2.65
Ballasts Update	3.37	2.70	2.04	1.37	0.71	0.04	-0.62	-1.29	-1.95	-2.62	-3.28	0.45
Clothes Washer Update	8.08	8.33	8.59	8.85	9.11	9.36	9.62	9.88	10.14	10.40	10.65	103.01
Water Heaters- 2001	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	23.74
Central AC & HP- 2001	18.39	21.45	24.51	27.58	30.34	30.34	30.34	30.34	30.34	30.34	30.34	304.28
Ceiling Fan Light Kits- EPACT	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	10.42
Dehumidifiers- EPACT	0.92	1.08	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	12.39
Torchieres- EPACT	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.40	48.41
Automatic Ice Makers- EPACT	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	4.27
Exit Signs- EPACT	1.81	2.11	2.41	2.72	3.02	3.32	3.62	3.92	4.23	4.53	4.83	36.53
Traffic Signals- EPACT	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	2.58
Commercial Clothes Washers- EPACT	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.86
Commercial Refrigeration Equipment- EPACT	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	14.32
Distribution Transformers (LVDT)- EPACT	1.71	1.99	2.28	2.56	2.84	3.13	3.41	3.70	3.98	4.27	4.55	34.41
Mercury Vapor Lamp Ballasts- EPACT	1.00	0.82	0.67	0.53	0.42	0.32	0.24	0.17	0.12	0.08	0.06	4.42
Commercial AC- EPACT	5.24	6.11	6.98	7.86	8.73	9.17	9.17	9.17	9.17	9.17	9.17	89.91
Incandescent Reflector Lamps (BR and R20)- EISA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
External Power Supplies- EISA	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	3.63
Metal Halide Lamp Fixtures- EISA	4.62	5.39	6.16	6.93	7.70	8.47	9.24	10.01	10.78	11.16	11.16	91.61
Walk-In Coolers and Freezers- EISA	2.47	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	29.18
Dishwashers- EISA	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	1.51
Electric Motors (not covered by EPAct)- EISA	1.77	2.07	2.37	2.66	2.96	3.25	3.55	3.84	4.14	4.43	4.58	35.63
Electric Motors (covered by EPAct)- EISA	1.49	1.74	1.99	2.24	2.49	2.74	2.98	3.23	3.48	3.73	3.86	29.97
Dehumidifiers- EISA	0.66	0.77	0.88	0.99	1.10	1.22	1.33	1.44	1.49	1.49	1.49	12.87
General Service Lamps (Tier 1)- EISA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
General Service Lamps (Tier 2)- EISA	13.22	38.11	38.11	38.11	38.11	38.11	38.11	38.11	38.11	38.11	38.11	394.34
Distribution Transformers (LI & MVDT)- 2007	1.71	1.99	2.28	2.56	2.84	3.13	3.41	3.70	3.98	4.27	4.55	34.41
PTACs and PTHPs- 2008	0.21	0.25	0.28	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	3.13
Commercial Refrigeration Equipment- 2009	2.33	2.71	3.10	3.49	3.88	3.88	3.88	3.88	3.88	3.88	3.88	38.78
Ranges and Ovens (Gas)- 2009	-0.09	-0.10	-0.12	-0.13	-0.15	-0.16	-0.18	-0.19	-0.21	-0.22	-0.23	-1.78
General Service Fluorescent Lamps- 2009	13.39	13.39	13.39	13.39	13.39	13.39	13.39	13.39	13.39	13.39	13.39	147.30
Beverage Vending Machines- 2009	0.71	0.83	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	9.50
Commercial Clothes Washers- 2010	0.11	0.13	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	1.58
Small Motors- 2010	11.03	13.03	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	14.04	150.39
Water Heaters- 2010	5.26	6.21	7.17	8.13	9.08	10.04	10.99	11.95	12.43	12.43	12.43	106.12
Clothes Dryers- 2011	0.94	1.11	1.28	1.45	1.62	1.79	1.96	2.13	2.31	2.48	2.65	19.73
Room Air Conditioners- 2011	1.95	2.28	2.61	2.93	3.26	3.26	3.26	3.26	3.26	3.26	3.26	32.57
Central AC- 2011	2.16	2.55	2.95	3.34	3.73	4.13	4.52	4.91	5.30	5.70	6.09	45.38
Heat Pumps (Cooling)- 2011	1.54	1.82	2.10	2.38	2.66	2.94	3.21	3.49	3.77	4.05	4.33	32.29
Heat Pumps (Heating)- 2011	1.14	1.35	1.56	1.76	1.97	2.18	2.39	2.59	2.80	3.01	3.22	23.97
Refrigerators and Freezers- 2011	10.46	12.20	13.94	15.69	17.43	19.17	20.91	22.66	24.40	25.45	25.45	207.75
Fluorescent Lamp Ballasts- 2011	13.94	16.26	18.59	20.91	23.24	25.56	27.88	29.27	29.27	29.27	29.27	263.47
Clothes Washers- 2012	4.63	5.66	6.69	7.72	8.75	9.78	10.80	11.83	12.86	13.89	14.61	107.22
Distribution Transformers- 2013	2.34	2.87	3.39	3.91	4.43	4.95	5.47	5.99	6.51	7.03	7.55	54.44
Microwaves (standby mode)- 2013	1.12	1.37	1.62	1.87	2.12	2.37	2.62	2.75	2.75	2.75	2.75	24.09
Metal Halide Lamp Fixtures- 2014	0.53	0.66	0.78	0.90	1.01	1.12	1.23	1.33	1.44	1.53	1.63	12.16
External Power Supplies- 2014	2.19	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	24.37
Commercial Refrigeration Equipment- 2014	4.38	5.63	6.88	8.13	9.38	10.63	11.88	12.51	12.51	12.51	12.51	106.92
Electric Motors- 2014	7.24	8.85	10.46	12.07	13.68	15.28	16.89	18.50	20.11	21.72	23.33	168.13
Walk-In Coolers and Freezers- 2014	4.10	5.27	6.44	7.61	8.78	9.96	11.13	12.15	12.15	12.15	12.15	101.88
Furnace Fans- 2014	1.74	2.89	4.05	5.21	6.37	7.52	8.68	9.84	11.00	12.16	13.31	82.77
Total Electricity Savings	191.99	238.99	259.74	279.33	298.61	313.99	328.95	342.09	351.55	359.40	365.25	3330
Total Electricity Sales (AEO 2014)	3,986	4,021	4,063	4,106	4,143	4,178	4,213	4,245	4,276	4,304	4,327	45862

Source: Analysis by Appliance Standards Awareness Project (ASAP) and ACEEE. These calculations were made by subtracting 2014 savings from existing standards from expected savings in 2015 and later years. Implicit in this calculation is that all savings achieved in 2014 are part of BAU and are part of the base case.

Table A2. Savings from pending federal standards for products purchased in 2015 and later years

	Electricity Savings (TWh)											
Product	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Sum 2020-2030
Residential												
Battery chargers	9.85	10.77	10.77	10.77	10.77	10.77	10.77	10.77	10.77	10.77	10.77	117.54
Boilers												
Gas boilers	0.00	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.07	-0.08	-0.09	-0.10	-0.55
Oil boilers	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.08
Computers												
Desktops	0.00	0.86	2.59	4.32	6.05	7.77	8.64	8.64	8.64	8.64	8.64	64.78
Laptops	0.00	0.21	0.64	1.06	1.27	1.27	1.27	1.27	1.27	1.27	1.27	10.80
Monitors	0.00	0.23	0.70	1.16	1.62	1.86	1.86	1.86	1.86	1.86	1.86	14.85
Dehumidifiers	0.60	1.00	1.40	1.80	2.20	2.60	3.00	3.40	3.80	4.20	4.43	28.43
Faucets	0.18	0.30	0.42	0.53	0.65	0.77	0.89	1.01	1.13	1.19	1.19	8.24
Furnaces												
Commercial and Industrial												
Automatic ice makers	0.65	0.91	1.17	1.43	1.69	1.95	2.21	2.21	2.21	2.21	2.21	18.88
Commercial air conditioners	0.97	1.62	2.27	2.92	3.56	4.21	4.86	5.51	6.15	6.80	7.45	46.32
Commercial clothes washers	0.17	0.24	0.30	0.37	0.44	0.51	0.57	0.64	0.71	0.72	0.72	5.38
Commercial furnaces												
Fans	0.00	0.40	1.21	2.02	2.83	3.64	4.45	5.26	6.07	6.88	7.69	40.48
Pre-rinse spray valves	0.24	0.40	0.56	0.72	0.80	0.80	0.80	0.80	0.80	0.80	0.80	7.55
Pumps												
Water pumps	0.05	0.15	0.24	0.34	0.44	0.54	0.64	0.73	0.83	0.93	1.03	5.92
Circulators	0.07	0.22	0.37	0.52	0.67	0.81	0.96	1.11	1.26	1.41	1.48	8.89
Unit heaters												
Lighting												
Candelabra and intermediate base incand. lamps												
Candelabra	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	4.84	53.24
Intermediate base	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	3.75
General service fluorescent lamps	12.26	15.08	17.80	17.20	16.61	16.02	15.43	14.84	14.25	13.66	13.07	166.21
High-intensity discharge lamps	5.11	4.68	4.24	3.81	3.37	2.94	2.50	2.07	1.63	1.20	0.76	32.30
Incandescent reflector lamps												
Covered	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.64
Exempt	16.66	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	186.57
Total electricity savings	52.06	59.29	66.89	71.18	75.17	78.64	81.01	82.26	83.51	84.65	85.47	820
Total electricity sales (AEO 2014)	3,986	4,021	4,063	4,106	4,143	4,178	4,213	4,245	4,276	4,304	4,327	45862

Source: Analysis by Appliance Standards Awareness Project (ASAP) and ACEEE.

Appendix B: Additional Suggestions Regarding Evaluation of Specific Types of Energy Efficiency Activities

In this section we make some additional specific suggestions regarding evaluation of building codes, state appliance standards, energy performance contracting, and energy savings efforts by large customers. Each of these activities poses specific evaluation issues that we believe EPA guidance should address.

BUILDING ENERGY CODES

Savings from building codes can be determined by comparing a baseline of energy consumption in buildings to the energy consumption under new building codes. Savings can be quantified by multiplying the average savings under new codes by building type and the number of new homes (residential sector) or square feet (commercial sector) of each building type built in a state each year. Typically the major building types are included and minor building types are grouped with the most similar major building type. Adjustments will also need to be made for code compliance, as discussed later in this section.

A baseline needs to be established in order to evaluate savings from building codes. We discuss two possible options for baselines, each of which has pros and cons.

A simple option would be to evaluate building code savings relative to the 2004 ASHRAE 90.1 standard for commercial and high-rise residential buildings and relative to the 2006 IECC for low-rise residential buildings. Approximately 45 states have codes at this level or higher, in some cases through local jurisdictions (Gilleo et al. 2014). These codes predate the recent rapid improvement in model energy codes, and they are frequently used as the baseline for calculating energy savings in new codes and in beyond-code programs, such as the federal tax incentive for efficient new homes.[19] As discussed below, most states have stronger codes, and thus this baseline would allow many states to count savings from their existing codes. On the other hand, because the baseline code is less stringent than what most states now use, for evaluation purposes 100% compliance with the 2004/2006 codes should be assumed in the baseline.

A second option would be to evaluate building code savings relative to the 2007 ASHRAE 90.1 standard for commercial and high-rise residential buildings and relative to the 2009 IECC for low-rise residential buildings. These codes are in common use, with about 40 states employing their equivalent or better, in some cases through local jurisdictions (Gilleo et al. 2014). Under the American Recovery and Reinvestment Act of 2009, all states signed certifications that they planned to update their codes to the IECC residential 2009 code and the ASHRAE 90.1-2007 commercial code, or equivalent, making this a logical national baseline (National Building Community Stakeholders 2009). However, if this approach is used, an allowance would need to be made for less than perfect compliance. We are researching this issue now, and as a preliminary estimate would suggest increasing baseline energy use by about 5–7.5% relative to the 2007/2009 codes. This represents a compliance rate that results in energy savings of 92.5%–95% of the total savings anticipated under the code. For this stronger base code, a state could

---

[19] 26 USC 45L.

alternatively conduct its own compliance study to develop a more accurate baseline. This second approach to setting a baseline would limit the savings that states could claim more than the first, and it is more complicated, but it may better reflect the average efficiency of new homes and commercial buildings being constructed today.

New energy savings for each building type can be estimated using computer models that estimate building energy use based on detailed data on building characteristics, such as DOE EnergyPlus. In terms of modeling details and representative building types, we recommend that EPA make reference to DOE's "Residential Energy and Cost Analysis Methodology" and "Commercial Energy and Cost Analysis Methodology"(PNNL 2012; DOE 2014a). The residential methodology includes two building types (single family and multifamily), while the commercial methodology includes 16 building types that together constitute more than 80% of the commercial building floor area in the United States. Furthermore, we note that DOE and its contractor, PNNL have already conducted state-specific analyses of building-level energy savings available from various model building codes such as the 2012 version of the IECC and the ASHRAE 90.1-2010 standard. EPA should explicitly authorize states to use these estimates (DOE 2012a; PNNL 2013). PNNL is also working to evaluate savings from the 2013 ASHRAE standard, and these analyses should be referenced as well when they are completed. In addition to the savings estimates in these reports, DOE's Building Energy Codes Program also has an online calculator states can use; EPA should reference this as well (DOE 2014b).

Since compliance with codes is imperfect, it also is necessary to evaluate the portion of the savings that is lost. Here the key is to determine not just the percentage of buildings that do not fully comply but the impact of compliance on energy savings. A building may not meet all the requirements of the code but may still achieve significant energy savings.

We propose two options, each of which applies in different situations as follows:

Conduct code compliance studies. A state could conduct code compliance studies to estimate compliance with building codes. The studies would determine a realization rate of energy savings, and this rate could be multiplied by the estimated code savings assuming full code compliance. This methodology is the most rigorous and would apply in particular to states that are striving to improve compliance. DOE and PNNL are working to develop a methodology that EPA should reference once it is completed. States should also be able to propose their own approaches.

Assume a code compliance rate. A default compliance rate could be assumed for states that lack current codes and that do not undertake a code compliance study. We recommend a very conservative default rate, one that assumes near-worst-case practice, in order to provide an incentive for these states to conduct their own compliance studies. Based on work to date, we suggest that two default values be prescribed: one assuming no or few code compliance efforts, and a second assuming that a state is implementing a specified list of code compliance measures. As a preliminary estimate, we recommend a 50% code compliance rate if little effort is devoted to code compliance, and a rate of 75% if a state implements at least three out of four of the following measures:

- Conduct training for at least 90% of code officials on the energy portion of the building code and key aspects that need to be inspected

- Establish a stakeholder advisory group on compliance activities that meets regularly, and act on this compliance collaborative's recommendations
- Prepare and implement a compliance gap analysis, and develop and implement a strategic compliance plan
- Implement utility code compliance programs, giving utilities credit for energy savings from improved code compliance[20]

States could claim savings above these default rates in their compliance plans if they conducted their own compliance studies and found a higher rate in practice.

States could also conduct their own studies and potentially propose other methodologies. In particular we note that several states already provide utilities with some credit for building-code savings when they help with code adoption and/or implementation. In these states methodologies have already been developed and approved by state public service commissions, and we would expect many or most of these states to continue to use their current methodologies.

STATE APPLIANCE STANDARDS

Several states have their own appliance and equipment efficiency standards for products not covered by federal efficiency standards. EPA should provide guidance on how savings from these standards can be calculated. Savings from standards can be estimated using the following formula:

Savings = Product sales in the state x Energy savings per product x Compliance rate

Product sales in the state can be estimated from data compiled by trade associations, data compiled by DOE, or data from commercial sources. National data can be used with a reasonable way of estimating a state's share of national sales (e.g., number of households for residential products or commercial square feet for commercial products). Energy savings per product can be estimated by comparing the average required level of product efficiency to the estimated baseline level of efficiency, e.g., one that occurred in the state prior to the standard, or one that is currently occurring in nearby or similar states that do not have the standard. The state will need to conduct a study to estimate and document these figures. Compliance rate can be determined by periodic surveys of products being offered for sale (for retail products) or products that have recently been installed (for contractor products such as heating and cooling systems). Again, states could propose alternative methods, but it would be useful for EPA to indicate at least one particular specific method that is acceptable.

ENERGY PERFORMANCE CONTRACTING

Energy performance contracting can be a source of large energy savings that states should be able to count. Most of these savings have been in institutional facilities, with smaller amounts in commercial and multifamily buildings and in industrial facilities. These programs can generally

---

[20] These four strategies come from the 2014 ACEEE *State Energy Efficiency Scorecard* (Gilleo et al. 2014) and were developed in consultation with code compliance experts. Items could be added or subtracted from this list based on additional consultation with such experts.

be evaluated using methods similar to those used for other programs serving these sectors. However there are some important details regarding energy performance contracting that should be noted.

First, performance contracts often include savings guarantees, where a specific amount of savings is guaranteed for a specific period of time, usually measured in years. In these cases, the period of guarantee provisions can be used for savings persistence, as the savings are guaranteed and there are penalties if the savings are not delivered as promised.

Second, some performance contracting efforts use utility incentives and others do not. In states where plans include both utility and performance contracting programs, states should be required to put in place explicit procedures to allocate savings between utilities and energy service companies and prevent double counting.

Third, in most cases, the various IPMVP protocols are used to trigger payments under performance contracting. Just as with other programs, periodic impact evaluations should be conducted to verify these savings estimates, and if there are discrepancies between the results of the impact evaluation and previous savings claims, then prospective adjustments should be made to the methods used to estimate savings. Such impact evaluations could be conducted on a sample of projects at the vendor (ESCO), state, or even regional level.[21]

Fourth, many performance contracts estimate savings relative to baseline conditions at the time of the initial audit, even if equipment is about to be replaced. To be consistent with evaluations of other efficiency programs and policies for performance contracting, one of two methods should be used. Option 1 is to establish baselines based on Table 7.1 of the SEE Action Energy Efficiency Program Impact Evaluation Guide (SEE Action 2012), as discussed in EM&V comments separately submitted by ACEEE and other energy efficiency groups. Option 2 is to use the impact evaluations discussed in the third point above to adjust savings estimates for all ESPCs in a state (or even in a region) as a class. A single impact evaluation could be conducted in each state or region and the results applied for purposes of reporting energy and emissions savings under the Clean Power Plan. Impact evaluations should include control groups of similar customers who do not have ESPCs or do not participate in utility or other state programs. The control group will capture business-as-usual savings such as from normal equipment replacement at end of equipment life, and also the effects of weather and the overall economy, allowing the impact of the ESPCs to be isolated.

Energy Savings Efforts by Large Customers

Some customers are large enough that they will be interested in going through the effort to get credit for energy savings they achieve on their own. These customers will typically be large

[21] The need for impact evaluations is particularly important for projects without savings guarantees. We note that a 2014 paper by LBNL on a limited number of projects, found that for Energy Savings Performance Contracts (ESPCs) with savings guarantees, impact evaluations indicate that earlier savings estimates were very accurate, but for individual measure retrofits that used IPMVP Method A and did not have savings guarantees, impact evaluations found that many of the earlier savings estimates were too high. Method A uses many assumptions, and if these assumptions are optimistic, then the estimate savings will also be optimistic. See https://www.aceee.org/files/proceedings/2014/data/papers/5-1278.pdf.

industrial or institutional entities and commercial retailers who wish to aggregate multiple facilities (e.g., big-box stores). The same procedures should be applied for these customers as the ones described above for energy performance contracting. For industrial projects, however, there may be an additional need for adjustments based on actual production levels. The DOE Superior Energy Performance program has developed a methodology for estimating baseline and savings from industrial projects (LBNL 2012). We recommend that EPA approve this methodology as adequate for state compliance plans.

Appendix C: Treatment of CHP in the Clean Power Plan

The EPA should provide guidance on how combined heat and power (CHP) systems should be treated under the Clean Power Plan and how a CHP system's emissions rate should be determined. This appendix contains ACEEE's suggestions and recommendations on these two issues.

TREATMENT OF CHP SYSTEMS

ACEEE suggests the following approach to recognizing the lower emissions rates of CHP systems. The treatment of a CHP system will depend, in part, upon whether it is an affected electrical generating unit (EGU) under the Section 111(d) rule for existing sources or the Section 111(b) rule regulating greenhouse gas emissions for new fossil-fueled power plants.[22] Table C1 places CHP systems into four categories.

Table C1. CHP systems categories

Existing or new source	Major emissions source (affected EGUs)	Non-major emissions source
Existing	1 These units are regulated under Sec. 111(d) as existing power plants. These units could be eligible for credit under 111(d) if they dispatch to the grid and their hours of operation increase or there is a switch to a lower carbon fuel (e.g., coal to natural gas, or coal to biomass).	3 These units are not regulated by existing carbon dioxide rules. These units could be eligible for credit under 111(d) if they dispatch to the grid and their hours of operation increase or there is a switch to a lower carbon fuel (e.g., coal to natural gas, or coal to biomass).
New	2 Greenhouse gas emissions from these units are regulated under Sec. 111(b) for new power plants. These systems could be eligible for credit under 111(d) if they have a lower emissions rate than the 111(b) standard requires.	4 Greenhouse gas emissions from these units are not regulated by existing carbon dioxide emission rules. These systems could be eligible for credit under 111(d).

[22] The January 8, 2014, proposed GHG standards for new EGUs generally define an affected EGU as any boiler, integrated gasification combined cycle (IGCC), or combustion turbine (in either simple cycle or combined cycle configuration) that (1) is capable of combusting at least 250 million Btu per hour; (2) combusts fossil fuel for more than 10% of its total annual heat input (stationary combustion turbines have an additional criteria that they combust over 90% natural gas); (3) sells the greater of 219,000 MWh per year and one-third of its potential electrical output to a utility distribution system; and (4) was not in operation or under construction as of January 8, 2014 (the date the proposed GHG standards of performance for new EGUs were published in the Federal Register). The minimum fossil fuel consumption condition applies over any consecutive three-year period (or as long as the unit has been in operation, if less). The minimum electricity sales condition applies on an annual basis for boilers and IGCC facilities and over rolling three-year periods for combustion turbines (or as long as the unit has been in operation, if less).

ACEEE recommends that each of these four categories be considered an eligible pathway for states to avoid or reduce affected EGU emissions under Section 111(d):

1. *Existing CHP system that is an affected EGU under Section 111(d).* These units produce both electricity and thermal energy, and the combined efficiency is greater than conventional generation. The determination of their emissions rate should take into consideration the overall efficiency of the system at converting fuel to useful energy (electricity, steam, hot water, etc.). State plans should be able to value the carbon reductions that result from increased dispatch of power from these lower carbon EGUs.
2. *New CHP systems that will be regulated under Section 111(b)*. The determination of an emissions rate of new CHP systems should take into consideration its overall efficiency at converting fuel to useful energy. A state compliance plan should be able to recognize the carbon reduction potential of systems that have lower emissions rates than required by the NSPS standard.
3. *Existing CHP system that does not meet the requirements of an affected EGU under Section 111(d)*. The efficiency of these systems to convert fuel to useful energy should be recognized if these units have the ability to provide power to the grid and their hours of operation increase or they switch to a lower carbon fuel such as switching from coal to natural gas or from natural gas to a biofuel.
4. *New CHP systems not covered by existing rules*. These new systems should be treated as energy efficiency measures, and the energy savings they provide converted into a reduction of generation and associated emissions from affected EGUs.

Calculating Emissions Reductions from Major Emissions Source CHP

Two common approaches have been used to calculate an emissions rate that factors in both the electric and thermal outputs of CHP: the equivalence approach and the avoided emissions approach. The equivalence approach involves expressing the CHP system's thermal output and electric output in consistent units when calculating compliance. The avoided emissions approach involves determining the displaced emissions associated with the CHP system's thermal output. Both approaches value the thermal output from CHP and have been used effectively in existing state and federal regulations.

The avoided emissions approach is more directly tied to the environmental benefit of the CHP system, and for this reason, ACEEE suggests the avoided emissions approach as the preferred method for calculating an adjusted emissions rate under the Clean Power Plan. This method is the most accurate depiction of greenhouse gas benefits from CHP because the calculation is directly tied to the emissions displaced by the unit (i.e., the emissions that would have occurred from purchasing grid electricity and generating steam onsite in a conventional boiler).[23]

---

[23] See U.S. EPA CHP Partnership, 2013, "Accounting for CHP in Output-Based Regulations," http://www.epa.gov/chp/documents/accounting.pdf. See also U.S. EPA CHP Partnership, 2014, "Output-Based Regulations: A Handbook for Air Regulators," http://www.epa.gov/chp/documents/obr_handbook.pdf.

While the avoided emissions approach is a more accurate reflection of the emissions benefits of CHP, we understand that many stakeholders may prefer a simpler approach that is easy for states to administer. With those considerations in mind, the equivalence method can be an acceptable alternative.

If the equivalence approach is applied, EPA should provide full thermal credit for affected units. The proposed rule invites comment on "a range of two-thirds to 100 percent credit for useful thermal output in the final rule to better align incentives with avoided emissions."[24] In previous use of the equivalence approach, EPA has applied a range of credits to CHP thermal output, ranging from 75% in EPA's New Source Performance Standard (NSPS) for Electric Utility Steam Generating Units (40 CFR Part 60, Subpart Da) to recognizing 100% in the NSPS for Stationary Combustion Turbines. A 100% credit has likewise been applied in several states that have used the equivalence approach in state regulations.[25] Use of 100% thermal credit on a typical CHP system results in an effective CO_2 emissions rate that more closely approaches the emissions rate determined by the avoided emissions method. While the actual comparison is site specific and depends on several factors (e.g., overall CHP system efficiency, power-to heat ratio, displaced boiler characteristics), discounting the thermal output by 25% does not fully account for all of the benefits provided by CHP systems. As long as the rule includes monitoring and a minimum thermal output requirement (to protect against sham CHP projects), we recommend that 100% of the thermal output of affected EGUs be recognized under 111(d).

EPA has already published a tool that can help states account for CHP under output-based standards using either of the approaches described above.[26] EPA should direct states to these or other tools to help them account for the emissions benefits of CHP.

Calculating Emissions Reductions from Non-major Emissions Source CHP

States should be able to consider new CHP systems (not covered under existing rule) installed by industrial facilities, commercial and institutional office buildings, and campuses as compliance measures in their compliance plans. Additional guidance is needed on accounting for electricity savings from these CHP systems. These systems should be eligible for credit through a mechanism, such as an Energy Efficiency Resource Standard (EERS), that recognizes end-use energy efficiency gains and overall emission reductions.

Credit should only be given for the effective energy savings or emission reductions provided by these systems and not for their entire electrical output. Even though CHP burns less fuel and has fewer emissions overall when compared to separate heat and power, installing a CHP system will generally increase the emissions at the site as a result of increased fuel consumption.

---

[24] *Federal Register* 79 (117): 34914. http://www.gpo.gov/fdsys/pkg/FR-2014-06-18/pdf/2014-13726.pdf.

[25] See U.S. EPA CHP Partnership, 2013, "Accounting for CHP in Output-Based Regulations," pages 7–9. California's multi-pollutant regulation and Texas's permit by rule and standard permitting program allow CHP to account for 100% of their thermal output using the equivalence approach. http://www.epa.gov/chp/documents/accounting.pdf.

[26] *Ibid*.

We are aware that under the scope of the proposed rule, EPA may be limited to considering only the displaced emissions from affected EGUs and may not be able to consider the increased emissions resulting from a CHP installation beyond the fence. However, providing credit for full electric output of a CHP system without taking into account an increase in onsite emissions creates leakage and the potential for gaming the system.

An acceptable approach to crediting CHP for reducing electric generation at the central station should account for any incremental increase in onsite emissions. One possible approach would be to calculate a prorated credit for the CHP unit compared to the 2012 average fossil emissions rate of the compliance area. This calculation would result in a percentage indicating the portion of electricity eligible for credit and would ensure the calculated electricity savings are well aligned with geography-specific CO_2 emissions reduction estimates.

A simpler approach to recognizing electricity savings from CHP is to include CHP in a state's overall energy efficiency programs. Energy savings provided by new CHP systems would be added to the savings of other energy efficiency measures implemented as part of a state energy efficiency program. The calculation of the energy savings from a CHP system could be determined by deeming a certain percentage of a CHP system's electric output as net energy savings. A tiered system that ties the portion of electric output eligible to the CHP system's overall efficiency would allow systems with higher efficiency to receive more credit.[27] A tiered approach is simpler to implement, provides an estimation of electricity savings, and encourages the installation of a more efficient CHP system design. This approach has the added benefit of not requiring the consideration of emissions outside of the power sector.

Finally, while not currently regulated, EPA may consider regulating carbon dioxide emissions from these non-covered sources in the future. In most cases, a facility installing CHP may increase onsite emissions while displacing a greater amount of emissions from the electric system. This onsite increase could trigger additional or more-stringent regulation through other current or future rulemakings. This uncertainty could be a significant deterrent to facility owners considering new CHP. If a facility anticipates future regulation, it may perceive a disincentive to participate in a Clean Power Plan emissions-reduction program in the near term, leaving readily deployable emissions reductions on the table.

To address this issue, we propose that EPA should allow a non-covered CHP system to voluntarily place itself under current power plant regulation either under section 111(b) (for new sources) or 111(d) (for existing sources). By placing the CHP system under regulation, direct emissions from the CHP system should be excluded from site emissions that may in the future be regulated by EPA.

---

[27] This type of tiered system was proposed in 2013 by a consortium of environmental groups in response to the energy efficiency programs being proposed in Ohio Senate Bill 315. http://dis.puc.state.oh.us/DocumentRecord.aspx?DocID=9023e404-3606-4aa7-a72b-30f0344aeb48.