ADVANCED ENERGY ECONOMY

Comments on the Clean Power Plan

Proposed Rule: Carbon Pollution Emission Guidelines for Existing Stationary Sources: Existing Electric Utility Generating Units

Docket ID No. EPA-HQ-OAR-2013-0602

Submitted to the U.S. Environmental Protection Agency by Advanced Energy Economy

November 5, 2014

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Gina McCarthy
Administrator, U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C., 20460

RE: Proposed Rule: Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, Docket ID No. OAR–2013-0602

Administrator McCarthy:

Advanced Energy Economy is pleased to submit these comments on EPA's proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, or Clean Power Plan.

AEE is a national organization of businesses making the energy we use secure, clean, and affordable. Thanks to technological advances and innovation, we now have more options for meeting energy needs than ever before in history. We call those new options "advanced energy."

AEE and its state and regional partner organizations, which are active in 23 states across the country, represent more than 1,000 companies and organizations that span the advanced energy industry and its value chains. Technology areas represented include energy efficiency, demand response, natural gas, wind, solar, smart grid, nuclear power, and advanced transportation systems. Used together, these technologies and services will create and maintain a higher-performing energy system—one that is reliable and resilient, diverse, cost-effective, and clean—while also improving the availability and quality of customer-facing services.

AEE strongly supports the Clean Power Plan as a vital step toward modernizing the U.S. electric power system for greater efficiency, reliability, and economic opportunity, while achieving the Plan's goal of reducing carbon emissions. Although our comments identify a number of issues that need to be addressed in order to fully realize the potential contribution of advanced energy technologies, we believe that a few commonsense revisions and additional guidance for states will produce a final rule that achieves its goal with maximum benefit.

Sincerely,

M. Woolf

Malcolm Woolf
Senior Vice President, Policy and Government Affairs

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EXECUTIVE SUMMARY

Advanced Energy Economy (AEE) is pleased to submit these comments on EPA's proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units ("Clean Power Plan" or "Proposed Rule").[1]

AEE is a national organization of businesses making the energy we use secure, clean, and affordable. Thanks to technological advances and innovation, we now have more options for meeting our energy needs than ever before in history. We call these options "advanced energy."

AEE and its state and regional partner organizations, which are active in 23 states, represent more than 1,000 companies and organizations that span the advanced energy industry and its value chains. Technology areas represented include energy efficiency, demand response, natural gas, wind, solar, smart grid, nuclear power, and advanced transportation systems. Used together, these technologies and services will create and maintain a higher-performing energy system—one that is reliable and resilient, diverse, cost-effective, and clean—while also empowering customers with new and better energy products and services.

AEE strongly supports the Clean Power Plan. The basic framework laid out in the proposal is largely consistent with the three principles AEE adopted to guide development of smart, cost-effective plans for reducing emissions from the power sector: (1) recognizing the value of advanced energy technologies; (2) providing business certainty to encourage investment; and (3) encouraging technology-neutral solutions to facilitate competition. As such, the Proposed Rule represents a vital step toward modernizing the U.S. electric power system for greater efficiency, reliability and resilience, while also creating more value for consumers and the economy as a whole.

AEE believes that the Clean Power Plan will drive investment in an electric power system sorely in need of improvement. Our existing power system is facing serious challenges as innovations disrupt old ways of doing business, infrastructure shows its age, and customers demand new forms of service. Fortunately, many of the technologies and services that are already being deployed to upgrade and modernize the electric power system also reduce carbon emissions.

The Clean Power Plan's incorporation of "beyond the fence line" advanced energy technologies, which are in widespread use at reasonable cost today, will allow states to adopt policies that capture the carbon reduction and economic benefits of these technologies. AEE applauds EPA for recognizing this value by incorporating advanced energy technologies—including natural gas, renewable energy, nuclear power, and energy efficiency—as components of its "best system of emission reduction" (BSER). Today these technologies are widely deployed and providing significant cost-effective carbon emission reductions, thus fulfilling the requirement that the emission limitations be "achievable through the best system of emission

[1] 79 Fed. Reg. 34830 (proposed June 18, 2014) [hereinafter "Clean Power Plan" or "Proposed Rule"].

reduction…taking into account… cost… [that] has been adequately demonstrated."[2] AEE is likewise pleased to see these same technologies, as well as energy storage and transmission and distribution, included in the non-exclusive list of compliance options. AEE's recent *Advanced Energy Technologies for Greenhouse Gas Reduction* report highlighted 40 separate advanced energy technologies; these 40 technologies and many more can provide states with both carbon and economic benefits.[3] Given the array of relevant technologies and the flexibility for states to use their available resources, AEE believes that the EPA-determined state-by-state goals will be easy to achieve, both technologically and economically.

In fact, advanced energy can contribute substantially more to emission reduction and electric system modernization than is anticipated under the Proposed Rule. As a result of certain assumptions, the Proposed Rule underestimates how much advanced energy technologies can help states meet carbon reduction goals. At the same time, some structural elements of the Proposal could restrain advanced energy market growth and limit the use of advanced energy technologies as compliance tools that can deliver emission reductions along with significant economic opportunity for states, businesses, and consumers.

In order to fully capture the benefits of advanced energy and to ensure that the Clean Power Plan accelerates advanced energy markets, AEE makes the following specific recommendations to improve upon the solid foundation provided in the Propose Rule:

1. **EPA Should Strengthen the BSER Targets for Renewable Energy by Adopting a Significantly Modified Version of the Alternative RE Approach.** The primary methodology in the Proposed Rule for calculating achievable renewable energy generation in states has significant shortcomings. First, it is pegged to state renewable portfolio standards ("RPS"), which are policy commitments that may not fully capture the actual levels of cost-effective renewable energy generation. Second, the Proposed Rule only expects a state to meet a regional average rate of renewable energy generation, even if the state's renewable generation is already above that average. Third, the Proposed Rule assumes no renewable energy growth between 2012 and 2017, even though deployment continues to rise. Fourth, it expects each state to achieve by 2030 only the average renewable energy targets set for 2020. For all these reasons, the primary methodology represents a significant understatement of the renewable energy potential available to states for the reduction of carbon emissions.

   A more accurate evaluation of the level of achievable, cost-effective renewable energy in a state would directly consider the renewable resources that will be available to that state (and at what cost) during the compliance period. EPA presents for comment one

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[2] *See* Clean Air Act § 111(a)(1), 42 U.S.C. § 7411(a)(1).
[3] Advanced Energy Economy, *Advanced Energy Technologies for Greenhouse Gas Reduction: 40 Solutions for Cutting Carbon Emissions from Electricity Generation* (May 2014), *available at* http://info.aee.net/epa-advanced-energy-tech-report.

version of such a methodology in the Alternative RE Approach. AEE supports the use of the Alternative RE Approach, but believes it must be substantially modified to better represent both available renewable resources and reasonable expectations about costs.

Specifically, the Alternative RE Approach bases its 2030 targets on 2012 generation levels for specific renewable energy technologies in 16 leading states. Given the rapid and sustained rise in renewable energy (e.g., generation by utility-scale solar photovoltaics—PV—experienced a compound annual growth rate of nearly 47 percent in the top 16 states from 2007-2012,[4] while onshore wind capacity experienced a compound annual growth rate of almost 25 percent from 2001-2012[5]), it hardly seems reasonable to treat generation levels from several years ago as the benchmark for performance nearly 20 years in the future. Furthermore, these states are able to increase their use of renewable energy precisely because of the rapidly falling costs of these technologies—a fact that is not adequately reflected in the cost assumptions used in EPA's Alternative RE Approach. Finally, the Alternative RE Approach calculates the impact of only utility-scale renewable energy installations and does not consider distributed generation resources such as residential and commercial solar PV, one of the fastest-growing segments of renewable energy. Nor does it consider offshore wind, a nascent resource but one with enormous potential for zero-emission power generation. Its treatment of biomass and hydroelectric generation also requires revision.

In sum, the Alternative RE Approach is an improvement over the principal methodology in the Clean Power Plan but significantly underestimates the renewable energy potential for states today, let alone in 2030. EPA should modify the methodology of the Alternative RE Approach to set targets that better reflect what is actually achievable and cost-effective during the compliance period.

2. **EPA Should Strengthen the Targets for End-Use Energy Efficiency To Reflect the Full Extent of Achievable Efficiency as Demonstrated in the Market.** Based on industry experience, AEE confirms EPA's determination that an annual energy savings rate of 1.5 percent per year in utility-based energy efficiency programs for BSER is achievable, reasonable, and sustainable. In fact, the Proposed Rule's calculation of each state's energy savings potential significantly underestimates what is achievable because it does not include end-use energy savings from major market sectors and strategies that utilities have typically left to others. For example, in 2012, the market for energy service company (ESCO) efficiency improvements, much of which takes place outside of

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[4] Energy Information Administration, *EIA Form 860*, (2012), *available at* http://www.eia.gov/electricity/data/state/.

[5] Installed U.S. onshore wind capacity grew from 4,147 MW in 2001 to 60,012 MW in 2012. American Wind Energy Association (AWEA), *American Wind Industry Third Quarter 2014 Market Report,* (2014), *available at* http://www.awea.org/3Q2014.

traditional utility programs, was $4.8 billion, whereas utility efficiency program budgets totaled $5.7 billion.[6,7] This market size corresponds to significant emission reduction; since 1990, ESCOs have delivered an estimated 470 million tons of avoided CO_2 emissions.[8] Similarly, combined heat and power (CHP) is excluded from the BSER calculation even though a recent analysis concluded that increased CHP could drive 565 million MWh of cumulative energy savings by 2030.[9] Finally, the Proposed Rule does not include the use of building codes to drive efficiency. A recent paper found that expanded building code policy could drive an additional 1.1 trillion MWh of cumulative energy savings by 2030.[10]

Beyond overlooking major segments of energy efficiency in the BSER calculations, the Proposed Rule creates two issues related to timing. First, it assumes that states will achieve the same annual incremental reductions in 2017 as they did in 2012, even though some states have surpassed their 2012 savings rates already. Second, the Proposed Rule's assumptions about how the energy savings from a particular action are distributed over time have the effect of pushing much of the benefit of such actions outside of the compliance period.

AEE strongly urges EPA to address these timing issues as well as the exclusion of major energy efficiency industry segments. Adjusting these assumptions will ensure that the emission targets in the final rule more accurately capture the full potential of energy efficiency as a cost-effective emissions reduction mechanism.

3. **The Final Rule Should Shorten Compliance Periods and Incorporate Ongoing Updates To the Emission Rate Standards.** The challenge inherent in predicting the technological progress that will take place by 2030 and beyond creates several issues of concern with the Proposed Rule. First, given the rapid rate of improvement in advanced energy technologies (e.g., system prices for residential and commercial PV declined 6-7 percent annually, on average, from 1998 to 2013)[11] any EPA projection of emission

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[6] Navigant Research, *The U.S. Energy Service Company Market* (2013), *available at* http://www.navigantresearch.com/research/the-u-s-energy-service-company-market.
[7] Consortium for Energy Efficiency, *The Efficiency Program Industry by State and Region* (2013), *available at* http://library.cee1.org/sites/default/files/library/10535/2012_AIR_Tables_-_All_Tables_FINAL_-_with_erratum_NEW_VERSION.pdf.
[8] National Association of Energy Service Companies, *What is an ESCO, available at* http://www.naesco.org/what-is-an-esco.
[9] Hayes, Sarah, et al., American Council for an Energy-Efficient Economy, *Change Is in the Air: How States Can Harness Energy Efficiency to Strengthen the Economy and Reduce Pollution* (Apr. 2014), *available at* http://www.aceee.org/sites/default/files/publications/researchreports/e1401.pdf.
[10] *Id*.
[11] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014),

reduction potential in 2030 is likely to underestimate the contribution these technologies can make towards BSER. Second, the long compliance period in the Proposed Rule creates a timing issue with regard to implementation. The 10-year interim compliance period beginning six years from the date of the proposal allows for years of delay and creates significant timing uncertainly for the advanced energy industry as it plans the investments necessary to help states meet their targets.

Given their extensive experience in deploying advanced energy technologies, states do not need more than a few years to fully deploy emission reduction programs. We urge EPA to break its interim compliance period, which is currently proposed as 2020-2029, into two five-year periods to provide greater clarity as to the timing of emission reductions. In addition, we recommend that EPA reevaluate its BSER determination at least every eight years, starting when states submit compliance plans in 2016 and continuing indefinitely beyond the proposed final compliance period. This standard is consistent with the requirement in Section 111(b) and, given EPA's current rulemaking schedule, would require the Agency to finalize a reevaluation of the BSER no later than 2024. The Agency should indicate that states may be required to submit updated compliance plans to meet modified targets based on the revised BSER. State updates in 2025 would meet this obligation for the first review.

4. **EPA Should Explicitly Recognize More Advanced Energy Technologies as Compliance Options and Provide Guidance on Incorporating Them Into State Plans.** The Proposed Rule notes that there is a broad range of compliance options available to states as they develop their implementation plans. AEE is pleased to see natural gas, renewable energy, nuclear power, energy efficiency, transmission and distribution improvements, and energy storage listed as options. While EPA has indicated that states can propose options outside of the list, there is a great deal of uncertainty as to what options EPA might allow. Given the finite timeline for the development of state plans, such uncertainty is likely to limit the compliance options states incorporate into their plans to those listed in the rule. AEE's recent report, *Advanced Energy Technologies for Greenhouse Gas Reduction*, outlined 40 separate technologies that can provide the power sector with emission reductions while also providing other system and economic benefits—including many not named in the Proposed Rule, such as demand response and voltage-VAR optimization.[12] We ask that EPA explicitly recognize the technologies in this report as compliance options and provide guidance to states on the use of these technologies in compliance plans.

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available at http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy%20Prices%20See.

[12] Advanced Energy Economy, *Advanced Energy Technologies for Greenhouse Gas Reduction: 40 Solutions for Cutting Carbon Emissions from Electricity Generation* (May 2014), *available at* http://info.aee.net/epa-advanced-energy-tech-report.

5. **EPA Should Drive New Markets by Crediting New Actions Taken Prior To 2020.** The Proposed Rule only gives credit to emission reductions that occur during the interim compliance period (2020-2029) or beyond. This approach actively encourages developers—and their customers and financing entities—that would otherwise implement advanced energy projects prior to 2020 to wait until such time as these projects are eligible for credit under a state compliance plan. Similarly, it encourages states and utilities to wait until 2020 to implement new policies and programs for emission reduction.

   EPA has requested comment on the appropriateness of its approach,[13] and AEE strongly recommends modifying the Proposed Rule to address this flaw. One potential solution would be for the Agency to allow states to bank emission reductions from new actions stemming from programs included in a state compliance plan and achieved from the date the Clean Power Plan was published in the Federal Register (June 18, 2014) through 2019. While there are a number of policy approaches to encourage pre-2020 emission reductions, AEE believes the most workable and flexible option would be to allow credit banking. Granting credit to early actions will facilitate new advanced energy deployment, accelerate emission reductions, and give states a longer period to ramp up compliance activities.

6. **The Final Rule Should Provide Clear Crediting Guidance Regarding Out-of-State Renewables and Efficiency.** Renewable energy, along with the associated environmental attributes, is regularly sold across state boundaries. The ability to sell the environmental attributes of renewable power to buyers that will retire the attributes for compliance or other purposes is a critical component of the business model of renewable energy developers. Yet, as currently drafted, the Proposed Rule lacks clarity as to the approaches EPA will approve regarding what entities and what states get to use renewable generation and/or its associated environmental attributes for compliance with Clean Power Plan state goals. The lack of clarity around interstate crediting is creating uncertainty for buyers of renewable energy and is already impeding the development of projects that will send power across state lines. The interstate market for renewable electricity is significant as evidenced by solar-rich Arizona exporting 77 percent solar PV generation to neighboring states, nearby Utah exporting 97 percent of its wind generation, and Wyoming exporting 74 percent of electricity produced from all renewable sources.[14] In order to encourage the continued expansion of these interstate markets for renewable energy, EPA should provide clarity around how out-of-state

[13] Proposed Rule at 34919.
[14] National Renewable Energy Laboratory, *Beyond Renewable Portfolio Standards*. (2013), *available at* http://www.nrel.gov/docs/fy13osti/57830-1.pdf.

renewable energy generation will be credited under the Clean Power Plan. In subsequent comments, AEE may outline an approach to such crediting.

EPA should provide similar clarity on the crediting of energy efficiency investments. The Proposed Rule's current approach would discount state energy efficiency savings so as to credit only the share of the savings that are expected to reduce emissions at in-state EGUs. However, energy efficiency reduces total electricity consumption, including consumption of imported electricity, and the associated emissions. Moreover, EPA does not require other measures taken within a state (i.e., nuclear generation or renewables generation) to reduce emissions in that state in order to receive credit, so there is no reason for the Agency to take such an approach for energy efficiency. The proposed discounting will make energy efficiency a less desirable compliance mechanism.

AEE encourages EPA to allow states to credit the full value of energy efficiency investments within a state and not discount them based on whether that state is a net energy importer. Additionally, EPA should allow states to establish credit-trading platforms—similar to those used for RECs—that allow credits from energy savings to be traded, including among states. EPA should also facilitate the creation of an optional credit tracking system that states could join, particularly if they do not already have a system in place. This would eliminate the risk of double counting, and allow MWh of energy savings to be treated the same as MWh of renewable generation.

7. **EPA Should Provide Additional Guidance on EM&V To Facilitate Energy Efficiency in State Compliance Plans.** Under the Proposed Rule, there is some uncertainty for states regarding the treatment of evaluation, measurement, and verification ("EM&V") of energy efficiency measures. This uncertainty could impede incorporation of this important resource into state plans, which is a matter of concern given the finite timeline for states to develop compliance plans. In its final rule, EPA should provide greater certainty with regard to EM&V by developing a non-exclusive list of protocols that the Agency would approve for use. The final rule also should include clear criteria under which the Agency would evaluate alternative protocols submitted by states in their plans. As a general principle, EM&V should provide reasonable confidence in energy savings, but should not be so onerous as to become a disincentive to deploying energy efficiency as a resource. EPA should not wait until after states submit plans to signal which of these protocols will ultimately be approved. States and advanced energy businesses alike need to know that the types of protocols that are widely used and respected today within the industry and across the states can be incorporated into state implementation plans.

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AEE strongly supports the proposed Clean Power Plan and believes that a few commonsense revisions and additional guidance for states will produce a final rule that achieves its goal with maximum benefit for states. To that purpose, AEE offers the comments summarized above and explained in more detail below. The recommendations outlined here will ensure that the Clean Power Plan takes full advantage of the entire suite of advanced energy technologies available today. These technologies will, in turn, provide additional cost-effective emission reductions while driving performance-improving investments in an electric power system that is in need of modernization. We look forward to working with EPA on the final rule, including by providing supplementary analysis and recommendations at a later date (e.g., we are currently analyzing Notice of Data Availability Related to the Proposed Clean Power Plan released by EPA on October 28, 2014[15]), and working with the states on successful implementation.

[15] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units – Notice of Data Availability,* (Oct. 28, 2014), *available at* http://www2.epa.gov/sites/production/files/2014-10/documents/20141028noda-clean-power-plan.pdf.

I. INTRODUCTION & BACKGROUND

This section provides an introduction to Advanced Energy Economy and explains the value and availability of advanced energy technologies. Section II provides an overview of AEE's perspective on the Clean Power Plan. Section III provides detailed comments.

A. About Advanced Energy Economy

Advanced Energy Economy (AEE) is a national organization of businesses dedicated to making the energy we use secure, clean, and affordable. AEE and its state and regional partner organizations, which are active in 23 states, represent more than 1,000 companies and organizations that span the advanced energy industry and its value chains. Technology areas represented include energy efficiency, demand response, natural gas, wind, solar, smart grid, nuclear power, and advanced transportation systems. AEE promotes the interests of its members by engaging in policy advocacy at the federal, state, and regulatory levels, by convening groups of CEOs to identify and address cross-industry issues, and by conducting targeted outreach to key stakeholder groups and policymakers.

B. Value and Availability of Advanced Energy Technologies

In the 21st century, economic, social, and technological elements are fundamentally changing the way we make, manage, and consume energy. Demand for reliable, resilient energy is growing rapidly, even as our understanding of the health and environmental impacts of traditional energy sources compels a transition to cleaner options. Modern life and our modern economy depend on always-on electricity at the same time as increasingly severe storms expose the limitations of our aging energy infrastructure and severely challenge the reliability and resiliency of those structures. With global energy demand projected to increase 47 percent by 2040,[16] future prosperity depends on meeting growing demand with energy that is secure, clean, and affordable—what we call "advanced energy."

Advanced energy encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. These technologies, to name a few, include energy efficiency, demand response, natural gas, wind, solar, smart grid, nuclear power, and advanced transportation systems. While some of these technologies are just approaching commercial scale, many are well established in the marketplace.

Advanced energy is a substantial and growing contributor to the economy. AEE's *Advanced Energy Now 2014 Market Report* documents that advanced energy is a $1.1 trillion global

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[16] Energy Information Administration, *International Energy Outlook,* (2014) *available at* http://www.eia.gov/oiaf/aeo/tablebrowser/#release=IEO2013&subject=0-IEO2013&table=1-IEO2013&region=0-0&cases=Reference-d041117.

market,[17] as big as the pharmaceutical industry worldwide. In the United States, the advanced energy market accounts for nearly $170 billion in gross revenues annually, equal to the U.S. airline industry.[18] Advanced energy technologies have the potential to power the long-term growth of the economy both in the United States and around the world.

II. OVERVIEW OF AEE'S PERSPECTIVE ON THE CLEAN POWER PLAN

A. AEE Supports Historic Action To Modernize Our Electricity System

AEE strongly supports EPA's "Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units"[19] ("Clean Power Plan" or "Proposed Rule") and believes that it provides a historic opportunity to modernize our electric power system for the 21st century. The Proposed Rule will infuse the electric power system with critical investments to improve efficiency, reliability and resiliency, while also creating more value for consumers and the economy as a whole.

In the most basic terms, the Proposed Rule will require states to achieve predetermined reductions in CO_2 emission rates from existing fossil fuel-fired electric generating units (EGUs) within their jurisdictional boundaries. Advanced energy technologies will serve a crucial role in helping states meet these required emission targets.

In order to meet the requirements of the Proposed Rule, states will need to move away from the less efficient and increasingly costly conventional means of generating power while still meeting the electricity needs of residential, commercial, and industrial customers. This will require investment in efficient and reliable advanced energy technologies, which will create new employment opportunities and fuel economic growth. Moreover, because of the myriad of advanced energy solutions available, states will have many options for how they structure their compliance plans. These options will increase competition, choice, and innovation in the marketplace, ultimately resulting in both lower emissions and greater customer value.

Thanks to the benefits they provide to the system, advanced energy technologies are already deploying rapidly into the marketplace. Between 2011 and 2013, Federal Energy Regulatory Commission (FERC) Energy Infrastructure Reports show that 86 percent of new generating capacity installed came from advanced technologies.[20] The Proposed Rule will simply accelerate the incorporation of advanced energy technologies into the electric power system, resulting in widespread economic and environmental benefits. By way of illustration, a 2011

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[17] Advanced Energy Economy, *Advanced Energy Now 2014 Market Report* (Feb. 2014), *available at* http://info.aee.net/advanced-energy-now-2014-market-report.
[18] Advanced Energy Economy, *Advanced Energy Technologies for Greenhouse Gas Reduction* (May 2014), *available at* http://info.aee.net/epa-advanced-energy-tech-report.
[19] 79 Fed. Reg. 34,830 (June 18, 2014).
[20] Office of Energy Projects, Federal Energy Regulatory Commission, *Energy Infrastructure Update* (Dec. 2012 and Dec. 2013), *available at* https://www.ferc.gov/legal/staff-reports/2013/dec-2012-energy-infrastructure.pdf *and* http://www.ferc.gov/legal/staff-reports/2013/dec-energy-infrastructure.pdf.

study produced by Google.org, the philanthropic arm of Google Inc., found that by 2030, select advanced energy technologies could annually save consumers over $900 per household, reduce U.S. CO_2 emissions by 13 percent, create 1.1 million new jobs, and increase U.S. GDP by $155 billion per year.[21] Under the Clean Power Plan, states that incorporate advanced energy into their compliance plans will reap these benefits. For example, analysis by the Montana Department of Environmental Quality shows that under five different scenarios of 111(d) compliance, the state will keep existing energy jobs while creating new jobs in advanced energy.[22]

B. The Proposed Rule Aligns with Principles Adopted by AEE and Its Members

The Clean Power Plan is consistent with the three principles adopted by AEE to guide the development of smart, cost-effective plans for reducing emissions from the power sector:

1. Recognize the value of advanced energy technologies for achieving emission reduction;
2. Provide business certainty to encourage investment; and
3. Encourage technology-neutral solutions to allow for competition in the marketplace.

The Proposed Rule recognizes the value of advanced energy by including many advanced energy technologies in its determination of the “best system of emission reduction” (BSER) from fossil fuel-fired electric generating units (EGUs), including expanded generation from underutilized natural gas capacity (Building Block 2), zero emission renewable energy and nuclear power generation (Building Block 3), and end-use energy efficiency (Building Block 4). The Clean Power Plan provides certainty for business investment by setting enforceable standards for emission reduction by state in a fixed compliance period and allowing a range of readily available, market-tested “beyond the fence line” measures (i.e., actions beyond the fence lines of existing EGUs) for compliance. Finally, in the Proposed Rule, EPA has taken a technology neutral stance to compliance. States have substantial flexibility in determining how they craft their plans, thereby allowing them to choose among the full range of advanced energy technologies in order to meet their targets.

C. Targets Set Forth Are Technologically Easy To Meet at Low Cost

The Proposed Rule establishes emission goals that states are required to meet, including an interim goal, which would apply between 2020 and 2029, and a final goal, which must be achieved starting in 2030. Based on EPA’s method of calculation, state emission goals are not uniform; this means that some states will be required to reduce emission rates significantly,

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[21] Google.org, *The Impact of Clean Energy Innovation* (Jul. 2011), *available at* http://www.google.org/energyinnovation/The_Impact_of_Clean_Energy_Innovation.pdf.

[22] Job creation for the five scenarios ranges from 953 to 2,040, including both permanent direct and indirect jobs, as well as temporary construction jobs. Craig Henrikson et al., Montana Department of Environmental Quality, *Options for Montana’s Energy Future: Creating jobs and delivering clean air in a changing economy* (2014), *available at* http://governor.mt.gov/Portals/16/docs/111dwhitepaperpathways91914-final.pdf.

while others will be required to make smaller reductions. Nevertheless, AEE believes that even states with the most significant reduction goals will be able to meet their targets with relative ease given EPA's conservative assumptions and the range of emission reduction options available.

Texas, for example, must reduce its emission rate by 39 percent, one of the largest of any state. However, Texas will be able to leverage its leadership in advanced energy technologies to meet this reduction target. Texas has a sizeable natural gas combined cycle (NGCC) fleet—37,548 MW installed capacity[23]—that can be used for coal to gas switching, and as a major producer of natural gas, the state stands to benefit from increased use of natural gas across the states for the purposes of Clean Power Plan compliance. For renewable energy generation, the state achieved 600 percent growth over 8 years from 2004 to 2012, but EPA only assumes Texas can grow 100 percent growth from 2012 to 2020.[24,25] This is despite the fact that renewable energy prices have been declining rapidly; system prices for residential and commercial PV declined 6-7 percent annually, on average, from 1998 to 2013,[26] while the cost of wind energy has decreased by more than 90 percent since the 1980s.[27] Furthermore, energy efficiency, demand response and a number of other advanced energy technologies are also poised to help the state substantially. Recent analysis by the Brattle Group shows that energy efficiency and demand response could cut peak demand growth in Texas by as much as 50 percent.[28]

Since the Proposed Rule allows states to deploy these types of "beyond the fence line" solutions to reduce emissions in addition to the on-site options, states will be able to employ the full suite of advanced energy technologies. This flexibility will also allow states to address a major contributing factor to excessive emissions: the inherent inefficiencies of the existing electricity system. By employing more natural gas and renewable generation, expanding demand-side energy efficiency, and deploying additional smart grid technologies, states will dramatically decrease their emissions as they displace generation from outmoded, high-emitting sources and eliminate inefficiency and waste in the system.

The Proposed Rule specifically targets the emissions of existing coal- and oil-fired EGUs, many of which were constructed in the 1960s and 1970s. These aging EGUs, a product of an earlier

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[23] State Goal Computation TSD, Appendix 1 & 2.
[24] Texas renewable energy generation target in 2020 is 68,273,785 MWh. In 2012, renewable energy generation was 34,016,697 MWh. State Goal Computation TSD, Appendix 1 & 2.
[25] Texas renewable energy generation was 4,991,243 MWh in 2004, growing 593 percent by 2012. Energy Information Administration, *Detailed State Data* (2014), http://www.eia.gov/electricity/data/state/
[26] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy%20Prices%20See.
[27] U.S. Department of Energy, *Revolution Now: The Future Arrives for Four Clean Energy Technologies* (Sep. 2013), *available at* http://energy.gov/sites/prod/files/2013/09/f2/200130917-revolution-now.pdf.
[28] Ira Shavel et al., The Brattle Group, *Exploring Natural Gas and Renewables in ERCOT, Part III: The Role of Demand Response, Energy Efficiency, and Combined Heat & Power* (May 2014), *available at*http://www.texascleanenergy.org/Brattle%20III%20Final.pdf.

technological age, are inefficient and outmoded. As of 2012, nearly three-quarters of all U.S. coal-fired capacity was more than 30 years old[29] and had an average efficiency of about 33 percent.[30] In other words, two-thirds of the energy from these coal-fired power plants is wasted—mostly as excess heat. Low efficiency, combined with a carbon-intensive fuel, yields high carbon emissions.

By contrast, a modern NGCC plant is nearly 60 percent efficient, requiring significantly less fuel to produce the same amount of electricity.[31] Because these plants are more efficient and natural gas is less carbon intensive, the net carbon emissions from these facilities are lower (50 percent or more).[32] Moreover, as the price of natural gas has fallen, gas-fired generation has become increasingly competitive for baseload power and has already displaced significant coal-fired generation.

Beyond gas-fired generation, other advanced energy technologies offer additional opportunities to increase efficiency, diversify resources, and maintain grid reliability. For example, high-voltage direct current transmission (HVDC) can connect wind and large-scale solar installations to population centers with minimal transmission losses while enhancing the reliability and resiliency of the bulk electricity transmission network. At the distribution system level, intelligent grid management solutions and demand response technologies, coupled with granular energy use data and appropriate customer incentives, can reduce peak demand. By flattening the demand curve, these advanced energy technologies avoid the need for investment in peaking capacity and traditional transmission and distribution (T&D) upgrades, ultimately freeing up capital and increasing asset utilization across the network. Emerging technologies such as electric vehicles and bulk energy storage can also help to manage an increasingly dynamic grid with higher levels of variable sources of generation; by providing reserve electricity, they enable a more flexible, responsive load and further reduce the need for investments in peaking capacity. Energy efficiency technologies, such as LED lighting and intelligent building controls, will continue to drive down total electricity use while providing superior performance and comfort.

Given the availability of the full range of advanced energy technologies, states will be able to meet their goals easily from a technological perspective and at low cost, while at the same time increasing grid reliability and resiliency and providing new products and services to consumers. By driving investment in these high-value emission-reducing technologies, the Clean Power

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[29] Energy Information Administration, *How old are U.S. power plants?* (Mar. 2013), *available at* http://www.eia.gov/tools/faqs/faq.cfm?id=110&t=3.
[30] Energy Information Administration, *Annual Electric Generator Report*, Form EIA-860, *available at* http://www.eia.gov/electricity/annual/html/epa_08_02.html.
[31] U.S. Department of Energy, *How Gas Turbine Power Plants Work* (2014), *available at* http://energy.gov/fe/how-gas-turbine-power-plants-work.
[32] EPA, *Natural Gas* (Sep. 2013), *available at* http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html.

Plan will accelerate the country's transition to a high-performing grid that is efficient, reliable, resilient, flexible, clean, affordable, and consumer-focused.

D. The Proposal Can Be Improved To Allow States to Maximize the Benefits of Advanced Energy Technologies

As a result of certain assumptions and provisions, the Proposed Rule significantly underestimates the degree to which advanced energy technologies can help the states meet their carbon reduction goals. At the same time, certain aspects of the Proposed Rule create challenges for states looking to use advanced energy technologies for compliance. In order for states to fully leverage these technologies, which provide carbon reduction along with significant economic opportunities for businesses and consumers, the final rule should build on the solid foundation provided in the Proposed Rule by addressing the issues outlined below. As noted in the Executive Summary, we believe it is particularly important that the Final Rule:

- Should strengthen the BSER targets for renewable energy by adopting a significantly modified version of the Alternative RE Approach;
- Strengthen the targets for end-use energy efficiency to reflect the full extent of achievable efficiency as demonstrated in the market;
- Shorten compliance periods and incorporate ongoing updates to the emission rate standards;
- Explicitly recognize more advanced energy technologies as compliance options and provide guidance on incorporating them into state plans;
- Drive new markets by crediting new actions taken prior to 2020;
- Provide clear crediting guidance regarding out-of-state renewables and efficiency; and
- Provide additional guidance on EM&V to facilitate energy efficiency in state plans.

III. DETAILED COMMENTS

In addition to the overview provided above, AEE offers the following specific and technical comments to the Proposed Rule. These comments are intended to (1) support fundamental elements of the Proposed Rule; (2) suggest refinements to the Proposed Rule that will allow advanced energy technologies to drive greater reduction of CO_2 emissions from existing fossil fuel fired EGUs at lower cost, while simultaneously modernizing the electric power system; and (3) recommend further changes to the state guidance documents that will help states develop plans that leverage advanced energy technologies as emission reduction tools.

In addition to the detailed comments provided in this document, AEE may also provide further analysis and recommendations to guide the EPA's consideration of certain issues, such as the inclusion of specific advanced energy technologies and the crediting of out-of-state renewable generation. AEE is currently analyzing the Notice of Data Availability Related to the Proposed

Clean Power Plan [hereinafter "NODA"] released by EPA on October 28, 2014,[33] and may submit further comments regarding this additional information.

A. EPA's Flexible System-Based Approach To the Clean Power Plan Allows for Significant Decarbonization of the Electric Power System at Low Cost

1. A system-based conception of BSER can appropriately drive significant emission reductions

AEE applauds EPA for finding that the BSER to limit CO_2 emissions from existing fossil fuel-fired EGUs is a system that goes beyond the fence line of individual EGUs. This recognizes that the electric power system is not simply a set of individual generation units, but rather a highly interconnected system of generation, transmission and distribution facilities and end users all managed in real time to keep the system in balance. The utilization and ultimate emissions of individual EGUs operating within this system are a function of the performance of the entire system and should not be artificially viewed in isolation.

Achievable and cost effective emission reduction opportunities can be found both within the fence lines of existing EGUs and beyond the fence line with application of advanced energy technologies such as energy efficiency, demand response, natural gas, wind, solar, voltage-VAR optimization, nuclear power, combined heat and power, and others. These technologies are well established, cost effective, and are already contributing to emission reductions at affected EGUs.

EPA's approach to determining the level of emission reductions that have been adequately demonstrated—whether justified as the application of four BSER "Building Blocks" to the broadly conceived electric system or as a quantification of the emission reductions achievable through reduced utilization of affected EGUs—is consistent with past practice,[34] legal authority,[35] and common sense.

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[33] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units – Notice of Data Availability,* (Oct. 28, 2014), *available at* http://www2.epa.gov/sites/production/files/2014-10/documents/20141028noda-clean-power-plan.pdf.

[34] *See* Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Municipal Waste Combustors, 60 Fed. Reg. 65387 (Dec. 19, 1995), *available at* http://www.epa.gov/ttn/atw/129/mwc/fr1295f.pdf (requiring a materials separation plan as part of the Section 111(d) emission guideline).

[35] *See* Robert R. Nordhaus and Ilan W. Gutherz, *Regulating CO_2 Emissions from Existing Power Plants Under § 111(d) of the Clean Air Act: Program Design and Statutory Authority,* 44 E.L.R. 10366, 10383-10388 (2014); Gregory E. Wannier et al., Resources for the Future, RFF DP 11-29, *Prevailing Academic View on Compliance Flexibility Under § 111 of the Clean Air Act,* (2011), http://www.rff.org/RFF/Documents/RFF-DP-11-29.pdf; Megan Ceronsky & Tomas Carbonell, Environmental Defense Fund, *Section 111(d) of the Clean Air Act: The Legal Foundation for Strong, Flexible & Cost-Effective Carbon Pollution Standards for Existing Power Plants 8-14* (Feb. 2014), http://www.edf.org/sites/default/files/section-111-d-of-the-clean-air-act_the-legal-foundation-for-strong-flexible-cost-effective-carbon-pollution-standards-for-existing-power-plants.pdf.

2. The Clean Power Plan's emission reduction targets reflect an achievable, adequately demonstrated, and cost-effective system of emission reduction

The Clean Power Plan and its technical support documents (TSDs) appropriately establish that the four Building Blocks constituting BSER and applied to the particular facts and circumstances of each state are technically feasible,[36] cost-effective, and adequately demonstrated. In fact, the conservative BSER assumptions, availability of advanced energy technologies for compliance, and ongoing technological innovation in the advanced energy industry, mean that states will be able to achieve their emission targets at low cost.

a. *Increasing existing natural gas utilization*

As noted in Section II.C of this document (above), NGCC technology is significantly less carbon-intensive than other forms of fossil-fired generation. The Proposed Rule has appropriately determined that it is feasible and cost-effective for states to take advantage of existing NGCC fleets and low natural gas prices.

EPA states that the generation of approximately 1,400 TWh from NGCC facilities in operation or under construction as of January 8, 2014 is feasible starting in 2020.[37] This constitutes an approximately 50 percent increase in NGCC generation from today's levels by 2020,[38] a target supported by the 80 percent increase from 2005 to 2012.[39]

The Clean Power Plan supports, through Integrated Planning Model (IPM) modeling, that 70 percent utilization of existing and under construction NGCC is technically feasible.[40] In fact, IPM was able to successfully simulate 75 percent NGCC utilization nationally.[41] Even if such utilization is not feasible in every region or state, EPA is not required to demonstrate that BSER is universally achievable; only that it is nationally achievable and adequately demonstrated.[42] The Clean Power Plan rule has clearly met this burden.

Finally, EPA considers, but does not include, other mechanisms for increasing low-emitting natural gas as part of BSER. Technologies exist to significantly expand natural gas use beyond

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[36] As EPA notes, technical feasibility can be read as a requirement that an emission limitation is "achievable." However for the purposes of this rule, it is treated as a criterion for the BSER. EPA, *Legal Memorandum for Proposed Carbon Pollution Emission Guidelines for EPA, Existing Electricity Utility Generating Units* 37 (June 2014) [hereinafter "Legal Memo"].
[37] Proposed Rule at 34863.
[38] *Id.*
[39] *Id.*
[40] *See Sierra Club v. Costle*, 657 F.2d 298, 332-36 (D.C. Circ. 1981) (upholding Section 111 NSPS from challenge based on EPA's use of a utility system computer model).
[41] *Proposed Rule* at 34865.
[42] *C.f. Essex Chemical Corp. v. Ruckelshaus*, 486 F.2d 427, 433-34 (D.C. Cir. 1973) ("An achievable standard is one which is within the realm of the adequately demonstrated system's efficiency and which, while not at a level that is purely theoretical or experimental, need not necessarily be routinely achieved within the industry prior to its adoption.").

what is possible through re-dispatch. For example, co-firing of natural gas with coal can reduce the emission rate of an affected EGU. Similarly, conversion of coal-fired EGUs to natural gas-fired EGUs (repowering) can significantly reduce emissions, particularly in states without significant potential to shift utilization towards underutilized NGCCs. Additionally, construction of and re-dispatch to new NGCC is a viable emission reduction strategy for every state, regardless of the capacity factor of existing NGCC capacity. While AEE does not take a position on the inclusion of these emission reduction strategies as part of BSER, their availability further demonstrates the technical ease and low cost of the state targets established by the Clean Power Plan. AEE is currently reviewing the additional information released by EPA in its NODA regarding possible changes in the calculation of Building Block 2, and may submit comments on these potential changes at a later date.

b. *Retaining at-risk and adding under construction nuclear power*

The continued use of existing nuclear power plants, as well as the completion of those under construction, will provide significant quantities of zero-carbon generation, displacing fossil fuel generation and reducing emissions. Moreover, nuclear power is a critical zero-carbon generation source that provides baseload electricity. The nearly 115 GW of nuclear capacity in the U.S. avoids carbon emissions of around 245 million metric tons per year, so closing just one third of these nuclear plants would cause CO_2 emissions to rise by 8 percent.[43,44]

The impact of nuclear plant closures can have significant emission repercussions. For example, the San Onofre nuclear facility in California generated an average of 16,000 GWh per year of zero-carbon electricity, representing 8 percent of electricity generation in California.[45] Last year, the facility's two generators were shut down. It would require nearly 7,200 MW of zero-carbon generation to replace San Onofre. In the near term, the mix of resources covering for the plant is adding 6 million metric tons of carbon emissions per year.[46]

The proposed Clean Power Plan recognizes the critical contribution that existing nuclear facilities make to lowering CO_2 emissions from what they would otherwise be without this source of zero-emission generation. By allowing states to take credit for keeping in place the 5.8 percent of the country's nuclear fleet that the Energy Information Agency (EIA) has deemed to be "at risk"—made possible by also including 5.8 percent of a state's nuclear generation as part

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[43] In 2012, there were 115.4 GW of nuclear capacity in North America, mostly in the U.S. *See* Energy Information Administration, *Today in Energy* (May 17, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=6310.
[44] Third Way, *Shutting Down Nuclear Plants is Still Bad News for Environmentalists* (May 2014), http://content.thirdway.org/publications/794/Third_Way_Memo_-_Shutting_Down_Nuclear.pdf.
[45] Energy Information Administration, *Today in Energy* (Nov. 14, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=8770.
[46] Geoffrey Styles, *San Onofre: the Fallout from Closing California's Nuclear Plant* (Jun. 14, 2013), http://www.csmonitor.com/Environment/Energy-Voices/2013/0614/San-Onofre-the-fallout-from-closing-California-s-nuclear-plant.

of that state's target—the Proposed Rule creates an important incentive for states to find ways to keep existing nuclear facilities operational.

While AEE takes no position on the particularities of the proposed approach, AEE applauds the Clean Power Plan's inclusion of nuclear power as a significant factor in the decarbonization equation and to provide states an incentive to develop policies that allow facilities that otherwise might close to safely stay open as an emission prevention measure.

c. *Ramping up renewable energy*

The Clean Power Plan determines that states can ramp up renewable electricity generation as a cost-effective and adequately demonstrated means of reducing emissions from affected EGUs. Nationally, the Proposed Rule expects 522 TWh of renewable energy generation by 2029,[47] which constitutes 13 percent of 2012 net electric generation[48] or 11.5 percent of EIA's projected 2029 net electric generation in the Reference Case of the 2014 Annual Energy Outlook.[49]

This expected level of renewable energy growth is conservative given historical trends. From 2002 to 2012, net renewable generation in the United States grew 176 percent, outpacing in just 10 years the 139 percent growth that EPA assumes over the 17-year period from 2012 to 2029.[50,51] Growth in some states has dwarfed these figures; between 2004 and 2012, renewable energy generation in Texas grew nearly 600 percent.[52]

Furthermore, the growth in renewable generation expected by the Proposed Rule is feasible and cost effective with today's technologies. The long-term growth in renewable energy deployment has been accompanied by continuous improvements in technology performance and cost. In 2013, the national average price for wind power purchase agreements (PPAs) hit an all-time low of $25/MWh.[53] The system prices for residential and commercial PV, for example, declined 6-8 percent per year, on average, from 1998 to 2013.[54] Projections by the

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[47] State Goal Computation TSD, Appendix 1 & 2. This is excluding existing hydroelectric generation.
[48] In 2012, the United States generated 4047 TWh of electricity, net. *See* Energy Information Administration, *Electric Power Annual* (2014), http://www.eia.gov/electricity/annual/html/epa_03_01_a.html.
[49] EIA projects 4500 TWh of net electricity generation in 2029 under its reference case. *See* Energy Information Administration, *2014 Annual Energy Outlook: with Projections to 2040* (Apr. 2014), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2014).pdf.
[50] State Goal Computation TSD, Appendix 1 & 2. This is excluding existing hydroelectric generation.
[51] Energy Information Administration, *Electric Power Annual* (Dec. 12, 2012), http://www.eia.gov/electricity/annual/html/epa_03_01_a.html.
[52] Texas renewable energy generation was 4,991,243 MWh in 2004, growing 593 percent by 2012. *See* Energy Information Administration, *Detailed State Data* (Nov. 12, 2013), http://www.eia.gov/electricity/data/state/.
[53] Ryan Wiser et al., U.S. Department of Energy. *2013 Wind Technologies Report.* (August 2014), *available at* http://energy.gov/sites/prod/files/2014/08/f18/2013%20Wind%20Technologies%20 Market%20Report_1.pdf.
[54] Galen Barbose et al., Lawrence Berkeley National Laboratory.*Tracking the Sun VII: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2013.* (Sept. 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6808e_0.pdf.

National Renewable Energy Laboratory (NREL) and Lawrence Berkeley National Laboratory (LBNL) show that this sustained price drop over eight years is expected to continue, with solar eventually reaching widespread grid parity.[55] Recent market data indicates that average levelized cost of electricity (LCOE) of renewable generation has already become cost competitive with conventional sources, particularly in resource-rich regions.[56] In the latest figures from Navigant Consulting, LCOE for utility-scale photovoltaic (PV) and onshore wind generation were $0.08/kWh and $0.06/kWh, respectively, compared to $0.075/kWh for coal.[57]

Historical growth rates in renewable energy generation and the pace of improvements in technology performance and cost over the last decade indicate a high likelihood that renewable energy generation will continue to grow quickly. As such, the targets in the Proposed Rule are overly conservative with respect to the potential for renewable generation growth over time as discussed in Section III.C. of this document (below).

d. *Increasing energy efficiency*

As an inexpensive source of CO_2 emission reduction that also saves money for electricity customers, end-use energy efficiency can and should play a critical role in helping the United States meet its emission reduction objectives. Indeed, energy efficiency is already playing a significant role in reducing CO_2 emissions. Through the U.S. Department of Energy's Better Buildings, Better Plants Program, 143 manufacturing companies have used energy efficiency improvements in their facilities to reduce CO_2 emissions by 18.5 million metric tons while saving $1.7 billion in energy costs.[58] Over the past seven years, behavioral efficiency alone has helped save over 5 TWh of electricity, avoiding the emission of roughly 39 million tons of CO_2.[59] AEE agrees that energy efficiency can serve as a significant means of emission reduction at affected EGUs and strongly supports the EPA's inclusion of energy efficiency as a critical component of BSER.

Specifically, Building Block 4 is based on the demonstrated ability of states to reduce energy demand by 1.5 percent each year, continuously. AEE supports the Clean Power Plan's

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[55] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy%20Prices%20See.

[56] According to Lazard, the average LCOE for onshore wind dropped almost 60 percent in 5 years from 2009-2014, while the LCOE for utility-scale crystalline PV dropped almost 80 percent during the same period. *See* Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 8.0,* (September 2014), *available at* http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf.

[57] Bruce Hamilton, Navigant Research, *As Race Tightens, Renewable Energy Costs Fall Quickly* (Mar. 201, 2014), *available at* http://www.navigantresearch.com/blog/as-race-tightens-renewable-energy-costs-fall-quickly.

[58] U.S. Department of Energy. *Better Plants Progress Update 2014,* (2014) *available at* http://www.energy.gov/sites/prod/files/2014/09/f18/Better%20Plants%20Progress%20Update%202014.pdf.

[59] OPower, *Results, available at* http://www.opower.com/results.

determination that a 1.5 percent incremental annual energy savings rate is feasible, cost-effective, and adequately demonstrated. A recent report from the American Council for an Energy Efficient Economy (ACEEE) cites six states that have achieved this savings rate in 2013 through utility and non-utility energy efficiency programs, and another five that have achieved greater than 1 percent savings. Two states—Massachusetts and Rhode Island—exceeded 2 percent savings in 2013,[60] while Vermont has achieved savings greater than 1.5 percent for the past 7 years.[61] Given these historical reductions, the target set by EPA is conservative. As a result, it would be inappropriate for EPA to use the alternative proposed level of 1 percent annual incremental energy savings[62] when determining the level of emission reductions at EGUs that is achievable due to energy efficiency.[63]

Furthermore, EPA does not require all states to reach 1.5 percent annual incremental savings starting in the first compliance year, 2020. Instead, the Clean Power Plan has specified that a 0.2 percent rate of annual growth for each state's energy efficiency program is feasible.[64] Thus, state energy efficiency programs are expected to grow slowly until they reach a maximum of 1.5 percent annual incremental savings. EPA is requesting comment on whether it should adopt a 0.25 percent growth rate.[65] As demonstrated by another ACEEE report, a 0.25 percent per year energy efficiency growth rate could reduce nationwide emissions by 25 percent by 2030 with a net positive economic impact.[66] Top-performing states such as Massachusetts and Rhode Island have achieved consistent growth in energy efficiency savings, with average annual increases of 0.30 and 0.25 percent, respectively, over the period 2009-2013.[67] Based on this data, AEE believes the 0.2 percent growth rate is conservative and encourages EPA to adopt the more aggressive 0.25 percentage growth rate.

e. *Further reducing emissions through the application of synergistic advanced energy technologies across the Building Blocks*

In justifying the beyond the fence line approach to the BSER, EPA accurately cites the interconnected nature of the electricity system.[68] Despite this recognition, EPA evaluated each

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[60] Annie Gilleo et al., American Council for an Energy Efficient Economy, *The 2014 State Energy Efficiency Scorecard,* by Gilleo et al. (Oct. 2014), *available at* http://www.aceee.org/research-report/u1408.
[61] American Council for an Energy Efficient Economy, *The State Energy Efficiency Scorecard* (2009, 2010, 2011, 2012, 2013, 2014), *available at* http://www.aceee.org/state-policy/scorecard.
[62] *See* Proposed Rule at 34873.
[63] EPA itself notes that this 1.5 percent annual incremental target is conservative because it does not include measures of energy efficiency from many existing policies. *See* Proposed Rule at 34872.
[64] Proposed Rule at 34872-73.
[65] Proposed Rule at 34875.
[66] Sarah Hayes et al., American Council for an Energy Efficient Economy, *Change Is in the Air: How States Can Harness Energy Efficiency to Strengthen the Economy and Reduce Pollution* (Apr. 2014), *available at* http://www.aceee.org/sites/default/files/publications/researchreports/e1401.pdf.
[67] American Council for an Energy Efficient Economy, *The State Energy Efficiency Scorecard* (2009, 2010, 2011, 2012, 2013, 2014), *available at* http://www.aceee.org/state-policy/scorecard.
[68] Proposed Rule at 43880-81.

BSER Building Block separately. This approach fails to account for the additional emission reductions that result from the synergistic nature of advanced energy technologies, including but not limited to those technologies that comprise Building Blocks 2, 3, and 4. As a result, the Proposed Rule does not sufficiently account for the fact that the technologies covered by the four BSER Building Blocks are complementary and cumulative in nature, supporting feasible, cost-effective statewide emissions targets.[69] Moreover, the Proposed Rule underestimates the other benefits of advanced energy technologies, which, used together, create an electric power system that is more efficient, reliable, resilient, and consumer-focused.

Some critics of the Proposed Rule overlook the way in which the technologies that comprise each Building Block enable and support one another. For example, they argue that states cannot increase renewable energy deployment to the level expected by EPA because of technological limitations such as variability. These critics are stuck with an outdated view of an electricity system that is, in reality, already successfully doing what they say it cannot. For example, grid operators around the country, including the Electric Reliability Council of Texas (ERCOT), PJM Interconnection, and Midcontinent Independent System Operator (MISO), are effectively managing ever higher levels of variable renewable generation, and in some states variable renewable resources already supply large portions of total annual generation. In 2013, Iowa and South Dakota generated 27 and 26 percent, respectively, of their total annual generation with wind power. These states are not anomalies; seven other states supplied at least 12 percent of their total annual generation from wind in 2013.[70] The successful integration of wind energy in these states proves that it is possible to break down historical barriers to expanded renewable energy deployment.

This wind integration has largely been accomplished using traditional solutions, such as creating larger balancing areas, ramp capability enhancement, better wind forecasting, and transmission expansion. Today, these traditional solutions are being coupled with advanced energy technologies, enabling even higher levels of cost-effective renewable energy. However, advanced energy technologies will not only help facilitate renewable energy integration, but will also act synergistically in other ways to improve overall grid performance.

First, advanced energy technologies that minimize the impact of the variability of wind and solar generation also provide increased grid flexibility and reliability. For example, new high voltage direct current (HVDC) transmission can link several renewable energy projects together. By connecting individual projects, HVDC transmission increases resource diversity, smoothing out the generation curve over the electric system and reducing the impact of short-term fluctuations in output at any one wind farm or solar array. HVDC not only facilitates the integration of

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[69] EPA includes limited analysis of the cumulative nature of emission reductions achievable by each Building Block. *See* Proposed Rule at 34884-85. This section further supports EPA's BSER determination.

[70] U.S. Department of Energy, *Offshore Wind Market and Economic Analysis: 2014 Annual Market Assessment,* Prepared by Navigant Consulting, DE-EE0005360 (Sep. 8, 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6809e.pdf.

renewable energy, but also reduces transmission line losses 30-50 percent compared to traditional alternating current (AC) systems,[71] and can work to reinforce and debottleneck the existing AC network. Similarly, energy storage, working on timescales of seconds to a few hours, can be used to smooth and firm the output of variable renewable generation, whether close-coupled to specific renewable energy projects or as part of a more flexible grid. Energy storage also improves the reliability of the grid by providing frequency regulation, voltage support and reactive power. Additionally, demand response makes customer load more elastic and responsive, which can help match supply and demand as part of a more dynamic grid. This can increase variable renewable integration at both the local distribution level and at the wholesale level. Demand response also provides other grid benefits, including firm capacity reserves and system-wide peak shaving when demand is high. For example, during the 2014 polar vortex, PJM hit a wintertime load record of 138,600 MW, and ERCOT's demand rose to within 2,000 MW of total available capacity. In response, grid operators called on demand response for savings of 1,900 MW (PJM) and 1,600 MW (ERCOT) to help prevent blackouts.[72] Thus, applied in an integrated fashion, advanced energy technologies can support each other, reducing emissions while maintaining and enhancing the overall reliability and flexibility of the electric grid.

Second, generation from dispatchable zero- and low- emitting facilities can be used to meet needs for new or replacement baseload generation. Such technologies include new NGCC,[73] dispatchable hydroelectric power, biomass, geothermal, nuclear, and waste-to-energy. These technologies provide reliable always-on power, and some of them, including dispatchable hydropower, NGCC and other advanced gas turbine cycles, provide flexible generation that can be used to integrate variable renewable resources. At the same time, some of them are subject to risk related to future fuel cost and volatility, but when integrated with renewable energy (including variable resources), the result is a flexible, low-emission generation fleet that offers resource diversity that can hedge against volatility and long-term fuel price risk.[74] As an example, a recent study on the Texas electricity market by the Brattle Group found that, under a variety of scenarios, the combination of NGCC and renewables is likely to crowd out coal

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[71] Siemens, *High Voltage Direct Current Fact Sheet* (Jul. 2012), http://www.siemens.com/press/pool/de/events/2012/energy/2012-07-wismar/factsheet-hvdc-e.pdf.

[72] Alex Lopez and Aaron Tinjum, *An Olympic-sized challenge: Across US, Demand Response is Helping Utilities Navigate Treacherous Winter Peaks* (Jan. 9, 2014), http://blog.opower.com/2014/01/an-olympic-sized-challenge-across-us-demand-response-is-helping-utilities-navigate-treacherous-winter-peaks/

[73] Of course, existing NGCC can similarly serve as backup generation. However, because BSER includes the redispatch from steam generating units to NGCC, some states may not have as much spare NGCC capacity as they do now for those units to ramp up and down as needed to complement renewable power. In those states where NGCC utilization would not reach 70 percent under Building Block 2 because of the relative dearth of steam generation, *existing* NGCC would also serve to complement intermittent renewable power.

[74] NREL, *Opportunities for Synergy Between Natural Gas and Renewable Energy in the Electric Power and Transportation Sectors,* prepared by April Lee, Owen Zinaman, and Jeffrey Logan (December 2012), http://www.nrel.gov/docs/fy13osti/56324.pdf

generation in the long term.[75] Renewable energy and low-emission dispatchable NGCC therefore complement each other both technologically and economically, allowing the electricity system to provide reliable, low-carbon energy while hedging against future uncertainties.

Third, distributed resources can provide grid benefits such as reduced congestion and increased reliability and flexibility. These resources include distributed generation such as residential and commercial solar and wind, combined heat and power (CHP), industrial waste energy recovery, and fuel cells. Similarly, energy efficiency reduces congestion and peak demand, and reduces the impacts of changes in the firm capacity associated with retiring EGUs. As discussed above, demand response also provides cost-effective alternatives to meeting peak demand, both locally and at the wholesale level, and can improve reliability while reducing peak power costs. In fact, demand response in the PJM wholesale market already results in net savings of over $275 million annually.[76] Advanced grid technologies such as advanced metering infrastructure (AMI), distribution automation, microgrids, high temperature superconducting (HTS) transmission, and smart grid management technologies can help integrate and manage the growing diversity of renewable, low-emitting and traditional fossil generation. Combining advanced grid-facing and customer-facing smart grid technologies with clean distributed generation can create a resilient, flexible local electricity system that can support not only a bulk power system with high renewable penetration, but also high levels of embedded (distributed) renewable and clean generation.

Together, these advanced technologies can ensure that the changes envisioned by the Proposed Rule, including those determined to be part of the BSER, will have no significant adverse impacts on grid reliability and cost. In fact, accelerating the modernization of the electric grid to integrate the various resources envisioned as part of BSER can actually improve reliability and decrease costs, for example, by cutting peak demand. State-level analysis already supports this outcome. In its Track 1 Straw Proposal in the *Reforming the Energy Vision* proceeding, the New York Department of Public Service estimated that if the 100 hours of greatest peak demand were flattened, long-term avoided capacity and energy savings would range between $1.2 billion and $1.7 billion per year.[77] Similarly, a study led by former Colorado Public Utility Commission chairman Ron Binz has recently shown that utilizing a portfolio of technologies—including natural gas, energy efficiency, and renewables such as wind and

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[75] Jurgen Weiss et al., The Brattle Group, *Partnering Natural Gas and Renewables in ERCOT* (Jun. 2013), *available at* http://www.texascleanenergy.org/Brattle%20report%20on%20renewable-gas%20FINAL%2011%20June%202013.pdf.

[76] PJM, *PJM Efficiencies Offer Regional Savings,* available at http://www.pjm.com/~/media/documents/presentations/pjm-value-proposition.ashx.

[77] State of New York Department of Public Service, Case 14-M-0101 - Proceeding on Motion of The Commission In Regard To Reforming The Energy Vision. *Developing The Rev Market In New York: DPS Staff Straw Proposal On Track One Issues*, August 22, 2014, page 13.

solar—can result in lower cost generation than any single technology can provide.[78] Using such a portfolio approach allows states to take advantage of the benefits of each technology, hedge risk, and reduce emissions at the same time. And, a recent study by Analysis Group indicates that advanced planning will ensure that implementation of the portfolio of solutions under the Clean Power Plan across the different state market structures will not create any reliability concerns.[79]

To be sure, the technologies that comprise each Building Block do not have to be used in combination. Should EPA later determine to change or remove one or more building blocks, the remaining blocks would remain feasible, demonstrated, and cost effective.[80] However, when used together, it is clear that the technologies in the Building Blocks are synergistic in nature, providing cost effective emission reduction and electric system performance improvements that are beyond the simple summation of the potentials provided by each individual technology. Moreover, the technologies of the Building Blocks also work collaboratively with the other advanced energy technologies allowed for compliance, meaning that states have a wide array of demonstrated, cost effective, and synergistic tools for emission reduction.

B. EPA Should Strengthen Its BSER Methodology To Better Reflect the Potential of Advanced Energy

AEE supports EPA's general Building Block-based approach to BSER, and believes that the overall targets EPA has set through those Building Blocks are achievable. However, particular features of the Clean Power Plan's BSER methodology have resulted in estimated contributions from advanced energy technologies that underestimate what is feasible, cost-effective, and adequately demonstrated. As a result, the state goals in the Proposed Rule reflect a *feasible* system of emission reduction, but not necessarily the *best* system of emission reduction. Each individual BSER Building Block, and the combination of the four Building Blocks together, can and should better reflect the true potential emission reduction contribution from advanced energy technologies in each state. AEE therefore provides the following recommendations to strengthen the BSER methodology.

In any event, the discussion below serves as further evidence that EPA's approach is conservative and, when combined with the flexibility afforded to states to use additional advanced energy technologies in compliance plans, shows that the state targets are technically and economically easy to meet. There is, therefore, no basis for EPA to adopt less stringent

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[78] Ron Binz et al., Ceres, *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know* (2014), *available at* http://www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation/view

[79] Susan F. Tierney, Analysis Group, *Greenhouse Gas Emission Reductions From Existing Power Plants: Options to Ensure Electric System Reliability* (May 2014), *available at* http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Tierney_Report_Electric_Reliability_and_GHG_Emissions.pdf.

[80] *See* Proposed Rule at 34892 (discussing the severability of the BSER approach).

goals. To that end, AEE does not support EPA's alternate state targets, which are less ambitious.[81]

The following three sections present AEE's recommendations for modification of the Building Blocks.

C. Strengthening Block 3: Renewable Energy

Generation from various forms of renewable energy can effectively displace CO_2 emissions from affected EGUs. While EPA is right to include renewable energy generation as part of its evaluation and application of BSER, the particular approach that EPA has chosen significantly underestimates the quantity of MWh that can be generated by renewables in each state over the 2020-2030 compliance period. Therefore, while AEE supports EPA's inclusion of renewable energy into BSER as part of Building Block 3, we propose a number of revisions to EPA's methodology to better capture the achievable, cost-effective, and adequately demonstrated growth of renewable energy.

The Proposed Rule lays out two methodological options for calculating the expected contribution of renewable energy to state targets.[82] Under the proposed "Best Practices Approach," the Proposed Rule uses state renewable portfolio standards (RPS) as the benchmark for achievable renewable energy generation.[83] Under an alternative, resource availability-based approach, the Proposed Rule relies on a National Renewable Energy Laboratory (NREL) study on the technical feasibility of renewable energy in each state combined with an evaluation of expected generation from renewable energy given certain cost assumptions.[84] EPA deems this the "Alternative RE Approach".[85]

This section first argues that a methodology based directly on resource availability and/or market performance, such as that used in the Alternative RE Approach, is a more appropriate measure of achievable and cost effective renewable energy than the approach used in the Best Practices Approach, which relies on historical state policies. The section then argues that the methodology EPA has chosen for the Alternative RE Approach has significant shortcomings, and provides suggestions for addressing them. Finally, the section provides recommendations for improving the proposed Best Practices Approach should EPA decide not to follow AEE's recommended adoption of a significantly modified Alternative RE Approach. AEE is currently

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[81] *See* Proposed Rule at 34898.
[82] *See* Proposed Rule at 34866-70.
[83] *See* GHG Abatement Measures TSD at 4-1 to 4-30.
[84] *See* EPA, Alternative RE Approach Technical Support Document (June 2014) [hereinafter Alternative RE Approach TSD].
[85] *Id.*

reviewing a third methodology outlined in the NODA,[86] and may provide further comments on this proposed approach in a subsequent submission.

1. EPA should establish its BSER calculations based on an assessment of technically achievable cost-effective renewable generation in a state, rather than on historically enacted state policies

Rather than evaluating the capacity of each state's electric system to develop and integrate renewable energy over time, the Proposed Rule outlines an approach that quantifies achievable generation from renewable energy by pointing to regional "best practices" embodied by state renewable portfolio standard (RPS) policies as a proxy for what is technically feasible, demonstrated, and cost-effective.[87] This is a conceptually different approach than an independent finding of the technically feasible, cost-effective, and adequately demonstrated level of emission reduction, as EPA conducted for Building Blocks 1 and 2 and the nuclear energy component of Building Block 3. For the reasons described below, AEE believes that EPA should instead adopt the Alternative RE Approach, which is based on a conceptual framework more similar to EPA's approach to the other Building Blocks.

The Proposed Rule assumes that state RPS programs are set based on an assessment of the costs and feasibility of target percentages of renewable energy.[88] However, the establishment of BSER, including evaluations of cost and feasibility, is the responsibility of EPA and not the states.[89] By resting the justification for the level of achievable renewable energy generation on the fact that "*states* have already had the opportunity to assess those requirements against a range of policy objectives including both feasibility and costs,"[90] EPA's Best Practices Approach does not directly demonstrate that the *Administrator* has determined that Building Block 3 is BSER.

The Best Practices Approach also finds that "renewable resource development potential varies by region, and the RPS requirements developed by the states necessarily reflect consideration of the states' own respective regional contexts."[91] To be sure, the recognition of the differential ability of U.S. regions to cost-effectively support renewable generation is an important insight that should be used in establishing BSER. However, a geographically-based approach does not

[86] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units – Notice of Data Availability,* (Oct. 28, 2014), *available at* http://www2.epa.gov/sites/production/files/2014-10/documents/20141028noda-clean-power-plan.pdf.
[87] *See* Proposed Rule at 34866-69.
[88] *Id.* at 34866.
[89] CAA Section 111(a)(1) ("best system of emission reduction which (taking into account the cost of achieving such reductions and any nonair quality health and environmental impact and energy requirements) *the Administrator determines* has been adequately demonstrated); 40 C.F.R. § 60.22(b)(2),(3) ("Guideline documents published under this section will provide information for the development of State plans, such as… A description of systems of emission reduction which, *in the judgment of the Administrator*, have been adequately demonstrated.") (emphasis added).
[90] Proposed Rule at 34866 (emphasis added).
[91] *Id.* at 34866.

necessitate delegating the responsibility to determine BSER for each region to the political compromises embodied in state policies developed for purposes other than CO_2 emission reductions at affected EGUs. Furthermore, state RPS targets may or may not be set by analytic evaluations of the same criteria EPA is required to use when determining BSER.[92] Due to political constraints, state-set goals are likely to underestimate what is technically and cost-effectively achievable. For regions with one or a very few states with RPS targets, such underestimation will result in renewables targets that are unambitious for every state in the region because of the particular political or economic circumstances of a single state at the time the RPS was enacted.

The state of Arizona provides a good example of the disconnect between state policy and achievable renewable energy generation. With high solar and geothermal potential and an active renewable energy industry, Arizona has among the most attractive markets for renewable energy generation.[93] However, the state has a relatively modest RPS while the West region has the least ambitious renewable energy growth factor under the Proposed Rule.[94] As a result, the EPA target estimates that Arizona would generate 3,663 GWh of renewable energy by 2030,[95] constituting just 4 percent of its 2012 generation.[96] This puts Arizona's target for renewable energy generation in the bottom quarter of Building Block 3 targets.[97]

A direct evaluation, by EPA, of the technically and cost-effectively recoverable level of renewable energy in each state can provide a more accurate and conceptually appropriate estimate of the contribution of renewable energy to BSER. EPA has proposed such a methodology in its Alternative RE Approach. AEE therefore strongly recommends that EPA finalize the Clean Power Plan using the Alternative RE Approach to estimate the emission reduction contribution of renewable energy in Building Block 3. However, as outlined in Section III.C.2 of this document (below), AEE highlights a number of modifications that need to be made to the Alternative RE Approach to ensure that it is a more accurate reflection of the technically feasible, cost-effective level of renewable energy generation given today's technology and market trends.

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[92] The primary criteria are technical feasibility, amount of emission reductions, source level and industry wide costs, technological development, and energy impacts. For a thorough discussion of the criteria by which BSER must be determined, including citation to relevant case law, see Legal Memo TSD at 36-38.
[93] *See* Ernst & Young, *United States Renewable Energy Attractiveness Index* (Aug. 2013), *available at* http://www.ey.com/Publication/vwLUAssets/United_States_renewable_energy_attractiveness_indices/$FILE/United_States_renewable_energy_attractiveness_indices.pdf. (ranking Arizona 14th overall and 7th for solar).
[94] Arizona is in the West Region, GHG Abatement TSD at 4-15, with a growth factor of 6 percent. *Id.* at 4-18.
[95] *Id.* at 4-22.
[96] *Id.* at 4-24.
[97] Arizona's target for renewable generation is the 37th most ambitious by GWh and the 46th most ambitious by percentage of 2012 sales. *See* GHG Abatement TSD.

If, however, the final Clean Power Plan nonetheless utilizes on the Best Practices Approach, EPA should make changes to the particular methodology, outlined in Section III.C.3 of this document (below), to more accurately reflect the level of renewable generation that the states have determined to be achievable by 2030.

2. EPA should implement the Alternative RE Approach with significant modification

EPA should adopt an approach to calculating the renewable energy component of Building Block 3 that directly relies on the technical and economic potential of renewable energy in each state or region. The Clean Power Plan proposes the Alternative RE Approach as one such methodology.[98] Specifically, the Alternative RE Approach calculates the renewable energy target for a state by taking, for each energy resource type (*i.e.*, solar, wind, geothermal, biomass, hydropower), the lower of: (1) a resource availability (or "benchmark generation") measure—derived largely from a National Renewable Energy Laboratory (NREL) GIS-based study; and (2) the amount of generation from that renewable resource projected through the use of EPA's IPM ("IPM-projected generation"). The levels calculated for each renewable resource type in a state are then summed to determine the total renewable target for that state.

Because of shortcomings in the assumptions and methodology, which are outlined below, the proposed Alternative RE Approach significantly underestimates the level of cost-effective renewable energy that each state can achieve by 2030. Therefore, AEE supports adopting a version of the Alternative RE Approach that corrects these limitations. One way to address a number of the shortcomings would be for EPA to incorporate historical market growth rates into the projections of achievable renewable energy growth. A viable approach to implementing this type of methodology utilizing market data over the last five years was recently outlined in the brief entitled, *Strengthening the EPA's Clean Power Plan.*[99]

a. *The benchmark generation calculation under the Alternative RE Approach assumes no technological innovation*

The Alternative RE Approach caps the amount of generation expected from each evaluated technology type for each state using the development rate[100] of that technology in the top states in 2012 (deemed "benchmark generation"). That is, the estimated 2030 benchmark generation for each technology type is driven primarily by the amount of generation from that technology in 2012 rather than by a projection of the technically and economically recoverable generation

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[98] For a detailed description of the Alternative Approach, see Alternative RE Approach TSD.
[99] The Union of Concerned Scientists, *Strengthening the EPA's Clean Power Plan* (Oct. 2014), *accessible at* http://www.ucsusa.org/sites/default/files/attach/2014/10/Strengthening-the-EPA-Clean-Power-Plan.pdf.
[100] Note that AEE understands EPA's use of the term "development rate" to mean the proportion of 2012 generation from a particular resource relative to the total technical potential of that resource, rather than a reflection of the *pace* of development of a particular resource. A measure of achievable renewable generation based on the *pace* of development would be both a less confusing use of the term "development rate" *and* better policy.

from that source in 2030. This assumption is unreasonable for a number of reasons. First, the amount of generation from most renewable technologies increases each year—often significantly. For example, net generation from solar PV increased nationally from 3,451 GWh in 2012 to 8,327 GWh in 2013.[101] Because EPA uses 2012 rather than 2013 data to calculate the solar development rate, the Alternative RE Approach already underestimates the utility-scale solar development rate of the top 16 states by over 100 percent.[102] Using 2013 data shows benchmark generation for solar of 80,000 GWh rather than the 34,000 GWh used in the Alternative RE Approach, underestimating achievable utility-scale solar generation by a factor of almost 2.4 in just one year.[103] Similar underestimation of achievable generation occurs for the other renewable energy technologies EPA evaluates.

Second, because each state's target generation from a particular resource type is capped at the proportion of 2012 generation to technical potential for the top states for all compliance years, this underestimation will only increase over time, as continuous improvements in renewable technology drive increasing deployment. Technology improvements and cost reductions for a number of renewable resources are already leading to rising penetration, so the potential underestimation is substantial. For example, the system prices for residential and commercial PV, for example, declined 6-7 percent per year, on average, from 1998 to 2013. [104] Projections by NREL and LBNL show that this sustained price drop over eight years is expected to continue, with solar eventually reaching widespread grid parity.[105]

Third, the amount of generation in a given state from a particular technology in 2012 is largely the result of state policy, rather than a reflection of resource availability or technological capability. For example, the lack of distributed solar in the "Sunshine State" of Florida is not due to poor solar resource, nor to technological deficiencies. Rather, the lack of distributed solar is largely a function of a state policy banning third-party power purchase agreements (PPAs),[106]

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[101] Energy Information Administration, *Electric Power Monthly* (2014), http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1_a.

[102] Calculated by updating EPA's Alternative Renewables Approach TSD Data File with the 2013 solar data from EIA's July 28, 2014 Electric Power Monthly. The EPA supplied Data File shows a solar benchmark development rate of 0.009 percent. Using 2013 data increases this rate to 0.020 percent. *See* Energy Information Administration, *Electric Power Monthly* (Jul. 28, 2014), http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1_a.

[103] *Id.*

[104] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy %20Prices%20See.

[105] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy %20Prices%20See.

[106] Kollins, et al., National Renewable Energy Laboratory, *Solar PV Project Financing: Regulatory and Legislative Challenges for Third-Party PPA System Owners*, NREL/TP-6A2-46723 (Feb. 2010), http://www.nrel.gov/docs/fy10osti/46723.pdf.

which have been a primary driver of distributed solar over the last decade. Similarly, policy uncertainty and disagreements have stalled Cape Wind for almost 13 years,[107] and while offshore wind technology has been widely implemented and adequately demonstrated globally, the strong U.S. offshore wind potential remains untapped.[108]

For all these reasons, it makes little sense to cap 2030 renewable generation based on the 2012 level of deployment, even if that level is derived from the performance of top states. While top states were likely capturing an achievable and cost-effective portion of technical potential renewable generation in 2012 based on current costs and technological development, given the scale of the resource availability in a number of states, they are unlikely to have captured all achievable and cost-effective renewable generation in 2012. Moreover, the portion of each renewable resource that is achievable and cost-effective has already increased since 2012—a trend that will surely persist as technology costs continue to drop and performance continues to improve.

Block 3 should capture predictable improvements based on established trends when determining the level of renewable generation that is feasible in each state. One way to do this is by using growth rates of renewable energy technology as the basis for the benchmark element of its approach rather than absolute 2012 development rates. One viable approach to implementing this type of methodology utilizing market data over the last five years was recently outlined in the brief entitled, *Strengthening the EPA's Clean Power Plan*.[109]

b. *The Alternative RE Approach uses a development rate that does not reflect the "best" system*

In calculating the benchmark development rate for utility-scale solar and onshore wind, the Alternative RE Approach utilizes the development rate of the 16 states with the highest penetration of that technology, *i.e.,* roughly the top third of states, while the development rate for geothermal is based on the top 6 states.[110] However, the Alternative RE Approach does not justify why it is appropriate to deem the top 16 states as the "best" performers for solar and wind, nor does it justify the different number of states used for geothermal. In fact, analysis of the top 16 states shows huge variation across the states. Among the 16 states with the highest development rates for onshore wind, the bottom 3 states had a development rate of 3 percent,

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[107] Bureau of Ocean Energy Management, *Cape Wind,* http://www.boem.gov/Renewable-Energy-Program/Studies/Cape-Wind.aspx.

[108] U.S. Department of Energy, *Offshore Wind Market and Economic Analysis: 2014 Annual Market Assessment,* Prepared by Navigant Consulting, DE-EE0005360 (Sep. 8, 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6809e.pdf.

[109] The Union of Concerned Scientists, *Strengthening the EPA's Clean Power Plan* (Oct. 2014), *accessible at* http://www.ucsusa.org/sites/default/files/attach/2014/10/Strengthening-the-EPA-Clean-Power-Plan.pdf.

[110] *See* Data File: Renewable Energy (RE) Alternative Approach.xls, *available at* http://www2.epa.gov/sites/production/files/2014-06/20140602tsd-proposed-re-alternative-approach.xlsx.

while the top 3 states had a development rate of 23 percent.[111] As such, it is difficult to argue that all 16 states should be used for wind and solar, particularly when other portions of the Clean Power Plan utilize smaller numbers of states to more accurately establish technically feasible best practice. Beyond geothermal, the Proposed Rule bases the best-practices level of achievable annual incremental energy efficiency on the performance of three states and the anticipated achievement of an additional nine states.[112]

The choice of the number of states used to calculate the benchmark development has large implications for the ultimate renewable energy growth assumptions. Averaging across 16 states produces benchmark development rates of 0.009 percent and 9 percent, respectively, for utility-scale solar and wind, while averaging the top 6 states would increase respective rates to 0.02 percent and 17 percent.[113] Applying these higher development rates to the Alternative RE Approach increases total benchmark generation from 35,434 GWh to 129,041 GWh (264 percent increase) and onshore wind generation from 2,831,947 GWh to 7,221,230 GWh (155 percent increase). As a result, to better reflect the capability of the technologies and to establish an approach that is more consistent with the approach taken for other BSER technologies, AEE recommends that EPA calculate the benchmark development rate of utility-scale wind and solar using the experience of the top six states.

c. *The cost and performance assumptions in the Alternative RE Approach inaccurately represent renewable energy technologies*

The Alternative RE Approach determines target renewable energy generation for a given state by taking the lower of benchmark generation and IPM-projected generation for each resource type in that state. The IPM projection-based level of generation is intended to take into account the cost of renewable generation.[114] However, EPA provides very little detail on how it conducted the IPM projection for each resource. The Proposed Rule only states that the IPM scenario it used is "based on a scenario reflecting a reduced cost of building new renewable generating capacity… of up to $30 per MWh."[115] EPA does not specify why new renewable generation capacity costs were reduced by a *fixed* amount over time and across resources, why $30 per MWh is the appropriate amount, or the significance of "up to" in "*up to* $30 per MWh." AEE requests further clarification on EPA's methodology with regard to the IPM-projected generation cap for each resource.

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[111] *Id*.
[112] GHG Abatement TSD at 5-33.
[113] *See* Data File: Renewable Energy (RE) Alternative Approach.xls, *available at* http://www2.epa.gov/sites/production/files/2014-06/20140602tsd-proposed-re-alternative-approach.xlsx.
[114] Proposed Rule at 34870 ("[benchmark generation] does not explicitly take into account the cost that would be faced to reach the benchmark RE development rate in each state. In order to take this cost into account, or this alternative approach the EPA has paired the benchmark RE development rates described above with IPM modeling of RE deployment at the state level.")
[115] Proposed Rule at 34870; and Alternative RE Approach TSD at 2.

The Alternative RE Approach TSD says that "the cost reduction in new RE is intended to represent the avoided cost of other actions that could be taken instead to reduce power sector CO_2, and to reflect continued reductions in RE technology costs."[116] AEE applauds EPA for using a modified modeling scenario that reflects renewable energy cost reductions compared to the IPM base case scenario. However, the underlying base case cost data so significantly overestimate current and future renewable energy costs that it is unlikely the adjustments implemented by EPA to create the modified scenario are sufficient. For example, solar PV capital cost assumptions for 2016 in the IPM base case are $3.364 per W, compared to an average of $1.7 to $1.8 per W observed already in 2014.[117] Furthermore, IPM assumes that solar PV capital costs will fall to $2.533 per W by 2050—a small drop from EPA's 2016 estimate, and significantly higher than prices observed in the market today.[118] In contrast to this modest projected cost decrease, solar PV system costs have consistently declined 6-8 percent each year from 1998 to 2013.[119]

Similarly, capital costs for onshore wind energy are also overestimated in the IPM base case assumptions. EPA assumes costs of $2.258 per W in 2016, compared to a weighted average installed project cost of $1.63 to $1.75 per W in 2013,[120] according to U.S. Department of Energy data. These current market figures are lower than EPA's projected $1.864 per W in 2050.[121] No cost decreases are assumed for biomass, landfill gas, or geothermal energy.[122] Such an approach is difficult to support given that technology learning has been shown to push down cost as the volume of technology deployed rises.[123] State plans that are likely to encourage additional renewable capacity installation will continue to drive this technology learning over time.

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[116] Alternative RE Approach TSD at 2.
[117] These current costs are consistent with data from NREL (bottom-up modeled cost $1.8/W), SEIA ($1.69-$1.77/W), and Citi Research ($1.75/W). David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy %20Prices%20See; Solar Energy Industries Association, *Solar Market Insight Report 2014 Q2* (Sep. 2014), *available at* http://www.seia.org/news/new-report-shows-us-solar-industry-nearing-16-gw-installed-capacity; Citi Research, *Launching on the Global Solar Sector* (Feb. 2013).
[118] *See* IPM Documentation for EPA Base Case v.5.13 at 4-29.
[119] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy %20Prices%20See.
[120] U.S. Department of Energy, *Offshore Wind Market and Economic Analysis: 2014 Annual Market Assessment,* Prepared by Navigant Consulting, DE-EE0005360 (Sep. 8, 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6809e.pdf.
[121] *See* IPM Documentation for EPA Base Case v.5.13 at 4-29.
[122] *Id.*
[123] Alan McDonald & Leo Schrattenholzer, *Learning rates for energy technologies,* 29 Energy Policy 255 (2001), *available at* http://research.rem.sfu.ca/downloads/rem-658/Electronic%20Readings/McDonald%20and%20Schrattenholzer%202001%20Learning%20rates.pdf

The IPM base case assumptions around technology performance, which appear to be used in the modified modeling scenario without adjustment, are also inaccurate, underestimating capacity factors and misrepresenting regional variation. Building Block 3 should utilize economic modeling that more accurately reflects current technology performance and costs, and expected improvements over time. AEE would be glad to provide EPA with additional information to more accurately estimate technology cost and performance.

d. *The Alternative RE Approach fails to include all significant forms of renewable energy*

Building Block 3 should calculate the contribution that renewable energy can make to reduced emissions at affected EGUs by evaluating the technical and cost-effective potential of all adequately demonstrated renewable energy technologies. The Alternative RE Approach, as proposed, does not include the potential of distributed rooftop solar PV or offshore wind, and does not fully consider the potential for new hydroelectric or biomass generation.

The Alternative RE Approach does not include distributed solar in calculating either benchmark generation or IPM-projected renewable generation. Yet, distributed solar PV is both technically feasible and adequately demonstrated. From 2012 to 2013, installed distributed PV grew 17 percent overall and 68 percent in the residential sector.[124] Recent analysis by Deutsche Bank shows that distributed PV has reached grid parity in regions within at least 10 states.[125] AEE strongly recommends that EPA incorporate this increasingly important segment of the renewable energy market into the Alternative RE Approach. The Agency should either incorporate distributed PV into its IPM modeling or simply use the NREL technical potential study[126] as the basis for calculating each state's technically feasible, cost-effective generation from distributed PV. The latter approach is consistent with the method EPA used to calculate the potential for new hydroelectric generation.

Similarly, the Alternative RE Approach does not include estimates of feasible and cost effective offshore wind. While offshore wind is relatively new to the United States, it is well established globally with a market that added over 1,700 MW in 2013, bringing total installed capacity to 7,031 MW.[127] In the United States, DOE has estimated the potential capacity of offshore wind turbines in U.S. waters at 4,150 GW, four times the electric generating capacity from all sources

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[124] IREC at 14; *and* Larry Sherwood, Interstate Renewable Energy Council, *U.S. Solar Market Trends 2013* (Jul. 2014), *available at* http://www.seia.org/sites/default/files/resources/Final-Solar-Report-7-3-14-W-21.pdf.
[125] Deutsche Bank, *Markets Research,* (Oct. 2014), *available at* http://www.qualenergia.it/sites/default/files/articolo-doc/VSLR%2010.26.14.pdf.
[126] *See* Lopez et al, National Renewable Energy Laboratory, *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis* (Jul. 2012), *available at* http://www.nrel.gov/docs/fy12osti/51946.pdf.
[127] U.S. Department of Energy, *Offshore Wind Market and Economic Analysis: 2014 Annual Market Assessment,* Prepared by Navigant Consulting, DE-EE0005360 (Sep. 8, 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6809e.pdf.

nationwide in 2008.[128] And while no projects have reached completion yet in the United States, there are 4,900 MW of proposed projects in advanced stages of planning.[129] AEE recommends that EPA include estimates of achievable offshore wind in the Alternative RE Approach. Such estimates can be based on global development rates.

Generation from hydroelectric power is nominally included in the Alternative RE Approach; however, the methodology used to calculate hydroelectric generation is problematic and will result in an underestimation of new hydroelectric resources. Because "the study that formed the basis of NREL's hydropower technical potential estimate applied a full set of feasibility criteria to the development opportunities for new low power and small hydroelectric plants," the Alternative RE Approach calculates benchmark generation for hydropower using the technical potential identified for each state without adjusting it by a benchmark development rate.[130] Importantly, the study cited by EPA is an estimate only of potential *new* hydroelectric generation and does not include generation from existing hydroelectric dams.[131] However, EPA then takes the "greater of each state's reported 2012 conventional hydroelectric generation, or the feasible hydropower development potential identified by NREL."[132] This makes little sense, as there is no reason a state should be held to *either* potential new hydroelectric generation *or* existing generation. Rather, these values should be added together to get an estimate of total potential hydroelectric generation. Or, if EPA plans to exclude existing conventional hydroelectric generation from BSER as it proposes to do under the Best Practices Approach,[133] it should use the values estimating achievable levels of new hydroelectric generation from the NREL report for each state without subtracting out the MWh from existing hydropower facilities in 2012.

The calculation of hydroelectric generation under the IPM projection also requires adjustment. EPA states that "IPM is not currently configured to project the economic deployment of new hydropower resources in the United States."[134] However, rather than therefore relying only on

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[128] National Renewable Energy Laboratory, U.S. Department of Energy, *Assessment of Offshore Wind Energy Resources for the United States* (2010), *news release available at* http://www.nrel.gov/news/press/2010/885.html; *full report available at* http://www.nrel.gov/docs/fy10osti/45889.pdf.
[129] U.S. Department of Energy, *Offshore Wind Market and Economic Analysis: 2014 Annual Market Assessment,* Prepared by Navigant Consulting, DE-EE0005360 (Sep. 8, 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6809e.pdf.
[130] Alternative RE Approach TSD at 5.
[131] Douglas G. Hall et al., Idaho National Laboratory, *Feasibility Assessment of the Water Energy Resources of the United States for New Low Power and Small Hydro Classes of Hydroelectric Plants*, DOE-ID-11263 (Jan. 2006), *available at* http://www1.eere.energy.gov/water/pdfs/doewater-11263.pdf.
[132] Alternative RE Approach TSD at 5-6.
[133] Proposed Rule at 34867 ("Hydropower generation is excluded from this existing 2012 generation for purposes of quantifying BSER-related RE generation potential because building the methodology from a baseline that includes large amounts of existing hydropower generation could distort regional targets that are later applied to states lacking that existing hydropower capacity"). Note, EPA is taking comment on whether to include 2012 hydroelectric generation in the Alternative RE Approach. Proposed Rule at 34870.
[134] Alternative RE Approach TSD at 6.

the benchmark generation estimate, the Alternative RE Approach uses IPM projections of generation from *existing* hydropower facilities in 2020, 2025, and 2030. This approach has two problems. First, because the Alternative RE Approach uses the *lower* of benchmark generation (which includes only new hydropower) and IPM projected generation (which includes only existing hydropower), this effectively ignores any new hydroelectric construction estimated by the NREL report. Second, the inclusion of generation from existing hydroelectric facilities in the IPM calculation but exclusion of existing hydropower in the benchmark approach creates an unexplained inconsistency. Given the full suite of feasibility criteria used in the study underlying the NREL report used to set benchmark hydroelectric generation, if EPA decides to finalize the Clean Power Plan's BSER calculation without including existing hydroelectric generation,[135] EPA should use only the technical potential estimate for new hydroelectric generation in each state from the NREL report as the basis for calculating each state's technically feasible, cost-effective generation from hydropower. Alternatively, if EPA decides to include generation from existing hydroelectric facilities, it should include existing hydroelectric generation both in its calculation of generation using IPM, as proposed, and in its calculation of benchmark hydroelectric generation. However, generation from existing hydroelectric facilities should be included separately from new hydroelectric generation so that the limits of the IPM model do not lead to the false assumption that no new hydroelectric generation is feasible.

Like the treatment of hydroelectric generation, biomass also receives disparate treatment in the Alternative RE Approach without explanation. The Alternative RE Approach does not take advantage of NREL technical potential data for biomass (including solid biomass from crop, forest, mill residues, urban wood waste, gaseous biomass from animal manure, domestic wastewater treatment plants, and landfills), despite the fact that such potential is included in the same NREL report used for other resource types.[136] That is, the Alternative RE Approach does not include benchmark generation for biomass for each state.[137] Instead, the Alternative RE Approach relies only on expected generation of existing biomass (including landfill gas) using an IPM projection.[138] This treatment of biomass means that the potential for new or expanded biomass capacity is not included in estimates of achievable and cost-effective renewable generation. This is particularly concerning given the fact that biomass is most widely available in the southeastern states that otherwise have fewer technically recoverable non-biomass renewable resources than other regions.[139] AEE recommends that the final Clean Power Plan include an evaluation of achievable generation from biomass resources, including from new capacity.

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[135] *See* note 129, *supra*.
[136] *See* Lopez et al, National Renewable Energy Laboratory, *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis* (Jul. 2012), *available at* http://www.nrel.gov/docs/fy12osti/51946.pdf.
[137] Alternative RE Approach TSD at 3 n. 6.
[138] *See* Alternative RE Approach TSD at 16-19.
[139] *See* Lopez et al, National Renewable Energy Laboratory, *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis* (Jul. 2012), *available at* http://www.nrel.gov/docs/fy12osti/51946.pdf.

3. If the final Clean Power Plan uses the Best Practices Approach, it should modify it to better reflect the capabilities of renewable energy technologies

AEE believes that a modification of the Alternate RE Approach—incorporating all renewable energy resources and accounting for established trends in market growth—will provide a better basis for determining feasible renewable generation growth in each state as part of Building Block 3. However, should EPA decide to finalize the Clean Power Plan using a methodology consistent with the proposed Best Practices Approach, we believe a number of improvements are necessary.

As proposed, the Best Practices Approach significantly underestimates the level of renewable generation that is achievable, resulting in renewable energy targets that do not reflect the capabilities of renewable technologies as illustrated by well-established market growth trends. AEE urges EPA to modify the methodology by implementing the following modifications. It should be noted that one way to address a number of the shortcomings of the current Best Practices Approach would be for EPA to incorporate historical market growth rates into the projections of achievable renewable energy growth. A viable approach to implementing this type of methodology utilizing market data over the last five years was recently outlined in the brief entitled, *Strengthening the EPA's Clean Power Plan.*[140]

a. *Use each state's RPS goals as a floor for achievable renewable generation in that state*

The Best Practices Approach assumes that a given state can grow its renewable energy generation towards a regional target based on the average of state RPS policies in that state's region. However, if a state's own RPS puts it on a more ambitious rate of growth, the regional average is nevertheless applied as a cap. By failing to incorporate a state's own RPS commitments in its BSER determination, EPA undermines its own justification for the Best Practices Approach.

This shortcoming is particularly acute for the five states that already generate as much or more renewable electricity than their regionally calculated average for 2030.[141] For example, Minnesota currently generates 18 percent of its electricity from renewable generation; however, the regional average RPS target is only 15 percent. Therefore, Minnesota's goal is capped at the regional average RPS target, implying that renewable energy generation of only 15 percent of total generation is the best system of emission reduction for 2030 despite the fact that the state has already surpassed that rate. Iowa is an even more dramatic example—it currently gets

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[140] The Union of Concerned Scientists, *Strengthening the EPA's Clean Power Plan* (Oct. 2014), *accessible at* http://www.ucsusa.org/sites/default/files/attach/2014/10/Strengthening-the-EPA-Clean-Power-Plan.pdf.

[141] Iowa, Maine, Minnesota, North Dakota, and South Dakota all had higher renewable energy generation rates in 2012 than is deemed achievable and cost effective by 2030 under the Proposed Approach. GHG Abatement Measures TSD at 4-24.

25 percent of its power from renewable generation, but its final target is also 15 percent. Thus, such a state could *increase* affected EGU use as a proportion of generation—and therefore emissions—while still meeting its BSER targets for renewable energy.

EPA is taking comment on whether the level of 2012 renewable energy generation in each state should serve as a floor for the amount of renewable energy generation expected for that state under Building Block 3.[142] AEE strongly supports such a floor; however, to more accurately reflect the level of generation a state has actually achieved, we recommend that the floor be set at a state's renewable energy generation when the Clean Power Plan is finalized in 2015. Further, the Clean Power Plan should determine that for a state with a policy more ambitious than its regional average, generating at least as much as the state policy requires should constitute the BSER. This approach is consistent with EPA's general "no backsliding" policy approach.[143]

b. *Expect renewable energy growth beginning in 2012*

For each state that has not yet met the regional average RPS target, the Proposed Rule assumes that the state can increase its level of renewable generation consistent with the rate it would take the region as a whole to meet the regional average RPS target. However, the methodology applies this growth rate starting only in 2017. That is, the Proposed Rule assumes no increase in renewable energy between 2012 and 2017. This is clearly an inaccurate assumption. Non-hydroelectric renewable generation increased 16 percent from 2012 to 2013,[144] and is expected to grow 35 percent by 2015, when EPA expects to finalize its Clean Power Plan.[145] Zero renewable energy growth over five years cannot be considered a "best system of emission reduction" that has been "adequately demonstrated" when only six states have failed to grow their percentage of renewable energy generation over the last five years.[146]

Instead, the Clean Power Plan should at least assume each state's renewable energy generation is able to grow beginning in 2012 until it meets the regional target, rather than expecting zero growth from 2012 to 2017. Better, the Best Practices Approach should use a state's renewable energy generation at the time the Clean Power Plan is finalized, rather than 2012, as the starting point from which its renewable generation is expected to grow. It is clearly

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[142] Proposed Rule at 34868.
[143] Proposed Rule at 34917.
[144] Energy Information Administration, *Electricity Data Browser, available at* http://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=02&geo=g&sec=g&linechart=ELEC.GEN.AOR-US-99.A&columnchart=ELEC.GEN.AOR-US-99.A&map=ELEC.GEN.AOR-US-99.A&freq=A&start=2012&end=2013&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin.
[145] Energy Information Administration, *Short Term Energy Outlook* (Aug. 12, 2014), *available at* http://www.eia.gov/forecasts/steo/query/index.cfm?periodType=ANNUAL&startYear=2012&endYear=2015&formulas=x149xg.
[146] Energy Information Administration, *Electricity Data Browser, available at* http://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=02&geo=g&sec=g&linechart=ELEC.GEN.AOR-US-99.A&columnchart=ELEC.GEN.AOR-US-99.A&map=ELEC.GEN.AOR-US-99.A&freq=A&start=2012&end=2013&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin.

technically feasible and cost-effective for a state to increase renewable energy generation from the amount of annual generation it has already achieved when the Clean Power Plan is finalized.

c. *Set 2030 regional target based on 2030 RPS targets and reasonable growth rates*

EPA uses 2020 goals in states' RPS within a region to set 2030 targets. The Proposed Rule includes no justification as to why states should only be expected to meet 2020 targets by 2030, rather than 2020. This approach is not consistent with EPA's justification for using state RPS policies in the first place; if states in a region have determined that a certain level of renewable generation is achievable by 2020, shifting that target back 10 years does not constitute the best system of emission reduction that is demonstrated. The Proposed Approach should instead use each state's 2030 RPS requirements to set 2030 targets, rather than using 2020 RPS requirements to set 2030 targets. In that way, the calculation of achievable renewable generation as part of Block 3 would not ignore the commitment by policymakers in some states to add renewable generation after 2020.

For states with requirements that do not continue to increase through 2030, the Best Practices Approach should determine a reasonable growth rate based on historical market trends to estimate an achievable level of renewable energy growth between the last year in which a state has an increasing requirement and 2030. One viable approach to calculating growth rates utilizing market data over the last five years was recently outlined in the brief entitled, *Strengthening the EPA's Clean Power Plan*.[147]

D. Strengthening Block 4: Energy Efficiency

AEE strongly supports the inclusion of demand-side energy efficiency into the calculation of the best system of emission reduction. As with renewable energy, AEE believes that the Clean Power Plan has established an achievable level of energy efficiency. In fact, because of some overly conservative methodological choices, the Proposed Rule underestimates the amount of technically feasible and cost-effective energy efficiency that can be implemented in each state.

In this section, AEE provides a number of recommendations as to how the Clean Power Plan can more accurately account for the level of achievable emission reductions at affected EGUs by scaling up end-use energy efficiency. Even if EPA does not adopt any of these recommended changes in its final rule, this section also serves as evidence of the conservative nature of EPA's assumptions in constructing Building Block 4. Therefore, it would be inappropriate and unjustified for the final Clean Power Plan to use the alternatively proposed 1

[147] The Union of Concerned Scientists, *Strengthening the EPA's Clean Power Plan* (Oct. 2014), *accessible at* http://www.ucsusa.org/sites/default/files/attach/2014/10/Strengthening-the-EPA-Clean-Power-Plan.pdf.

percent annual incremental energy efficiency methodology on which EPA is requesting comment.[148]

1. Evaluate potential for energy efficiency outside of utility energy efficiency programs

In evaluating the level of adequately demonstrated achievable energy savings, the Clean Power Plan's most conservative assumption is its inclusion of only energy savings that "are realized exclusively through the adoption and implementation of energy efficiency programs."[149] That is, energy efficiency occurring outside of traditional utility energy efficiency programs was not used to calculate the achievable and demonstrated quantity of energy savings for the purpose of setting state targets. This simplifying assumption fails to account for significant additional sources of energy efficiency, which are already large contributors to overall energy savings in the economy and which could grow substantially with appropriate policy signals.

First, the Proposed Rule does not account for energy efficiency projects delivered outside of utility programs by private sector energy service companies (ESCOs). For a sense of scale, the market for ESCO energy efficiency was $4.8 billion in 2012,[150] while utility efficiency program budgets totaled $5.7 billion in the same year.[151] Much of the work is done through performance-based contracts (PCs) for energy savings, in which the ESCO reduces the energy consumption of its customers by installing new energy efficient equipment at their facilities. This investment is paid off over time with the resulting savings from the customers' utility bill. The performance of the newly installed equipment, and the resulting energy savings for its customer, is contractually guaranteed by the ESCO, and the performance of the project is measured and verified (M&V) by professionals, using internationally established protocols. Accounting for the contributions of the well-established PC market by incorporating PCs as viable tools for state emission reduction under the Clean Power Plan would result in an additional cumulative savings of 104 to 190 million MWh by 2030.[152]

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[148] *See* Proposed Rule at 34873.
[149] Proposed Rule at 34872. EPA calculates historical energy efficiency using EIA form 861, which requires utilities and certain state utility demand side management administrators report energy savings from efficiency programs the company or state manages or contracts with a third party to manage. *See* Energy Information Administration, *Form EIA-861 Annual Electric Power Industry Report Instructions 12, available at* http://www.eia.gov/survey/form/eia_861/instructions.pdf.
[150] Navigant Research, *The U.S. Energy Service Company Market* (2013), *available at* http://www.navigantresearch.com/research/the-u-s-energy-service-company-market.
[151] Consortium for Energy Efficiency, *The Efficiency Program Industry by State and Region* (2013), *available at* http://library.cee1.org/sites/default/files/library/10535/2012_AIR_Tables_-_All_Tables_FINAL_-_with_erratum_NEW_VERSION.pdf.
[152] ESCO Coalition, *Comments to EPA on Section 111(d) Proposed Rule,* prepared by AJW, Inc., forthcoming.

Second, CHP, which constituted 8 percent of U.S. installed generating capacity in 2013[153] and could reach 20 percent of total capacity by 2030,[154] is not included in the BSER calculations, nor are other forms of high efficiency distributed generation including all-electric fuel cells. A recent analysis concluded that increased CHP could drive 565 million MWh of cumulative energy savings by 2030.[155]

Third, the BSER calculations in the Proposed Rule exclude the use of building codes to drive improved energy efficiency. Commercial and residential buildings were responsible for approximately 40 percent of all 2013 energy consumption in the United States,[156] and a recent analysis showed that expanded building code policy could drive an additional 1.1 trillion MWh of cumulative energy savings by 2030.[157]

Importantly, with proper state policy, these additional forms of energy efficiency can be accounted for and directly supported by affected states, utilities, and EGUs. States and utilities can and do directly procure PCs and CHP projects. Additionally, an energy savings crediting system can serve as a mechanism by which individual EGUs or utilities indirectly support energy efficiency actions. Such mechanisms would be appropriate ways for states to include alternate energy efficiency programs, such as PCs, CHP projects, or building code policies.

2. Use most recent data regarding state savings rates

In calculating the achievable energy efficiency for a state for each compliance year, the Proposed Rule starts with the state's 2012 energy savings rate. It then determines subsequent achievable annual incremental savings rates by adding 0.2 percent to that rate for each year until it reaches a maximum of 1.5 percent.[158] However, rather than adding 0.2 percent to the rate starting in 2012, the Proposed Rule inappropriately assumes that a state will make no progress in increasing the annual incremental savings rate between 2012 and 2017. This matters because the 0.2 percent growth factor is only applied starting in 2017. This assumption is inaccurate. As with the similar renewable energy assumption, some states have already made progress improving their rate of energy savings since 2012, while others can be expected to improve by 2017. For example, Maryland's energy efficiency program, EmPOWER Maryland, had 2013 savings that exceeded those in 2012 by 31 percent, while 2012 savings exceeded

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[153] U.S. Department of Energy, *Energy Department Turns Up the Heat and Power on Industrial Energy Efficiency* (Mar. 2013), *available at* http://www.energy.gov/articles/energy-department-turns-heat-and-power-industrial-energy-efficiency.
[154] Oak Ridge National Laboratory, *Combined Heat and Power: Effective Solutions for a Sustainable Future* (Dec. 2008), *available at* http://info.ornl.gov/sites/publications/files/Pub13655.pdf.
[155] Hayes, Sarah, et al., American Council for an Energy-Efficient Economy, *Change Is in the Air: How States Can Harness Energy Efficiency to Strengthen the Economy and Reduce Pollution* (Apr. 2014), *available at* http://www.aceee.org/sites/default/files/publications/researchreports/e1401.pdf.
[156] Energy Information Administration, *How much energy is consumed in residential and commercial buildings in the United States?* (Jun. 2014), *available at* http://www.eia.gov/tools/faqs/faq.cfm?id=86&t=1.
[157] *Id*.
[158] The methodology for Building Block 4 is detailed in the GHG Abatement TSD, Chapter 5.

2011 savings by 36 percent.[159] Such acceleration means that the Maryland energy savings data from 2012 used in the Proposal Rule is already outdated in 2014. When finalizing the Clean Power Plan, EPA should use the most up-to-date data available on energy savings rates as the starting point. The Clean Power Plan should then apply the growth factor to that rate for all years after finalization. This will more accurately capture the level of savings that would occur even before states adopt compliance plans, and will thus more accurately predict the quantity of savings achievable during the compliance period.

3. Account for cumulative energy savings as a percentage of business as usual sales

In generating emission targets for a given state, the Proposed Rule calculates the energy efficiency contribution by multiplying the cumulative energy savings percentages for each year by the state's 2012 electricity sales.[160] The Proposed Rule should instead use estimates of business as usual (BAU) sales to determine the achievable number of MWh of energy savings under Block 4. This will more accurately capture the number of MWh of energy savings that would be expected from a 1.5 percent annual incremental savings rate from 2020-2030.

In fact, the Proposed Rule already utilizes projections of BAU sales when determining the appropriate cumulative energy savings rate for each state.[161] The incorporation of BAU energy sales projections into the calculation of the appropriate cumulative savings rate but not in the ultimate determination of energy savings in each compliance year is inconsistent. The final Clean Power Plan should instead calculate the expected quantity of MWh of energy savings for each state that results from 1.5 percent annual incremental savings using a projection of BAU retail sales.

4. Use more common evaluation of measure lives

The Proposed Rule's approach to the useful life of energy efficiency measures understates the expected energy savings of those measures. The Proposed Rule assumes that these measures last an average of 10 years and are equally likely to last between 1 year and 20 years.[162] Under

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[159] Public Service Commission of Maryland, *The EmPOWER Maryland Energy Efficiency Act: Standard Report of 2014* (Mar. 2014), *available at* http://webapp.psc.state.md.us/intranet/Reports/2014%20EmPOWER%20Maryland%20Energy%20Efficiency%20Act%20Standard%20Report.PDF

[160] Proposed Rule at 34873.

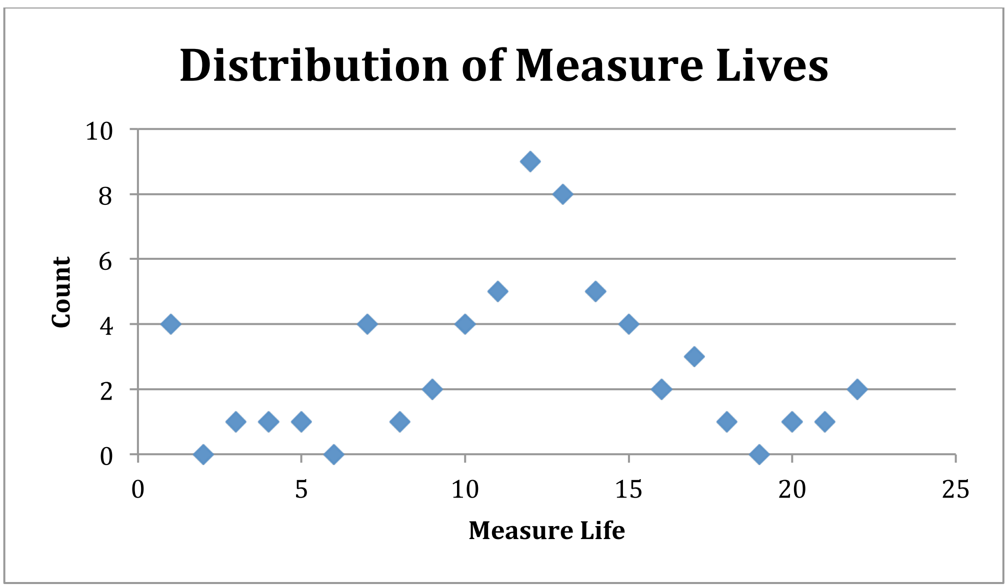
[161] To determine the cumulative energy savings rate for each compliance year, the Clean Power Plan starts with 2012 BAU sales for a state "and increase[es] them for each subsequent year by the average annual growth rate from the AEO 2013 Reference Case for the region corresponding to the state." For each state and year, the Proposed Rule then multiplies the projected BAU sales (adjusted by the level of prior year energy savings) by the appropriate annual incremental savings rate. After adjusting the resulting level of savings to account for expiring savings, the total is converted back into a rate of cumulative savings compared to BAU sales for each year. *See* GHG Abatement Measures TSD at 5-40 to 5-43.

[162] GHG Abatement Measures TSD at 5-36.

this uniform distribution approach, each year's incremental savings contributes a decreasing amount of MWh to each state's denominator. For example, the measures installed in year 2020 save 100 percent of potential savings in year 2020 and save 0 percent of potential savings in year 2040.

EPA is correct in stating that this distribution results in total energy savings over 20 years equivalent to the more common approach of assuming all measures have a set (in this case 10 year) life.[163] While the GHG Abatement TSD references an LBNL study that establishes the interquartile range of lives for different types of programs (from 5 to 25 years), the Proposed Rule provides no justification for the use of a uniform distribution of measure lives. This distribution effectively assumes that measures are as likely to last 1 year as they are to last 10 years or 20 years. This is not consistent with the data presented in the LBNL study that EPA itself cites.[164] Figure 1 presents the distribution of energy efficiency measure lives as catalogued in the LBNL study cited by EPA.

Figure 1: Distribution of Measures Lives in *The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs*[165]



[163] GHG Abatement Measures TSD at 5-36.
[164] Megan A. Billingsley et al., Lawrence Berkeley National Laboratory, *The Program Administrator Cost of Saved Energy for Utility Customer-Funded energy Efficiency Programs,* C-4 to C-6 (Mar. 2014), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6595e-appendices.pdf.
[165] *Id.*

This distribution is clearly not uniform. Measures are significantly more likely to last between 10 and 15 years than to last between 0 and 5 years. Moreover, some passive efficiency improvements to home and building envelopes (e.g., insulation and air sealing) can be expected to have much longer measure lives. By assuming a uniform distribution, the Proposed Rule overestimates the amount of energy savings that expire in early years and therefore underestimates the amount of achievable savings over the Interim compliance period. The Proposed Rule should utilize the distribution of measure lives included in the LBNL study rather than the inaccurate assumption that measure lives are uniformly distributed.

Furthermore, EPA should make it explicitly clear that the measure life figure(s) used to calculate state targets is (are) not an indication of what will be approved as part of state compliance plans. The Final Rule should clarify that EPA expects to see state plans that incorporate programs with a range of measure lives, and that any measure life that is determined with appropriate EM&V or M&V methodologies is acceptable.

E. Properly Accounting for Emission Reductions of BSER as a System

Under the Proposed Plan, EPA applies the targets for each of the four Building Blocks to calculate a final emission rate for each state. However, in making these calculations, the Proposed Rule treats the increased utilization of lower-emitting existing NGCC differently from increased generation from other low- and zero-carbon sources and from energy savings. Building Block 2 is calculated by explicitly re-dispatching certain fossil fuel-fired EGUs to NGCC. Consistent with how increased utilization of NGCC would occur in the electric system, the application of this Block involves not only incorporating the MWh of NGCC generation in the denominator and the associated emissions in the numerator of each state's emission rate calculation, but also removing the MWh and emissions of the coal- and oil-fired generation the NGCC is presumed to replace. This fully captures the impact that increased utilization of NGCC will have on a state's emission rate.

However, despite the fact that Block 3 similarly involves expanded use of generation with carbon intensity that is lower than the state's average, the Proposed Rule treats the expanded use of this power differently. As proposed, the Clean Power Plan evaluates the impact of Block 3 on each state's carbon intensity only by adding MWh of expected renewable and nuclear generation to the denominator of the state's 2012 adjusted rate. The calculation of the impact of increased generation under Block 3 therefore does not reflect the displacement of emissions and generation from affected EGUs that would result. Note that when describing Building Block 3, EPA indicates that it is intended to reflect the reduced utilization of affected EGUs and not just the addition of zero carbon generation.[166] Consistent with EPA's own description, the final Clean Power Plan should treat generation from nuclear energy, renewable energy and existing

[166] Proposed Rule at 34866 (explaining that "the reductions would occur at all affected EGUs, and entails an analysis of the extent to which generation at the affected EGUs can be replaced by using an expanded amount of lower-carbon generating capacity to produce replacement generation.")

NGCC in the same way. Since the energy savings that constitute Building Block 4 replace MWh that would otherwise be needed from generation sources, these savings should also be treated the same as redispatch to existing NGCC.

In order to calculate the impacts of Blocks 3 and 4 in a way that is consistent with the approach for Block 2, EPA should remove emissions associated with displaced EGUs from the numerator of each state's carbon intensity numerator. Affected EGU MWh should also be removed from the denominator, and the equivalent number of MWh should be added back based on low- and zero-carbon generation from Block 3 and energy savings from Block 4.[167] AEE welcomes EPA's acknowledgement of this issue in the NODA,[168] and may comment further on the particular questions raised by the Agency regarding fossil-generation displacement in a separate submission.

F. EPA Should Shorten Compliance Periods and Incorporate Ongoing Updates To the Emission Rate Standards

A number of the problems with the Proposed Rule's BSER stem from the challenges inherent in predicting the impact of technological progress to 2030 and beyond. Given the rapid rate of improvement in advanced energy technologies—e.g., solar PV panel costs declined 12-14 percent in 2013 alone—it is difficult for EPA in 2014 to accurately project emission reduction potentials in 2030.[169]

The long compliance period in the Proposed Rule, which does not even begin for six years, also creates a timing issue when it comes to implementation. By averaging state emissions over 10 years in the interim compliance period, the Proposed Rule allows for years of delay in action without compliance implications. Given the extensive experience of states in deploying advanced energy technologies through government and utility programs, there should be no need for a prolonged ramp-up period in emission reduction. Furthermore, greater clarity on the

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[167] To be sure, this approach should not involve the redispatch based on all projected MWh of nuclear power, renewable energy and energy efficiency. To the extent that a state is already generating renewable energy, this has emission reduction benefits primarily as foregone fossil fuel generation. Therefore, in order to properly evaluate the system-based impacts of Building Blocks 3 and 4, EPA should calculate the *incremental* MWh of nuclear generation, renewable generation, and energy savings. For nuclear generation, only under-construction nuclear should displace 2012 fossil fuel-fired generation. At-risk nuclear generation already exists and so would not displace additional generation. For renewable generation, EPA should add all MWh representing renewable generation to the denominator in calculating each state's rate. However, EPA need only displace fossil generation representing the renewable energy that is *incremental* to that produced in 2012. All energy savings would be considered incremental to 2012 generation and so all efficiency MWh would displace existing generation.

[168] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units – Notice of Data Availability,* (Oct. 28, 2014), *available at* http://www2.epa.gov/sites/production/files/2014-10/documents/20141028noda-clean-power-plan.pdf.

[169] David Feldman et al., National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections* (Sep. 22, 2014), *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf?utm_source=Solar%20Energy %20Prices%20See.

timing of implementation would help the advanced energy industry invest appropriately to meet compliance-driven demand for technologies that provide emission reductions.

In the Proposed Rule, EPA asks for comment on an alternative approach in which states would be required to submit a second, updated compliance plan in 2025 demonstrating that the final-goal level of performance will be maintained for up to 10 years beyond 2030.[170] The Agency also has requested comment on whether it should implement a policy of reviewing and revising state goals at least every eight years, as is required for performance standards for new sources under CAA Section 111(b)(1)(B).[171]

AEE recommends that EPA treat the 2030 final goals as a *default*, and further commit to reviewing, and if appropriate revising, the 2030 final goals by no later than 2024 (giving states time to revise their plans by the 2025 update deadline *and* eight years after state plans are approved by EPA). The Agency then should continue to review emission goals at least every eight years. Furthermore, such reviews should be consistent with the "no backsliding" policy that is appropriately emphasized in the Proposed Rule.[172] Accordingly, the reviews should only result in sustaining or increasing the stringency of the goals.

Such an updating approach is consistent with the statute, with the kind of authority normally available to a regulatory agency, and with EPA's interpretation in past Section 111(d) rulemakings.[173] By contrast, it is unreasonable to interpret the absence of any express updating authority in Section 111(d) as reflecting a Congressional intent that EPA regulate a source category only once under Section 111(d). An interpretation restricting EPA in that way would be grossly inconsistent with the strong emphasis in Section 111—and in the Clean Air Act generally—on protecting the environment and public health and promoting technological innovation.[174]

G. EPA Should Drive New Markets by Crediting Emission Reductions from New Actions Taken Prior To 2020

Under the Proposed Rule, state plans may not take into account emission reductions generated prior to 2020 by measures implemented between 2014 and 2019. Until 2020, this approach will actively discourage 1.) states and utilities from initiating new policies and programs for emission reduction and 2.) property owners and electric utilities from installing new projects beyond those

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[170] Proposed Rule at 34,908.
[171] *Id.*
[172] *Id.* at 34,917.
[173] *See* 79 Fed. Reg. 41,772, 41,774 (July 17, 2014) ("The EPA is not statutorily obligated to conduct a review of the emission guidelines, but has the discretionary authority to do so when circumstances indicate that this is appropriate. Based on changes in the landfills industry and changes in size, ownership, and age of landfills since the emission guidelines were promulgated in 1996, the EPA has concluded that it is appropriate to review the landfills emission guidelines at this time.")
[174] *See Sierra Club v. EPA,* 657 F.2d 298, 346 (D.C. Cir. 1981) (statutory factors that EPA must weigh in determining a "standard of performance" under Section 111 include "subfactors such as technological innovation.")

required by existing policy. These entities have an incentive to delay new work until the compliance period begins in order to maximize the potential benefits received under a state plan. This disincentive is particularly pronounced for energy efficiency measures, which may have a limited credit life under the design of the Proposed Rule. Such a disincentive holds the potential to delay the creation of new markets, and would also unnecessarily result in costly delays to electric system decarbonization.

In addition to economic and business risk, such a delay threatens to reduce the overall environmental effectiveness of the Proposed Rule. Given that emission rates of the electricity system are highest in the early years, these early actions will produce the greatest impacts. EPA should have a strong preference for securing emission reductions as early as possible due to the significant environmental and economic costs associated with delay.[175,176,177]

EPA has requested comment on the appropriateness of its approach,[178] and AEE strongly recommends modifying the Proposed Rule to address this flaw. One potential solution would be for the Agency to allow states to bank emission reductions from new actions stemming from programs included in a state compliance plan and achieved from June 2014 through 2019. Such a banking policy effectively would "smooth" the compliance trajectory between 2020 and 2030 for states that take (or encourage) early action, relieving pressure on 2020 interim targets, as acknowledged by the NODA.[179] AEE may comment further on issues relating to a "glide path" to emission reduction as outlined in the NODA.[180]

EPA has created banking programs in past rulemakings, and could encourage states to do so under this rule. For example, in its NO_X SIP Call, EPA clearly provided states with a mechanism to allow a source that reduced emissions before the May 1, 2003 compliance start date to generate early reduction credits (ERCs).[181] ERCs were then usable to offset emissions during the compliance period. EPA also included banking provisions in its Federal Implementation Plan (FIP) to serve as a backstop for the NO_X SIP call, but also to encourage states to adopt policies such as banking in their SIP revisions.[182]

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175 White House, The Costs of Delaying Action to Stem Climate Change, *available at* http://www.whitehouse.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf, at p. 2.
176 Levy et al., "The public health benefits of insulation retrofits in existing housing in the United States," Levy et al., *Environmental Health* (2003). The study is currently being updated.
177 Nishioka et al., "Integrating Risk Assessment and Life Cycle Assessment: A Case Study of Insulation," 22 Risk Analysis 5 (2002). The study is currently being updated.
178 Proposed Rule at 34919.
179 *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units – Notice of Data Availability,* (Oct. 28, 2014), *available at* http://www2.epa.gov/sites/production/files/2014-10/documents/20141028noda-clean-power-plan.pdf.
180 *Id.*
181 Robert A. Wyman Jr. & Janda D. R. Kuhnert, *Regional SIP Issues*, in The Clean Air Act Handbook 116 (Robert J. Martineau & David P. Novello eds., 2nd ed. 2004).
182 *Id.* at 118.

EPA could take a similar approach here by signaling to states that it will approve plans that include banking provisions and by describing, in some detail, the type and quantity of banking it will find acceptable. It will be particularly important to provide up-front clarity on this issue in the final rule because uncertainty is already contributing to unnecessary slowdowns in advanced energy project development, as purchasers and developers wait to see what regulatory obligations and benefits will apply to a project.

While AEE prefers the banking approach, there are some other potential solutions, including starting the compliance period for states in 2017 or 2018, while maintaining the business-as-usual emission rate for states until 2020. This approach would allow states to recognize actions implemented before 2020, but would not penalize states that do not have opportunities for such pre-2020 abatement. This approach could be applied to all states, or offered on an "opt-in" basis.

Irrespective of whether EPA adopts any of the above modifications, the Agency should clarify how emission reductions achieved between 2014 and 2019 are accounted for in the projections required for converting rate-based goals to a mass-based form.

H. Interstate Issues

Because the electric power system is interconnected and its operation does not respect state boundaries, Section 111(d)'s focus on state compliance plans raises a number of interstate issues. While the Proposed Rule attempts to address a number of these issues, AEE strongly recommends that EPA provide additional guidance to ensure that interstate advanced energy markets are not disrupted by the Clean Power Plan.

1. The Clean Power Plan should support multi-state compliance plans, as well as limited multi-state agreements on specific issues

In our pre-proposal recommendations, AEE urged EPA to support regional coordination for state plan development. AEE applauds EPA for drafting a Proposed Rule consistent with this recommendation. Multi-state compliance plans help deal with technical challenges such as cross-state power flow and crediting and they simplify the work of businesses by decreasing the number of markets created and increasing the size of each one. Most importantly, regional approaches lower implementation costs. A recent analysis of the Proposed Rule by the MISO found that regional compliance options save approximately $3 billion annually compared to sub-regional compliance.[183] Such market-based emission reduction programs are well established, with the Regional Greenhouse Gas Initiative (RGGI) in the northeast as a prime example. The nine participating states have reduced carbon pollution in the region by over 40 percent from

[183] Midcontinent Independent System Operator, *GHG Regulation Impact Analysis – Initial Study Results* (September 17, 2014), http://www.eenews.net/assets/2014/09/18/document_ew_01.pdf.

2005 to 2012.[184] At the same time, the program generated $1.6 billion in net benefits over the first three years, along with a net increase of 16,000 jobs.[185] The type of environmental and economic benefits delivered through this collaboration could be available to states in other regions through multi-state plans.

Under the Proposed Rule, multi-state plans are not only allowed, but also facilitated through streamlined plan submission procedures,[186] additional time for state plan submission,[187] and simplified default rules addressing interstate compliance issues.[188] Based on a suggestion from the ISO/RTO Council, the Proposed Rule also encourages states to consult with and work through existing regional electric market entities such as RTOs and ISOs.[189]

AEE supports EPA's effort to encourage cooperation and urges EPA to further emphasize to states the benefits of engaging in regional compliance discussions. AEE also encourages EPA to make clear that states need not form full multi-state compliance plans to benefit from regional coordination. Multi-state agreements on discrete issues—such as the treatment of interstate renewable energy flows and related accounting and compliance issues—can help reduce interstate complexity and challenges. Such plans also simplify compliance obligations and market structures for businesses operating in multiple states, and increase market transparency and competition, ultimately leading to lower implementation costs. EPA should provide states a clearly approvable avenue to realize the benefits of issue-specific multi-state agreements even if they cannot come to an agreement on drafting a comprehensive multi-state compliance plan.[190]

Finally, AEE urges EPA to provide states with an avenue to form and join multi-state compliance plans over time—potentially as part of the regular Section 111(d) review cycle outlined in Section III.3.F of this document (above).

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[184] Regional Greenhouse Gas Initiative, Report on Emission Reduction Efforts of the States Participating in the Regional Greenhouse Gas Initiative and Recommendations for Guidelines under Section 111(d) of the Clean Air Act 1 (2013)

[185] The Analysis Group, *The Economic Impacts of the Regional Greenhouse Gas Initiative 33* (2011), *available at* http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Report.pdf. The study looked at years 2009-2011.

[186] Proposed Rule at 34915.

[187] Proposed Rule at 34915.

[188] Proposed Rule at 34921-22.

[189] Proposed Rule at 34923.

[190] The California Air Resources Board has referred to such agreements as "modular agreements" and provides more background in its CLEAN POWER PLAN PROPOSED RULE (111(D)) DISCUSSION PAPER 8 (Sept. 2014), *available at* http://www.arb.ca.gov/cc/powerplants/meetings/discussion_paper.pdf.

2. The Clean Power Plan should clarify the crediting approach for interstate renewable energy and avoid disruption of existing commercial agreements

As a general rule, the Clean Power Plan, when finalized, should encourage new markets and avoid disrupting current and expanding interstate markets for advanced energy products and associated environmental attributes or credits. One such critical market is the cross-border sale of renewable energy and associated attributes. These transactions contribute to compliance with state renewable portfolio standards and other renewable energy policies and allow consumers to support renewable energy as part of voluntary programs. Cross-state sale of renewable electricity is vital to the renewable energy market, with some facilities fully reliant upon opportunities to export electricity to other states. For example, the Agua Caliente solar facility in Yuma, Arizona is a 290 MW photovoltaic power plant, the largest in the world, which sells the entirety of its electricity to San Francisco-based Pacific Gas & Electric in California through 25 year PPA.[191,192] Beyond individual projects, entire segments of the renewable energy economy are dependent on interstate sale of renewable electricity, as evidenced by solar-rich Arizona exporting 77 percent solar PV generation to neighboring states, nearby Utah exporting 97 percent of its wind generation, and Wyoming exporting 74 percent of electricity produced from all renewable sources.[193]

Thus, clear treatment of interstate sales of renewable generation under the proposed rule is key to ensuring that the final rule supports and encourages the growth of this market. The Proposed Rule states that "a state could take into account all of the CO_2 emission reductions from renewable energy measures implemented by the state, whether they occur in the state or in other states."[194] EPA goes on to directly reference the interstate trading of environmental attributes, traditionally represented by renewable energy credits (RECs), to justify this policy.[195] While EPA is attempting to provide guidance to states, this statement raises significant uncertainty. The lack of clarity as to the approach(es) EPA will require and/or approve for crediting interstate sales is already creating uncertainty for project buyers and stalling project development. AEE urges EPA to finalize the Clean Power Plan with clearer and more certain treatment of out-of-state renewable energy by addressing the issues outlined below.

First, EPA's statement that "a state *could*" count out-of state renewable energy creates uncertainty as to whether EPA will *only* approve state plans that allow for the interstate transfer of renewable attributes or whether states may develop plans that mandate that the

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[191] First Solar, *Agua Caliente Solar Project* (2014), http://www.firstsolar.com/en/about-us/projects/agua-caliente-solar-project.
[192] Ucilia Wang, *Behold the World's Largest Solar-Panel Power Plant—In Arizona* (Apr. 29, 2014), *available at* http://www.forbes.com/sites/uciliawang/2014/04/29/behold-the-worlds-largest-solar-panel-power-plant-in-arizona/
[193] National Renewable Energy Laboratory, *Beyond Renewable Portfolio Standards* (2013), *available at* http://www.nrel.gov/docs/fy13osti/57830-1.pdf.
[194] Proposed Rule at 34922.
[195] *Id.*

environmental attributes of renewable generation within the state be used for that state's compliance. This is a concern for advanced energy companies, as EPA's failure to specify acceptable and unacceptable attribution approaches introduces significant uncertainty as to how conflicts among states will be resolved. It is possible that states with different interests will both seek to claim credit for the same renewable energy MWh, and such uncertainty may delay or impede renewable energy projects.

Second, the Proposed Rule and TSDs say relatively little about how states with renewable energy policies that do not include a REC trading system can account for renewable generation in demonstrating compliance with the state goals. As the Proposed Rule acknowledges,[196] some states, such as Hawaii, do not allow for the use of RECs for compliance under an RPS not all state renewable energy policies require the use of RECs.[197] Instead of or in addition to RECs, some states allow utilities to use power purchase agreements (PPAs) for out-of-state renewables under a state-approved integrated resource plan to satisfy RPS requirements. Power producers that own generation in multiple states may use the environmental attributes of generation in one state to help meet RPS obligations in another state without purchase or sale of RECs.

Finally, with the significant decrease in renewable energy prices, customers in many states purchase renewable generation from out of state for reasons other than compliance with a state RPS or other regulatory requirements, such as reducing electricity costs, diversifying supply, or meeting corporate sustainability commitments. Relatedly, in some cases renewable generators sign bilateral contracts to provide purchasers of energy from renewable generation with all current and future environmental attributes associated with that energy. Without clear accounting rules, it will be administratively impossible to distinguish between renewable energy generated in a state due to (i) "renewable energy measures implemented by [another] state," (ii) policy measures implemented by the state where generation is located, or (iii) non-policy market reasons. A state compliance plan that claims credit for in-state renewable energy generation even when the environmental attributes are sold out-of-state will functionally invalidate these existing contracts and introduce significant uncertainty into the marketplace.

In order to clear up this uncertainty and avoid potentially contentious conflict between states seeking to count the same renewable electricity as part of their compliance plans, EPA should provide additional guidance on crediting of out-of-state renewable energy. AEE believes that clarification is needed to ensure that the Proposed Rule provides a strong signal to renewable energy developers and purchasers that their existing and future contracts will be honored, and to ensure that the Clean Power Plan encourages market expansion for renewable energy. AEE may submit further information on appropriate accounting methodologies for states to credit renewable energy generation as a compliance mechanism

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[196] State Plan Considerations TSD at 126-27.
[197] Hawaii State Energy Office, *Renewable Portfolio Standards* (2003), *available at* http://www.capitol.hawaii.gov/hrscurrent/Vol05_Ch0261-0319/HRS0269/HRS_0269-0091.HTM

3. The Clean Power Plan should allow a state to take credit for an in-state energy efficiency measure that causes emission reductions in another state

In contrast to its accounting provisions for cross-state renewable energy generation, the Proposed Rule would not recognize energy efficiency measures that result in CO_2 emission reductions out-of-state. Specifically, EPA is proposing to allow states to take into account "only those CO_2 emission reductions occurring…in the State that result from demand-side energy efficiency measures implemented in the State."[198] This provision of the Proposed Rule risks diminishing the incentive for cost-effective, feasible emission reductions from energy efficiency measures, leaving significant energy efficiency on the table.

A net-exporting state would have limited in-state demand-side energy efficiency opportunities to offset the emissions at its affected EGUs relative to its in-state generation. At the same time, the state receiving the exporting state's generation could get credit only for efficiency that reduces in-state fossil generation, of which there may be relatively little. In effect, this proposal would mean that reductions stemming from energy efficiency programs in importing states could be "stranded," discouraging investment in energy efficiency measures.

This is not how the Clean Power Plan treats any other emission reduction measure. As proposed, if a commercial customer in a net-importing state such as Maryland installs solar panels on its roof, the state where that customer is located is allowed to take credit for the MWh of solar in determining compliance with the state goal because this generation is presumed to offset in-state fossil generation regardless of whether the actual fossil generation offset was out of state—such as net-exporter West Virginia. However, if that same Maryland customer installed efficient insulation, the Clean Power Plan suggests that Maryland would only be able to credit a part of the actual MWh of energy savings (and therefore emission reductions) based on the proportion of Maryland sales covered by in-state generation. These analogous cases should not be treated differently. In order to provide the appropriate incentives for importing states to reduce demand—and therefore emissions from fossil fuel-fired EGUs—the Clean Power Plan should allow states to get credit for demand-side energy efficiency emission reductions regardless of whether they are net importers or net exporters, even if those savings likely occur out of state.

Such an approach could be facilitated without risk of double counting by allowing states to use energy efficiency accounting systems. EPA should allow the states to use existing tracking systems. In addition, EPA should facilitate the creation of an optional interstate credit tracking system—similar to those used for RECs (i.e., NEPOOL, PJM EIS GATS)—that allow credits from energy savings to be traded, including among states. While such an interstate system does not currently exist, a clear signal from EPA that such a system would allow states to take full advantage of low-cost emission reduction measures from energy savings would likely facilitate

[198] Proposed Rule at 34922.

the creation of such a system. Such a system, which states could join at their discretion, would particularly help those states without a tracking system already in place. This would allow states acting together to take advantage of the lowest cost emission reduction opportunities through energy efficiency without having to participate in full multi-state compliance plans. Therefore, AEE urges EPA to provide a clear signal of its support for an interstate energy savings trading platform.

I. EPA Should Provide Additional Guidance To States on Specific Emission Reduction Options and Issues

AEE commends EPA for providing states broad flexibility in crafting compliance plans that work for their particular circumstances. With a wide range of advanced energy technologies and services at their disposal, states can develop plans to meet EPA's carbon emission standards that will be vehicles for creating a higher performing electric power system for all customers. Deploying advanced energy technologies and services will create jobs and stimulate economic growth from investments in modernizing the electric power system. New consumer value will be created in a long-stagnant electricity sector by introducing competition, choice, and innovation for new products and services, both known today and not yet imagined. And because advanced energy technological development continues at a rapid pace, flexibility will allow states to utilize new technologies and mechanisms as they are developed over the course of the next 16 years.

Some state policies to encourage advanced energy—such as RPS and energy efficiency resource standards (EERS)—are familiar to many states, and the Proposed Rule provides a clear signal that they will be approved if incorporated into state compliance plans. However, without additional guidance from EPA, states may be reluctant to adopt other creative, cost-effective emission reduction policies that take full advantage of advanced energy technologies. Our member companies have heard concerns from states that policies or technologies not explicitly mentioned in the proposed rule will not be approved by EPA. Even then, without specific guidance as to how to incorporate these technologies, states may not do so.[199]

Therefore, to balance the need for flexibility with the benefits of certainty, EPA should provide as much specific guidance as possible on approvable measures and policies, while reiterating and making clear that additional measures and policies can be approved even if not specifically named in the Clean Power Plan. This guidance should contain as many default approvable policies as possible and criteria on which additional state policies will be evaluated.

This section provides data on the emission reduction opportunities of select advanced technologies; requests a clear signal from EPA as to the approvability of these measures; and

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[199] The failure of most states to revise State Implementation Plans to incorporate advanced energy technologies, even after EPA publication of its EE/RE Roadmap, demonstrates this risk. *See* EPA, *Incorporating Energy Efficiency/Renewable Energy in State and Tribal Implementation Plans* (2014), http://epa.gov/airquality/eere/.

requests additional EPA guidance on how states may account for their emission reduction benefits.

1. EPA should provide assurance that the emission reduction technologies described in AEE's *Advanced Energy Technologies for Greenhouse Gas Reduction* report will be approvable as components of state plans

AEE recently released a report, *Advanced Energy Technologies for Greenhouse Gas Reduction*, detailing 40 different advanced energy technologies and services that cut carbon emissions from the electric power sector while providing other system and consumer benefits. States should consider these technologies and services as they develop compliance plans.[200] The solutions in the report do not constitute a comprehensive list, but demonstrate the breadth of options that states have at their disposal today. The report groups technologies based on three broad categories: buildings and industry; electricity generation; and electricity delivery and grid management.

Many of the technologies in the report—including efficiency technologies such as behavioral energy efficiency, building envelope and insulation technology, and efficient appliances, lighting, and HVAC; and renewable generation technologies such as biomass, geothermal, hydroelectric, utility-scale nuclear, solar, and onshore wind—are discussed at length in the Proposed Rule and form the basis of BSER. However, many other technologies and services—such as industrial CHP, demand response, ESCO delivered energy efficiency, fuel cells, offshore wind, anaerobic digestion, advanced metering, energy storage, advanced transmission, smart grid data management, and voltage and reactive power optimization—are either not mentioned at all or are given only cursory reference. The Clean Power Plan should make clear how each of the 40 technologies can contribute to emission reductions at affected EGUs and be incorporated into approvable state plans.

The emission reduction opportunities associated with many of the technologies in AEE's report are straightforward and fall within EPA's existing guidance for the crediting of energy efficiency and renewable energy measures.[201] However, other advanced energy technologies require additional consideration as to their emission reduction impacts and how those impacts may be credited in state plans. AEE has jointly submitted comments to EPA providing information and

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[200] AEE, *Advanced Energy Technologies for Greenhouse Gas Reduction: 40 Solutions for Cutting Carbon Emissions from Electricity Generation* (2014), *available at* http://info.aee.net/epa-advanced-energy-tech-report.

[201] The Proposed Rule indicates that low- and zero-carbon energy, beyond renewable energy, such as new and uprated nuclear energy can be included as part of approvable state compliance plans. While these generation technologies would have the same accounting issues as renewable energy under a rate-based plan, the Proposed Rule is not explicit as to how the emission reductions from reduced utilization of affected EGUs could be incorporated into state plans for that non-renewable generation. AEE urges EPA to clarify that non-renewable zero carbon generation is eligible for the same emission reduction crediting opportunities as renewable energy generation.

recommending additional steps to ensure that the Clean Power Plan adequately guides states in incorporating CHP and Waste Heat to Power (WHP) as compliance mechanisms.[202] AEE may also submit information on additional emission reducing technologies in subsequent comments, including but not limited to: ESCO-delivered energy efficiency, demand response, energy storage, and smart grid technologies.

2. Additional guidance is needed on EM&V to facilitate energy efficiency in state compliance plans

The Proposed Rule requires that a state incorporating advanced energy measures—particularly energy efficiency—into its implementation plan, must develop an evaluation, measurement & verification ("EM&V") plan. The Proposed Rule outlines a number of approved EM&V plan options.[203] Nonetheless, there are some uncertainties for states regarding EM&V measures for energy efficiency, which could impede incorporation of this important resource into state plans, particularly because states face an accelerated timeline for developing and submitting their compliance plans. In the final rule, EPA should provide greater certainty with regard to EM&V by developing a non-exclusive list of protocols that the Agency would deem approvable.

The final rule should also include clear criteria under which the Agency would evaluate alternative EM&V protocols submitted by states in their plans. EPA should not wait until after states submit plans to signal which of these protocols will ultimately be approvable. States and advanced energy businesses alike need a strong signal that the types of protocols that are widely used and respected within the industry and across the states can be incorporated into approvable state EM&V plans.

As a general principle, EM&V should provide reasonable confidence in energy savings, but should not be so onerous that it fails to provide needed incentives for advanced energy companies. One need only look at the example of the set-aside for energy efficiency activities in the Acid Rain Program, which established such onerous criteria that it was more or less unused.[204] Furthermore, it is important to recognize that the degree of precision that might be necessary for criteria or toxic pollutant policies—where even small differences in reductions can translate into significant health impacts—is not necessary for policies addressing carbon emissions.

Therefore, the Clean Power Plan should embrace EM&V requirements and principles—such as aggregation—that yield accurate estimates of energy savings over a state and over time without requiring precision for each ton of emissions reduced and when. Where appropriate, some of

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[202] *Multi-Association Comments on CHP in 111d, RE: Carbon Pollution Emissions Guidelines for Existing Stationary Sources: Electric Utility Generating Units, EPA-HQ-OAR-2013-0602, 79 Fed. Reg. 34830* (Oct. 27, 2014), *available at* http://www.dgardiner.com/wp-content/uploads/2014/10/Multi-Association-Comments-on-CHP-in-111d_10_27_2014_final.pdf.
[203] State Plan Considerations TSD at 36-60.
[204] Kenneth Gillingham, et al., Res. for the Future, DP 04-19 REV, Retrospective Examination of Demand-Side Energy Efficiency Policies 35-37 (2004), http://www.rff.org/Documents/RFF-DP-04-19rev.pdf.

the low-cost methods outlined in the Technical Reference Manuals (TRMs) developed and/or adopted by states, utilities and regional bodies should be allowed.

EPA has requested comment on the level of guidance it should provide regarding energy efficiency EM&V.[205] Different EM&V protocols exist for various types of projects and AEE member businesses utilize a number of different EM&V protocols in their current operations. Accordingly, AEE recommends that the Clean Power Plan include a list of pre-approved EM&V protocols drawn from international standards, existing state-developed protocols, and industry best practices. In addition, the Clean Power Plan should provide criteria for approval of other EM&V protocols that may be submitted by states.

For example, we recognize that the Department of Energy is working on the Uniform Methods Project, a standardized set of EM&V protocols for specific energy efficiency actions. We support the inclusion of the Uniform Methods Project in a pre-approved list of EM&V protocols and are particularly interested in the future development of these protocols to include material relevant to behavioral efficiency as well as institutional and industrial energy users.

EPA has also asked for more information regarding the best practices for EM&V of behavioral energy efficiency programs. The industry standard best practice is to measure programs with a randomized control trial. This methodology is recommended by the State & Local Energy Efficiency (SEE) Action Network,[206] and recognized by 31 states[207] as an approved measure of behavioral energy efficiency. EPA should recognize this well-established methodology and indicate that it would likely be approved as part of state compliance plans.

In addition to clarifying acceptable EM&V plans for the evaluation of traditional utility- or state-run energy efficiency programs, the final rule should also offer a list of acceptable measurement & verification (M&V) protocols for the evaluation of ESCO-delivered energy efficiency projects based on PCs. As discussed in Section III.D.1. of this document (above), these ESCO *projects* deliver energy conservation measures to a customer, typically through PCs. The customer is often a single entity, often in a single building or handful of buildings at a given site. As such, these energy efficiency *projects* are quite different from energy efficiency *programs,* which are typically administered by utilities or state offices and target entire portfolios of buildings (e.g. 4,000 air conditioner replacements in a utility service territory). Energy efficiency programs have a history of recognition within policy, whereas projects delivered by private entities have often resided outside of regulated processes. As such, EPA needs to provide state regulators with

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[205] Proposed Rule at 34920-21.

[206] A. Todd et al., State and Local Energy Efficiency Action Network, *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations,* prepared Lawrence Berkeley National Laboratory (2012), *available at* http://behavioranalytics.lbl.gov.

[207] Rachel Kane & Nathan Srinivas, American Coalition for an Energy Efficient Economy, *Summer Study on Energy Efficiency in Buildings, Unlocking the Potential of Behavioral Energy Efficiency: Methodology for Calculating Technical, Economic, and Achievable Savings Potential,* prepared by Opower (2014), *available at* https://www.aceee.org/files/proceedings/2014/data/papers/5-284.pdf.

guidance on incorporating ESCO-delivered energy efficiency in compliance plans. That guidance needs to begin with a signal to states that well-established M&V protocols will be accepted as part of a state implementation plan by including a non-exclusive list of approved M&V protocols.

AEE recommends that the Clean Power Plan pre-approve the International Performance Measurement and Verification Protocol (IPMVP). IPMVP is internationally recognized and widely adopted for M&V. This standardized approach for measuring and verifying savings facilitates contractual agreements between providers of energy efficiency savings and their customers. In addition, IPMVP serves as a foundation for utility programs. IPMVP provides four basic options for determining the level of efficiency savings for various applications. The full IPMVP standard is available from the Efficiency Valuation Organization (EVO),[208] with supporting materials and analysis provided through Lawrence Berkeley National Lab.[209]

For more complex solutions at large commercial buildings and industrial facilities, a flexible system of tracking and verifying energy savings should be allowed, such as Energy Management Systems (EnMS) under the ISO 50001 standard. EPA should consider a pre-approved menu of protocols to quantify facility-specific energy savings for enterprises utilizing EnMS. One example is the Department of Energy's Superior Energy Performance protocol, an M&V protocol coupled with required certification by accredited third parties.

In addition to these specific methodologies, AEE supports the following protocols:

- Model Energy Efficiency Program Impact Evaluation Guide issued by the State and Local Energy Efficiency (SEE) Action Network;
- ASHRAE Guideline 14-2002 Measurement of Energy and Demand Savings; and,
- Technical Reference Manuals (TRMs) developed and/or adopted by states, utilities and regional bodies; examples include the Northwest Power and Conservation Council Regional Technical Forum (RTF) and the Northeast Energy Efficiency Partnerships (NEEP) EM&V Forum.

Moreover, new and improved EM&V and M&V protocols and approaches are continually under development. Therefore, the Clean Power Plan should signal that states may revise EM&V plans—subject to EPA approval—as new methods and technologies are developed.

Finally, the Clean Power Plan should clear up the widespread misimpression that EPA intends to limit the life of creditable energy efficiency measures to 10 years. It is AEE's understanding that while the Proposed Rule uses an average 10-year life for energy efficiency measures as the basis for its calculation of BSER Building Block 4, EPA has not intended that 10 years serve as a crediting limit for energy efficiency measures in compliance. Instead, measure lives should

[208] EVO, IPMVP Public *Library of Documents* (2014), *available at* http://www.evo-world.org/index.php?option=com_content&view=article&id=272&Itemid=504&lang=en.
[209] Lawrence Berkeley National Laboratory, *Measurement & Verification Portal,* (2014), *available at* http://mnv.lbl.gov/.

be determined as part of the EM&V process, consistent with a state's EM&V plan. This more project-specific determination is appropriate, as many measures have very long useful lives. For example, passive energy efficiency improvements to home and building envelopes (e.g., insulation and air sealing) will last for the life of the building with little or no maintenance. Similarly, ESCO PCs with guaranteed savings need not assume declining savings over time, as savings are guaranteed and energy service companies install new measures in order to maintain consistency of savings under the performance contract. Additionally, research indicates that habituated energy savings behaviors continue after an educational program concludes and estimated lives should account for this continued savings.[210] It is ultimately the prerogative of states to incorporate measure life questions into their EM&V plans. So long as a state supports its plan adequately, EPA should defer to state judgment regarding measure lives.

3. The Clean Power Plan should provide more guidance on approvable emission crediting methodologies, and should make clear that the avoided MWh approach is acceptable

The Proposed Rule has identified a number of ways a state may count the contribution of low- and zero-emission generation and energy efficiency measures to the resulting emission reductions at EGUs for states choosing to operate under a rate-based target.[211] EPA provides further detail as to these methodologies in its State Plan Considerations technical support document.[212]

The Proposed Rule lays out two broad categories of accounting options, for which EPA is seeking comment. One option would be to treat advanced energy MWh as avoided MWh of electric generation from affected EGUs. That is, the MWh from the advanced energy technologies would be added to the denominator of an affected EGU or group of affected EGUs, resulting in an adjusted emission rate. Another option would be to treat generation and energy savings from advanced energy as avoided emissions. That is, pounds of CO_2 representing the emissions avoided through generation or energy savings rather than through generation at affected EGUs would be subtracted from the numerator of an affected EGU or group of affected EGUs. The quantity of emissions attributed to the generation or energy savings could be calculated based on the average emission rate of the electric system, a measure of the marginal emission rate of avoided energy, a more complex methodology such as EPA's Avoided Emissions and Generation Tool (AVERT), or electricity sector modeling. While EPA includes significant discussion of these options, the Proposed Rule does not indicate which of the options will ultimately be approvable in state plans.

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[210] Hunt Allcott & Todd Rogers, *The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation* (Jan. 2014), *available at*: https://files.nyu.edu/ha32/public/research/Allcott%20and%20Rogers%20-%20The%20Short-Run%20and%20Long-Run%20Effects%20of%20Behavioral%20Interventions.pdf.
[211] Proposed Rule at 34919-20.
[212] *See* State Plan Considerations TSD at 20-34.

In order to provide certainty to states and to the advanced energy industry, EPA should provide clearer guidance in its final Clean Power Plan as to which accounting methods will be acceptable. Will EPA leave it to the states to choose among these methods? Will the Clean Power Plan include only a limited set of approvable methods rather than all methods identified in the Proposed Rule? EPA should not wait until the plan approval process to signal what methods states can use.

AEE strongly urges EPA to include the avoided MWh approach as an approvable means of calculating the emission reductions that occur at affected EGUs. Such a calculation method can be done with the greatest certainty and at least cost. While it may sacrifice some precision as to the exact level of affected EGU emission reductions that result from any particular MWh of zero-carbon generation, it is most likely to provide an acceptable level of emission reduction accuracy as well as a clear and sufficient signal of the economic opportunity to reduce emissions by means of advanced energy investments.

Moreover, this approach is consistent with the Proposed Rule's methodology for the calculation of BSER. For Building Blocks 3 and 4, EPA added the MWh of zero-carbon generation and energy savings into the denominator when calculating each state's adjusted emission rate. It would be inconsistent for EPA to find that method an acceptable means of estimating emission reduction from zero-carbon generation and energy savings for the purpose of calculating state targets but not for the purpose of determining compliance with those targets.

In addition, as EPA considers approaches for quantifying avoided emissions attributed to generation and energy savings from advanced energy, AEE recommends that EPA always consider avoided emissions based upon the system's marginal emission rate. Such an approach produces an estimate of the emissions reductions that actually occur from the marginal plants that reduce output.