National Governors Association

NGA Paper

Opportunities for Energy Efficiency to Help States Reduce Costs and Achieve Co-Benefits Under the Clean Power Plan

Executive Summary

In August 2015, the U.S. Environmental Protection Agency issued state-specific carbon dioxide emissions-reduction targets under the Clean Power Plan (CPP) for existing power plants. Governors have an opportunity to lower the costs of meeting those targets and achieve cobenefits by incorporating energy efficiency into their state compliance strategy and bolstering their efforts with complementary measures—such as broad energy efficiency standards or building codes—that fall outside the scope of CPP requirements. Increasing energy efficiency often costs less than generating electricity and can be a least-cost approach to complying with environmental regulations, including the CPP. States have been pursuing energy efficiency for many additional reasons as well, including its potential benefits for energy independence, energy resiliency, job creation, economic development and public health.

Although a February 2016 ruling of the U.S. Supreme Court stayed implementation of the CPP pending resolution of legal challenges, some governors have directed their states to continue their planning efforts so that they can be well positioned for compliance if the CPP remains in effect. Other governors have suspended such actions while litigation continues.[1] If the rule is upheld, governors interested in incorporating low-cost energy efficiency into their CPP compliance strategies can consider the following CPP-specific energy efficiency options:

- Direct the state agency tasked with drafting the state's CPP response to consider the costs, benefits and scale of energy savings and emissions avoided through energy efficiency. If energy efficiency demonstrates value as a compliance measure, establish it as a priority for CPP state planning;

- If pursuing a rate-based plan, enable a larger emission rate credit market by partnering with other states, and use protocols that are consistent with those of potential trading partners.[2] Using a common market administrator can limit the burden and cost to the state;

- If pursing a mass-based plan, distribute carbon emission allowances or their monetary value to encourage energy efficiency. This distribution can be made through a set-aside or output-based allocation that provides allowances to energy efficiency or an auction that directs revenue earned to energy efficiency;[3]

- If pursuing a mass-based plan, issue emissions allowances to utilities and other parties that demonstrate energy savings to provide market opportunities and tap a larger scale of energy efficiency; and

- Encourage early action through a state-created emissions allowance set-aside, or consider taking advantage of the voluntary federally created early action option known as the "Clean Energy Incentive Program."

In addition, governors can employ the following complementary energy efficiency policy options, which can provide states with multiple benefits

regardless of the status of the CPP:[4]

- Establish or expand energy efficiency targets for utilities;
- Establish or update building energy codes based on the most recent standards;
- Encourage sufficient energy efficiency cost-benefit analyses for utilities;
- Require utilities to procure all-cost-effective energy efficiency; and
- Encourage the realignment of utility regulatory models to enhance cost-effective energy efficiency.

Introduction

In August 2015, the U.S. Environmental Protection Agency (EPA) finalized a rule under the federal Clean Air Act requiring reductions of carbon dioxide (CO_2) emissions from existing fossil fuel–fired power plants.[5] Referred to as the Clean Power Plan (CPP), this rule aims to reduce U.S. carbon emissions by 32 percent below 2005 levels by 2030. EPA originally set timelines in the rule that required states to submit initial plans or requests for extensions by September 2016, submit their final compliance plans by September 2018 and begin compliance with the rule in 2022.

In February 2016, the U.S. Supreme Court issued a stay on the rule's implementation pending the resolution of legal challenges. In May 2016, the D.C. Circuit Court announced that the legal challenges will be heard by the full court (or *en banc)* in September 2016. The legal challenges are expected to advance to the U.S. Supreme Court, with a decision likely to occur in 2017 or 2018. If the rule is upheld, the timelines for states to submit a compliance plan may be adjusted, and there is uncertainty about whether the compliance period will be delayed. Therefore, any state planning or expecting to plan for CPP compliance should take this uncertainty about deadlines into account.

The CPP calls on governors to develop and submit a plan to reduce carbon emissions from existing fossil fuel-fired power plants. One option states can pursue to reduce carbon emissions is to encourage "demand-side" energy efficiency, in which electricity customers reduce their energy use while achieving the same level of service.[6] Energy efficiency can cost less than other emission-reduction approaches and offer unique opportunities for economic, health, environmental and energy reliability benefits. To take full advantage of these benefits, governors will need to incorporate energy efficiency directly into their compliance strategy and may want to bolster those efforts with additional energy efficiency policy measures.

Some may question the need for dedicated policy measures to promote cost-effective energy efficiency because the CPP creates carbon markets that should drive demand for the least cost opportunities for carbon emissions reductions. However, states and countries that already have some form of carbon market have pursued only modest amounts of energy efficiency because of the carbon price. Despite it being a low-cost resource, energy efficiency faces market and behavioral barriers that limit its adoption.[7] Carbon prices may not address energy efficiency barriers because of the low price elasticity of demand, the low share of electricity spending in household budgets and the split incentives where the person who pays the utility bill has no control over capital investments that affect electricity consumption.[8] Similarly, although there are widely differing projections for the price of carbon under the CPP, many of the projections are low, especially in the initial years.[9] A fuller consideration of the benefits of energy efficiency, however—beyond those captured in the electricity and emissions markets—would yield greater investment. Moreover, end users have demonstrated that they often do not invest in efficiency measures that will pay off through mid- to long-term (as opposed to short-term) returns in energy savings.[10] In addition, utility motivations are particularly complex and do not always align with public cost savings. Other barriers to greater energy efficiency include a lack of sufficiently robust cost-benefit analyses for utilities to adequately value the

benefits of energy efficiency, regulatory uncertainty and cumbersome energy efficiency programs that place administrative burdens on the state. For these reasons, most states have adopted policies and programs to promote energy efficiency at cost-effective levels and do not rely on market forces alone.

Incorporating Energy Efficiency Provisions into State CPPs

To advance opportunities to use energy efficiency to help meet state CPP targets, governors can direct agencies to consider the following approaches within their states' CPP planning processes.

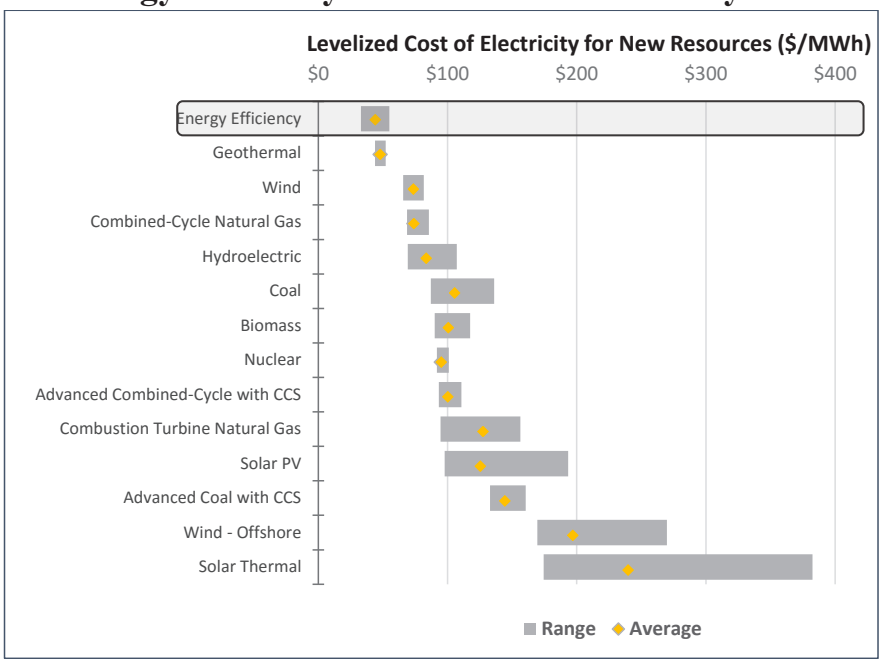
Consider the Costs, Benefits and Scale of Energy Efficiency

Direct the state agency tasked with drafting the state's CPP to consider the costs, benefits and scale of energy savings and emissions avoided from energy efficiency. If energy efficiency demonstrates value as a compliance measure, establish it as a priority for CPP state planning.

Owners of power plants can comply with the CPP in several ways, including using more renewable energy, switching from coal- to natural gas–fired energy generation, increasing the use of nuclear energy or qualified biomass and buying emission rate credits (ERCs) or allowances, each of which has its own implications for state policy goals. Energy efficiency is typically the least expensive option for meeting new electricity demand.[11] As shown in Figure 1 below, the cost of generating new electricity resources from natural gas, wind, coal, solar or nuclear are in the range of $80 to $200 per megawatt hour (MWh), while the cost of reducing demand through energy efficiency ranges from $29 to $80 per MWh, with an average cost of $46 per MWh.[12]

In addition to reducing consumers' utility bills in the near term, energy efficiency avoids future economic risks associated with electricity generation, such as price volatility and future environmental requirements.[13] In addition, for states that import most of their electricity fuel sources or electricity, energy efficiency can increase local economic activity (including employment) by reducing expenditures on imported electricity and fuel, and can provide reliability benefits by reducing stress to the electric grid and natural gas infrastructure during times of high demand or supply constraint. For mass-based states, energy efficiency can reduce demand in the

Figure 1. U.S. Energy Efficiency Costs vs. New Electricity Generating Costs[14]



Rate-Based vs. Mass-Based Approaches to Compliance

One of the primary decisions states must make about compliance with the Clean Power Plan (CPP) is whether they want to use a rate-based emissions target or an equivalent mass-based target as calculated by the U.S. Environmental Protection Agency (EPA). The state's decision on its compliance approach affects whom its power plants can trade with (if the state allows multistate trading in its plan). In the final emission guidelines for the CPP, EPA specifies that power plants can trade only with other power plants whose respective state plans use the same compliance approach.

Under a rate-based approach, a state's power plants must meet specific emissions rate goals, measured in tons of carbon dioxide (CO2) per megawatt hour of generation. Eligible units that undertake energy efficiency measures generate emission rate credits that they can trade as a compliance instrument.

Under a mass-based approach, power plants must reduce their gross emissions tonnage (in tons of CO2) to a specified amount equivalent to a state's rate-based target. Power plants can achieve that by either reducing their overall output to correspond to the number of allowances they hold, reducing on site emissions through improved efficiency or buying additional emissions allowances to net against their emissions totals.

state's emissions budget, which frees more emissions for coal generators. For rate-based states, energy efficiency creates ERCs that lower the state's effective emissions intensity, which may allow for more generation from fossil fuel–fired sources such as coal. For states looking to improve air quality, efficiency is often less costly than installing control devices for pollutants such as nitrogen oxides, sulfur dioxides, particulate matter and mercury.[15] For instance, a recent study on the CPP found that an integrated energy efficiency scenario can reduce emissions between 16 percent for CO_2 and mercury emissions and 25 percent for sulfur dioxide emissions by 2030.[16]

The scale of carbon emissions reduction that can be achieved through energy efficiency is significant. Some states can achieve their CPP targets simply by using a combination of three efficiency policies and programs—an energy efficiency resource standard (EERS), building energy codes and energy service company (ESCO) programs—according to a tool that the American Council for an Energy Efficient Economy created.[17] For example, this tool finds that **Minnesota**, whose 2030 CPP target would require an emissions reduction of 35 percent from its adjusted 2012 baseline, can surpass its target from these policies, as illustrated in Figure 2 on page 5. Based on the analysis from this tool, Minnesota can meet most of its CPP target through a 1.5 percent EERS that achieves a 31 percent emissions reduction.[18] Outside an EERS, the other big opportunity to reduce emissions through energy efficiency is updating building energy codes, which can achieve approximately an 8 percent reduction in carbon emissions by 2030.[19] ESCO programs, which operate outside the EERS, can achieve approximately a 4 percent reduction in carbon emissions by 2030.[20] The Minnesota example is illustrative of what other states may find, but differences in scale will result from the particular fuel mix and level of existing policies in each state. These particular policies are discussed later in this paper.[21]

Governors can direct their state agencies to consider these costs, benefits and scale from efficiency compared

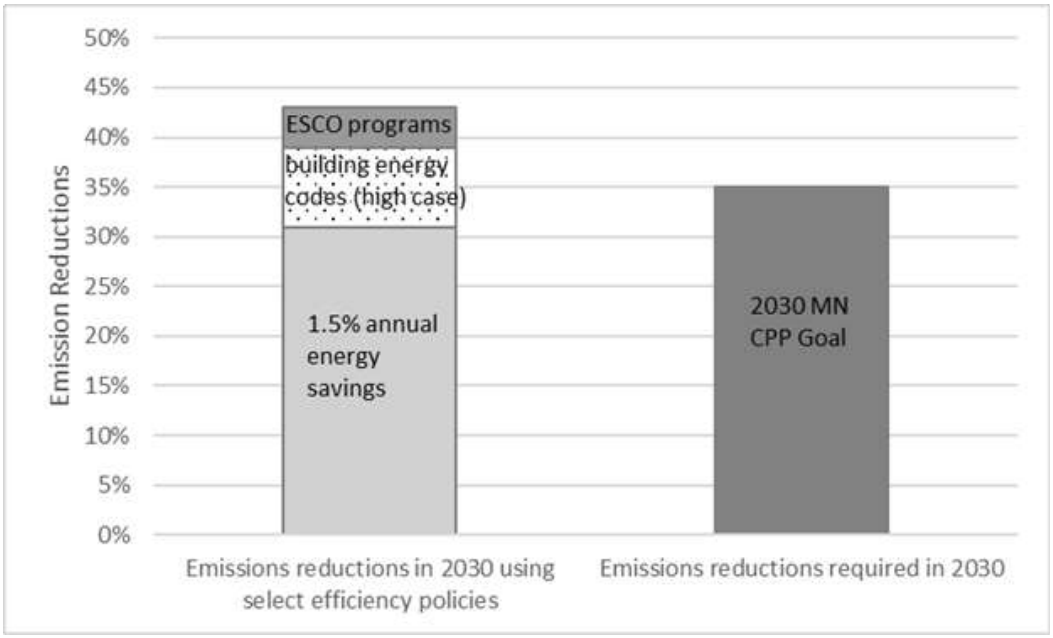
to other compliance measures, using existing, well-demonstrated cost-effectiveness analyses. This analysis is important because utilities will make their own CPP compliance decisions, and their economic incentives can differ from the public interest. If the state cost-benefit analysis finds favorable benefits from energy efficiency, then the state can take steps to encourage more energy efficiency within compliance plans.[22] If it is favorable for his or her state, the governor can issue an executive order that establishes energy efficiency as a policy goal for CPP planning.

Under a Rate-Based Approach, Support a Larger ERC Market

If pursuing a rate-based plan, enable a larger ERC market by partnering with other states to increase the size of the ERC market, and use protocols that are consistent with those of potential trading partners as well as a common administrator to limit the burden and cost to the state.

The rate-based approach under the final CPP includes an ERC option that allows crediting energy efficiency for electricity savings that occur during the compliance period.[23] In the proposed model rule, power plant owners in states that have the same rate-based compliance approach can buy credits from and sell credits to market actors operating in states that have the same approach with EPA-approved ERC evaluation, measurement and verification (EM&V) protocols and tracking system.[24] States can work together in a coordinated fashion to ensure that their EM&V approaches are robust, transparent and consistent with EPA's minimum requirements and guidance. As such, states can increase the size of the energy efficiency market pool, thereby reducing their compliance costs by partnering with other rate-based states to adopt the same type of rate target and meet other requirements to be "trading ready." In addition, states can consider pre-certifying efficiency projects from certain programs to provide certainty to project developers and encourage investments in energy efficiency. Finally, states can reduce public staffing needs and costs by contracting the same third-party administrator to oversee the tracking process. These efforts would lower the compliance costs by increasing the market pool and reducing the transaction cost of verifying ERCs.

Figure 2. Estimation of Minnesota Emissions Reductions from Select Energy Efficiency Policies and Programs[25]



Under a Mass-Based Approach, Distribute Allowance Value to Encourage Energy Efficiency

If pursing a mass-based plan, distribute carbon emission allowances or their monetary value to encourage energy efficiency. This distribution can be made through a set-aside or output-based allocation (OBA) that provides allowances to energy efficiency or an auction that directs revenue earned to energy efficiency.

To encourage energy efficiency within a mass-based plan, states have three options for distributing allowances:

- **Consider dedicating some portion of carbon emission allowances to an energy efficiency set-aside.** Under a mass-based plan, states can direct in-state investments to energy efficiency through a "set-aside"—that is, a pool of carbon emissions allowances dedicated for a specific purpose, such as for energy efficiency projects. Potential recipients earn those carbon emission allowances by demonstrating that they have qualifying energy efficiency projects, and then sell the carbon emission allowances on the market. The state can create the set-aside regardless of the method of allowance distribution it chooses for the remaining allowances (for example, allocation or auctioning). States have used energy efficiency set-asides in other emissions reduction programs as well.[26]

- **Consider auctioning some or all carbon emission allowances to generate revenue the state can dedicate to energy efficiency programs.** Under a mass-based plan, states can allocate the carbon emission allowances freely, sell them through an auction or use some combination of the two. Under an emissions auction program, affected power plants bid for the carbon emission allowances, and the sale of allowances creates a revenue stream that the state can dedicate to any state expense.[27] The amount of revenue generated could be significant. For example, auctioning all the carbon emission allowances under the CPP would generate revenue in the range of $16 million to $2 billion annually per state between 2022 and 2030, depending on each state's assigned reduction target and the price of carbon.[28] Government auctions for emissions allowances have been around since 1993, when they were used to sell sulfur dioxide emissions allowances for compliance with the Acid Rain Program.[29] Some states will find it politically untenable to pass legislation to establish a carbon emission auction, but in cases where a governor and state legislature are interested in creating a new revenue opportunity from carbon emission allowances and investing in efficiency, they may want to consider auctioning some or all of the carbon emission allowances.[30]

  States and countries that have set up auctions for carbon emission allowances typically dedicate a significant portion of the revenue raised to energy efficiency to further reduce emissions and protect consumers. For instance, the nine northeastern states that participate in the Regional Greenhouse Gas Initiative (RGGI) auction carbon emission allowances and dedicate portions to energy efficiency and protection of low-income residents.[31] The proportion varies by state, with most states in the RGGI program dedicating the majority of auction proceeds to energy efficiency.[32] **California** invests revenues from cap and trade auctions in programs that reduce greenhouse gases, including low carbon transportation, sustainable communities, energy efficiency, urban forests and high-speed rail. Twenty-five percent of investments must benefit disadvantaged communities.

  States can face various challenges to creating a successful auction program. First, they may need to ensure that the auction serves as an incentive to generators to make emissions reductions (and thereby avoid the need to purchase allowances). Some states have established an allowance price floor—that is, a minimum allowance price—to ensure that the market maintains a sufficient

price signal to reduce emissions.[33] In addition, state agencies may need to design auctions to fit within existing legal authority, or they may require legislative authorization to establish an auction and distribute the auction revenue.[34] If a state cannot establish an auction or direct that auction's revenue as the legislature specifies, it may want to consider establishing a "consignment auction." A consignment auction does not provide the state with a revenue stream to direct, but it does offer many of the other benefits of auctions, such as price formation and market liquidity. In a consignment auction, the state allocates the allowances to whomever it chooses—affected power plants, renewable projects, energy efficiency providers. The recipient would be required to place the allowances in the auction pool and would not be allowed to use the allowances directly for compliance, but it would receive the revenue from the sale of its allowances in the auction. Power plants that need allowances for compliance could purchase them from the auction or the secondary market.[35]

- **If using an updating output-based allocation (OBA) approach, states can allow supply-side energy efficiency measures to qualify for carbon emission allowances and set an efficiency threshold that power plants must meet to qualify for allowances.** Under a mass-based plan that freely allocates carbon emission allowances, a state can allocate allowances to power plants based on their historic share of electricity generation, fuel mix or emissions levels. Such an approach is called "grandfathering" because it fixes shares based on a single point in the past. Alternatively, a state can allocate allowances more dynamically, adjusting the distribution for each compliance period to base it on each generator's output in the prior period. This approach is called "updating" or "output-based allocation." States first determine which types of electricity generators will qualify to receive an allocation of emission allowances. Under the CPP, states have broad flexibility in the target to which they allocate allowances, including renewable energy sources, nuclear energy and energy efficiency, in addition to emitting sources. By allowing these resources to qualify for and receive allowances, states give them a valuable commodity that they can sell to regulated entities, thereby creating a financial incentive to pursue greater efficiency or generate more alternative energy. A group of ESCOs has proposed an approach to enable energy efficiency that would automatically qualify them to receive allowances through a registry approach. The registry could be used to allocate allowances to all sources that perform better than a pre-established performance target. This target would include low-emitting natural gas as well as allocations to non-emitting technologies.[36]

  Unless power plant energy efficiency measures are expressly included in OBAs, an output-based approach can create a production subsidy for supply-side resources and therefore create a disincentive for power plant efficiency measures (such as heat rate improvements) in addition to demand-side energy efficiency.[37] To mitigate this issue in other air pollution markets, some states, including **Delaware** and **Rhode Island**, require power plants to meet a minimum performance standard to qualify to receive free allowances. This requirement avoids providing particularly inefficient power plants with incentives to generate.[38] In the CPP context, some states may want to set minimum standards for power plants. Alternatively, states may want to create a formula that grants relatively more carbon emission allowances to more efficient power plants to reduce the production incentive for less efficient plants.

Under a Mass-Based Approach, Incentivize Energy Efficiency from Utility & Non-Utility Actors

If pursuing a mass-based plan, issue allowances from the main pool of carbon emission allowances to utilities and other, nonutility parties that demonstrate energy savings to provide market opportunities and tap a larger

scale of energy efficiency.

Under a mass-based plan, energy efficiency projects are not given a direct financial mechanism to realize the value of their emissions reductions the way ERCs do in rate-based plans. If a nonregulated business invests in efficiency, the power plant serving the business automatically receives benefits from the energy efficiency project without having to pay for that investment. As a result, businesses are not likely to invest in the optimal level of cost-effective efficiency.[39]

Governors who are open to using OBA (full or partial) and interested in opening the CPP emissions reduction market for energy efficiency can support the development of a registry that tracks ownership of allowances and direct allocation of carbon emission allowances for properly verified energy efficiency projects based on their level of avoided emissions.[40] In this type of scenario, a manufacturing plant that invests in more efficient electric motors and secures the proper measurement and verification of improved efficiency can submit the project to the registry. The plant would earn carbon emission allowances equivalent to the level of emissions it reduced and can then sell the allowances to regulated power plants. A proposal that a coalition of ESCOs developed asserts that states should allow all qualified and registered energy efficiency projects to automatically earn carbon emission allowances equivalent to the level of avoided emissions, and then distribute the remaining allowances to regulated entities based on some formula the state chooses.[41] Another option is for the state to set a cap on the level of automatically qualifying carbon emission allowances that are directed to energy efficiency projects while it pilots this project design to see the scale and price effects prior to finalizing its approach.

A model from the National Association of Clean Air Agencies proposes enabling energy efficiency to receive up to 15 percent of allowances above any set-asides.[42] If the sum of eligible energy efficiency projects is greater than 15 percent of the state budget, then each credit will adjust to a proportional value of the available allowances.

Incentivize Early Actions to Reduce Emissions

Incentivize early action through a state-created emissions allowance set-aside, or use the voluntary federally created "early action" program known as the Clean Energy Incentive Program (CEIP).[43]

A state may want to encourage greater deployment of clean energy technologies prior to the start of the CPP compliance period in 2022 because early action provides time for energy savings measures to develop; avoids further investments in less efficient infrastructure and equipment, which can make compliance costlier later; and positions the state to better take advantage of the allowance and ERC markets. To address this issue, **Michigan** proposed an Early Action Credit Pool, which operates like the set-asides discussed earlier, that will grant 10 percent of its first-year carbon emission allowances to energy efficiency and renewable energy measures implemented between 2016 and 2022.[44] Another way states can encourage early investments in energy efficiency is to participate in EPA's proposed voluntary Clean Energy Incentive Program (CEIP), which allows states to earn matching credits (under a rate-based program) or carbon emission allowances (under a mass-based program) for (demand-side energy-efficiency (EE) and solar projects implemented to serve low-income communities) and zero-emitting renewable energy projects (wind, solar, geothermal and hydropower in all communities) and double the matching credits for low-income energy efficiency projects.[45] Some details of the CEIP have not yet been finalized. As proposed, eligible projects receive CEIP credits or carbon emission allowances only for generation or MWh saved in 2020 and 2021.[46] States must decide how many carbon emission allowances or ERCs to allocate to the CEIP. Under the mass-based plan, states remove the CEIP-eligible allowances from their pool of allowances for the first compliance period. For each CEIP-eligible MWh of generation or savings to which the state designates credit, EPA will provide free matching credit in an amount that varies between renewable energy and energy efficiency.

Measures Complementary to the CPP

In addition to considering energy efficiency within the

context of the CPP, states can consider complementary measures outside of the CPP framework to help them comply with the CPP. The following actions fall outside a formal CPP state compliance plan. Regardless of the status of the CPP, however, these options can help states reduce utility bills and provide other co-benefits—economic, environmental and energy reliability—and so can be considered a no regrets approach.

Although the CPP will create a market for carbon emission reductions, including those from energy efficiency, consumers often do not invest in all the cost-effective energy efficiency available, so barriers to cost-effective energy efficiency may remain that the CPP does not address. As such, complementary policies that target market and behavioral barriers to efficiency—for example, the split-incentive, where the person who pays the utility bill has no control over capital investments that affect electricity consumption—can help achieve the state's emissions reduction target.[47] As discussed earlier, some of the largest state opportunities for encouraging carbon emissions reductions are EERSs, building energy codes and ESCO programs. A governor can encourage a statewide assessment of current energy policies and the most cost-effective enhancements to this suite of policies.

Establish or expand energy efficiency targets for utilities

The states that have achieved the most significant levels of energy efficiency thus far have done so in part by implementing an EERS that directs utilities to improve efficiency and achieve a certain annual energy savings target.[48] Twenty states have a mandatory EERS, and seven have voluntary EERS programs, with the national average being a requirement for utilities to achieve annual energy savings equivalent to 0.6 percent of their expected demand.[49] To achieve a significant number of their CPP targets, states could set an EERS of 1.5 percent or higher in annual savings, as discussed earlier. That level is robust, but seven states already require their utilities to reduce demand for energy by 1.5 to 2.6 percent of electricity sales annually.[50] EERS are typically designed with cost-containment measures that require evaluations to ensure that the utilities invest in measures that are cost-effective for their customers.[51]

Establish or update building energy codes using the most recent standards

Updating building energy codes gives states a significant opportunity to reduce emissions, with buildings accounting for 40 percent of U.S. CO_2 emissions.[52] Updating building codes from 2009 to 2012 standards will reduce the energy demand of those buildings by 24 percent.[53] Thirty-five states have building codes that predate 2012, and so significant opportunities remain for most states to update their residential and commercial building codes.

Encourage sufficient energy efficiency cost-benefit analyses for utilities

Utility ratepayer–funded energy efficiency programs are commonly evaluated by methods that state utility regulators develop or through state legislation to ensure that the programs use utility ratepayer support cost-effectively. Such programs are then implemented, usually under the purview of the state utility commission for investor-owned utilities, to meet EERS or other energy efficiency requirements or to earn utilities financial compensation in certain states for energy efficiency program investments. States want to ensure that energy efficiency investments are cost-effective. Several major cost-effectiveness tests exist, but states can implement them in different ways. Whether a cost-benefit analysis is applied appropriately has a significant effect on the level of energy efficiency determined to be cost-effective.[54] States can improve and enhance the use of cost-effectiveness testing by adopting best practices such as developing quantitative, monetary estimates for all program effects that can be readily monetized. These best practices can more fully capture energy efficiency program costs and benefits.[55] Further, a governor interested in enhancing utilities' efficiency efforts can encourage an evaluation of those cost-effectiveness tests to integrate a wider set of benefits, including emission and other environmental factors, such as water conservation and higher productivity.[56]

Require utilities to procure all-cost-effective energy efficiency

Another successful state policy for energy efficiency that is sometimes paired with an EERS is setting an "all-cost-effective" energy efficiency mandate that requires utilities to determine and invest in the maximum amount of cost-effective efficiency feasible.[57] Traditional utility energy procurement rules do not classify energy efficiency as a "source" of energy, thereby preventing utilities from pursuing it under their standard generation and procurement operations. Requiring utilities to invest in all-cost-effective efficiency recognizes efficiency as another "source" of energy that is selected where it is cost-effective compared to investing in traditional sources of generation. The resulting level of energy efficiency investments and energy savings can be higher than what most states achieve through energy efficiency resource standards or demand-side management programs. States that add an all-cost-effective efficiency procurement policy increase their investments per capita in efficiency programs.[58] For example, using a stakeholder advisory council to identify all-cost-effective energy efficiency, **Rhode Island** achieved a greater than 3 percent decrease in retail electricity sales.[59]

Encourage the realignment of utility regulatory models to enhance cost-effective energy efficiency Governors and utility commissions do not have direct authority over which technologies or processes power plants choose to invest in for CPP compliance. This gap poses a challenge because compliance decisions have significant implications for state energy goals, such as increasing energy efficiency and achieving low-cost compliance. In addition, most investor-owned utilities receive higher financial returns from investing in new generation or transmission than in efficiency projects. Many state efforts have emerged to address aspects of the misaligned incentives for utilities with respect to energy efficiency.[60] Through legislation or engagement with the utility commission, governors can encourage the creation of utility incentives that align with state goals. They can create shareholder incentives for energy efficiency by providing a rate of return for efficiency based on energy savings, offering shared benefit mechanisms to allow utilities to earn a portion of the benefits accrued to ratepayers or providing bonuses based on meeting energy savings performance targets. Forms of shareholder incentives for efficiency have been pursued in a number of states, including **Arkansas, Minnesota** and **Oklahoma**.[61]

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Endnotes

[1] E&E Publishing, "E&E's Power Plan Hub," http://www.eenews.net/interactive/clean_power_plan#planning_status (accessed August 25, 2016). National Governors Association has no policy or position on the Clean Power Plan (CPP), state legal challenges, the U.S. Supreme Court's ruling to stay implementation or states' decisions to continue with CPP planning.

[2] States have two options for emission standard rate-based goals under the Clean Power Plan (CPP): (1) States can elect to use emission rate standards according to technology, in which case market actors can trade with market actors in any other state that has elected the same form of standards without the states having to coordinate and (2) market actors in states that elect a single emission rate standard that applies for all technologies can trade with market actors in other states that have a single emission rate standard if the two states agree to merge their single emission rate standards as specified in the final CPP.

[3] A "set-aside" is an allowance amount designated for a specific purpose. In past emission allowance markets, allowances have been set aside for eligible early action measures, energy efficiency, renewable energy projects, consumer benefits or other purposes. "Output-based allocation" refers to emissions allowances distributed to energy generators based on the productive energy output of a generator (electricity or steam generated) rather than on the amount of fuel burned.

[4] For a longer list of complementary measures states can pursue for energy efficiency, see U.S. Department of Energy State & Local Energy Efficiency Action Network (SEE Action), *SEE Action Guide for States: Energy Efficiency as a Least-Cost Strategy to Reduce Greenhouse Gases and Air Pollution and Meet Energy Needs in the Power Sector* (Washington, DC: SEE Action, 2016), http://eetd.lbl.gov/publications/see-action-guide-for-states-energy-ef (accessed August 25, 2016).

[5] Carbon dioxide emissions are referred to throughout this document as "carbon emissions."

[6] These customer-side efforts are referred to as "demand-side efficiency." States can pursue supply-side efficiency through efforts such as optimizing the heat rate at the power plant itself. Both types of efforts assist with Clean Power Plan compliance.

[7] International Energy Agency, *Energy Efficiency Policy and Carbon Pricing* (Paris: IEA, 2011).

[8] Ibid.

[9] For an overview of various carbon prices, see Patrick Luckow et al., *Spring 2016 National Carbon Dioxide Price Forecast* (Cambridge, MA: Synapse Energy Economics, 2016), http://www.synapse-energy.com/sites/default/files/2016-Synapse-CO2-Price-Forecast-66-008.pdf (accessed August 25, 2016). In addition, Karen Palmer of Resources for the Future, in an email communication on April 4, 2016, argues that carbon pricing will cover approximately 25 percent of the project cost. Her analysis is based on assumptions using the U.S. Environmental Protection Agency (EPA) Regulatory Impact Analysis allowance price estimate of $14.50/ton of carbon dioxide (CO_2,) and the Lawrence Berkeley National Laboratory energy efficiency price of 4.6 cents per kilowatt-hour (kWh). EPA's economic analysis of its rule suggests that avoided energy use will be credited at roughly 1.2 cents/kWh avoided, assuming the average emission rate of 0.8 tons of CO_2 avoided for every megawatt hour (MWh) avoided ($14.50/ton * 0.8 tons of CO_2 avoided = $11.6/ton, and then converting from MWh to kWh gives you a payment of 1.16 cents/kWh of allowance value). This is a relatively moderate economic signal of 25 percent, given that energy efficiency measures average 4.6 cents/kWh.

[10] Called the "energy efficiency gap," academics differ on the reasons for this behavior and whether those reasons should be considered consumer preferences or market failures, but there is wide academic and practitioner acceptance that energy efficiency measures are not invested in at the levels of rational economic decision making. This is a primary reason why most states have adopted policies to promote energy efficiency rather than relying solely on market forces.

[11] A more precise way to analyze the cost of compliance options is to review the cost of abating each ton of carbon; however, the data for such carbon abatement cost curves have varied, especially in terms of how to calculate transaction costs for pursuing energy efficiency. Collectively, many carbon-abatement cost curves find that many forms of energy efficiency are the least cost options. For example, see Energy Innovation Policy & Technology, "Energy Policy Solutions: The Clean Power Plan Is Within Reach," http://energyinnovation.org/wp-content/uploads/2016/01/CleanPowerPlanAlternatives.pdf (accessed August 25, 2016).

[12] The energy efficiency cost data are based on 20 state programs, including administrative and participant costs, as reported in Ian M. Hoffman et al., "The Total Cost of Saving Electricity Through Utility Customer-Funded Energy Efficiency Programs: Estimates at the National, State, Sector and Program Level," *Policy Brief* (Berkeley, CA: Lawrence Berkeley National Laboratory, April 2015), https://emp.lbl.gov/sites/all/files/total-cost-of-saved-energy.pdf (accessed August 25, 2016). The other electricity data come from the U.S. Energy Information Administration annual outlook of levelized cost of electricity for new resources.

[13] Ron Biz et al., *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know* (Boston: Ceres, 2012), http://www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation (accessed August 25, 2016).

[14] Ian M. Hoffman et al., "The Total Cost of Saving Electricity Through Utility Customer-Funded Energy Efficiency Programs: Estimates at the National, State, Sector and Program Level, *Policy Brief"* (Berkeley, CA: Lawrence Berkeley National Laboratory, April 2015), https://emp.lbl.gov/sites/all/files/total-cost-of-saved-energy.pdf (accessed August 25, 2016); and U.S. Energy Information Administration data.

[15] SEE Action, *SEE Action Guide.*

[16] Marilyn Brown, G. Kim, and A. Smith, *Low-Carbon Electricity Pathways for the U.S. and the South: An Assessment of Costs and Options* (Atlanta: Georgia Institute of Technology, 2015). For further details, see Georgia Tech School of Public Policy, *Modeling an Integrated High Efficiency Scenario,* http://cepl.gatech.edu/projects/mecp/highefficiency (accessed August 25, 2016).

[17] See Cassandra Kubes, Sara Hayes, and Meegan Kelly, *State and Utility Pollution Reduction Calculator Version 2 (SUPR 2)* (Washington, DC: American Council for an Energy Efficient Economy, 2016), http://aceee.org/research-report/e1601 (accessed August 25, 2016). A 1.5 percent energy efficiency resource standard, building codes (high case) and energy service company programs were applied using the SUPR 2 tool to the following states: **Arkansas** (can achieve a 15 percent reduction in emission from these programs; the final state target is a 30 percent reduction from a 2012 baseline), **Pennsylvania** (can achieve a 19 percent reduction from these three programs; the final 2030 target is 25 percent), **Minnesota** (can achieve a 43 percent reduction from these three programs; the final 2030 target is 35 percent), **Missouri** (can achieve a 24 percent reduction from these

three programs; the final 2030 target is 29 percent), **Oregon** (can achieve a 65 percent reduction from these three programs; the final 2030 target is 10 percent) and **New York** (can achieve a 44 percent reduction from these three programs; the final 2030 target is 10 percent).

[18] The American Council for an Energy Efficient Economy (ACEEE) assumed that each state adopts a savings target that ramps up at a rate of 0.25 percent of electricity sales per year. Policies are assumed to begin in 2016, and energy savings are projected through 2030. The 2016 starting point is based on actual statewide 2011 or 2012 (as available) electricity savings levels. As of 2015, Minnesota already had an energy efficient resource standard target in place that was between 1.5 and 1.99 percent in annual savings. ACEEE assumed that the state achieves a 1.5 percent savings in 2016 and each subsequent year.

[19] The American Council for an Energy-Efficient Economy assumed that the state adopts the national models because they are updated every three years—International Energy Conservation Code for residential buildings and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers updates for model commercial codes.

[20] An "energy service company" (ESCO) is a business that develops, installs and arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities. The American Council for an Energy Efficient Economy assumed energy performance contracts with ESCOs in municipal buildings, universities, schools and hospitals (known as the "MUSH" market) as well as the private commercial sector. The size of the programs in each state is based on historic ESCO market growth trends of 8.3 percent annually.

[21] SEE Action, *SEE Action Guide.*

[22] For insights into tools and models that can assess these values, see Erin Boyd, "Overview of Power Sector Modeling" (Washington, DC: U.S. Department of Energy, 2016); and Jim Lazar and K. Colburn, *Recognizing the Full Value of Energy Efficiency* (Montpelier, VT: Regulatory Assistance Project, 2013), http://www.raponline.org/wp-content/uploads/2016/05/rap-lazarcolburn-layercakepaper-2013-sept-9.pdf (accessed August 25, 2016).

[23] U.S. Environmental Protection Agency, "Clean Power Plan Proposed Federal Plan and Proposed Model Rules," *Fact Sheet* (Washington, DC: Environmental Protection Agency, 2016).

[24] The Clean Power Plan was released as a final rule in August 2015. As part of this process, some of the guidance is still under development and has not yet been finalized, such as the federal plan; model rule; Clean Energy Incentive Program; and evaluation, measurement and verification protocols. There are three types of rate plans to choose from: subcategorized national emission performance rates, state-average emission performance rates and unique emission performance rates. The U.S. Environmental Protection Agency may create and administer a tracking system that rate-based states can use. For details, see U.S. Environmental Protection Agency, 40 Code of Federal Regulation Parts 60, 62 and 78, *Federal Plan Requirements for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations; Proposed Rule* (Washington, DC: U.S. Federal Register, October 23, 2015).

[25] Cassandra Kubes, Sara Hayes, and Meegan Kelly, State and Utility Pollution Reduction Calculator Version 2 (SUPR 2) (Washington, DC: American Council for an Energy Efficient Economy, 2016), http://aceee.org/research-report/e1601 (accessed August 25, 2016).

[26] U.S. Environmental Protection Agency Combined Heat and Power Partnership, *Output-Based Regulations: A Handbook for Air Regulators* (Washington, DC: U.S. Environmental Protection Agency Combined Heat and Power Partnership, 2014), https://www.epa.gov/sites/production/files/2015-07/documents/output-based_regulations_a_handbook_for_air_regulators.pdf (accessed August 25, 2016).

[27] Daniel C. Steinberg and Erin Boyd, *Energy Efficiency Under Alternative Carbon Policies: Incentives, Measurement, and Interregional Effects* (Golden, CO: National Renewable Energy Laboratory, 2015).

[28] These state estimates are based on assuming $10/ton and a national trading system. The price of carbon is uncertain. The U.S. Environmental Protection Agency estimates that the electricity sector will make investments estimated between $1 billion and $8.4 billion annually between 2020 and 2030 through power plants to comply with the Clean Power Plan. See U.S. Environmental Protection Agency, *Regulatory Impact Analysis for the Clean Power Plan Final Rule,* http://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf (accessed August 25, 2016).

[29] U.S. Environmental Protection Agency, "New EPA Rule Gives Every American Right to Buy and Sell Acid Rain Emissions," Press Release, December 5, 1991; and Lawrence M. Ausubel et al., *Pilot Auction Facility for Methane and Climate Change Mitigation: Relevant Auction Theory* (Washington, DC: Power Auctions, 2014), http://www.pilotauctionfacility.org/sites/paf/files/Review%20of%20Relevant%20Auction%20Theory.pdf (accessed August 25, 2016).

[30] Note that depending on the final guidance from the U.S. Environmental Protection Agency for addressing the risk of leakage from existing to new sources, a portion of the allowance allocation may already be determined, and fewer allowances will be available for auctioning.

[31] The Regional Greenhouse Gas Initiative (RGGI), *Investment of RGGI Proceeds Through 2013* (New York: The Regional Greenhouse Gas Initiative, 2015), https://www.rggi.org/docs/ProceedsReport/Investment-RGGI-Proceeds-Through-2013.pdf (accessed August 25, 2016).

[32] Ibid.

[33] A price floor is generally considered an important feature of good auction design and has been used by the Regional Greenhouse Gas Initiative and the state of California. Dallas Burtraw, *Fixing Emissions Trading Imbalances With a Price Floor* (Washington, DC: Resources for the Future, 2014), http://www.rff.org/blog/2014/fixing-emissions-trading-imbalances-price-floor (accessed August 25, 2016).

[34] Ari Peskoe, *Designing Emission Budget Trading Programs Under Existing State Law* (Boston: Harvard Law School Environmental Law Program Policy Initiative, 2016), http://environment.law.harvard.edu/wp-content/uploads/2014/08/Designing-Emission-Budget-Trading-Programs-Under-Existing-State-Law.pdf (accessed August 25, 2016).

[35] Dallas Burtraw and Kristen McCormack, *Consignment Auctions of Free Emissions Allowances Under EPA's Clean Power Plan* (Washington, DC: Resources for the Future, 2016), http://www.rff.org/research/publications/consignment-auctions-free-emissions-allowances-under-epa-s-clean-power-plan (accessed August 25, 2016).

[36] Advanced Energy Economy Institute, *A Performance-Based Approach to Allowance Allocation for Clean Power Plan Compliance* (Washington, DC: Advanced Energy Economy Institute, 2016), http://info.aee.net/allocation-for-clean-power-plan-compliance (accessed August 25, 2016).

[37] Karen Palmer and Anthony Paul, *A Primer on Comprehensive Policy Options for States to Comply With the Clean Power Plan* (Washington, DC: Resources for the Future 2015), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-15.pdf (accessed August 25, 2016).

[38] U.S. Environmental Protection Agency, *Output-Based Regulations.*

[39] However, there are still plenty of ways to encourage energy efficiency in mass-based compliance plans, and these plans also have certain advantages—for example, they are considered easier to administer. So it is in many states' interest to consider a mass-based approach.
[40] Several states are currently undergoing foundational work for a National Energy Efficiency Registry, and such a registry could potentially be available for use by any interested states. For more information, visit the Climate Registry's website at http://www.theclimateregistry.org/thoughtleadership/energy-efficiency.
[41] AJW, *Simplifying Energy Efficiency for States: Utilizing and Incentivizing Energy Efficiency-Related Greenhouse Gas Reductions Under the Clean Power Plan's Mass-Based Approach* (Arlington, VA: AJW, 2015), http://ajw-inc.com/wp-content/uploads/2015/12/151210-Mass-based-Allocation-White-Paper-FINAL.pdf (accessed August 25, 2016).
[42] National Association of Clean Air Agencies, *Implementing EPA's Clean Power Plan: Model State Plans* (Washington, DC: National Association of Clean Air Agencies, 2016), http://www.4cleanair.org/sites/default/files/Documents/5_30_2016_NACAA_State_Models_FINAL.pdf (accessed August 25, 2016).
[43] The U.S. Environmental Protection Agency has not yet finalized Clean Energy Incentive Program guidance.
[44] For more information about this proposal, see Michigan.gov, "Early Action Credit Pool: Proposal for Stakeholder Feedback," http://www.michigan.gov/documents/carbonrule/cr-earlyaction_512401_7.pdf (accessed August 25, 2016). For a discussion of additional questions to consider regarding this policy design, see the Regulatory Assistance Project at https://www.raponline.org.
[45] Ibid.
[46] U.S. Environmental Protection Agency, "Clean Energy Incentive Program," *Fact Sheet* (Washington, DC: Environmental Protection Agency, 2015), https://www.epa.gov/cleanpowerplan/fact-sheet-clean-energy-incentive-program (accessed August 25, 2016).
[47] Don Hynek, Megan Levy, and Barbara Smith, "'Follow the Money': Overcoming the Split Incentive for Effective Energy Efficiency Program Design in Multi-Family Buildings" (paper presented at the 2012 American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings), http://aceee.org/files/proceedings/2012/data/papers/0193-000192.pdf (accessed August 25, 2016).
[48] D. Steinberg and O. Zinaman, *State Energy Efficiency Resource Standards: Design, Status, and Impacts* (Golden, CO: National Renewable Energy Laboratory, 2014), http://www.nrel.gov/docs/fy14osti/61023.pdf (accessed August 25, 2016).
[49] American Council for an Energy Efficient Economy, "State Energy Efficiency Resource Standard (EERS) Activity," *Issue Brief* (Washington, DC: American Council for an Energy Efficient Economy, 2015), http://aceee.org/policy-brief/state-energy-efficiency-resource-standard-activity (accessed August 25, 2016).
[50] American Council for an Energy Efficient Economy, *The 2015 State Energy Efficiency Scorecard* (Washington, DC: American Council for an Energy Efficient Economy, 2015), http://aceee.org/state-policy/scorecard (accessed August 25, 2016).
[51] More examples of state Energy Efficiency Resource Standards can be found at National Governors Association's State Clean Energy Actions Database at http://www.nga.org/cms/cleanenergysearch.
[52] U.S. Department of Energy, *Quadrennial Technology Review* (Washington, DC: U.S. Department of Energy, 2015), http://energy.gov/under-secretary-science-and-energy/quadrennial-technology-review (accessed August 25, 2016).
[53] SEE Action, *SEE Action Guide.*
[54] Tim Woolf et al., "*Energy Efficiency Cost-Effectiveness Screening*" (paper presented at the Regulatory Assistance Project, November 2012).
[55] Rodney Sobin, *Energy Efficiency Strategies for Clean Power Plan Compliance: Approaches and Selected Case Studies* (Washington, DC: National Association of State Energy Officials, 2015).
[56] Tim Woolf et al., *The Resource Value Framework: Reforming Energy Efficiency Cost-Effectiveness Screening* (Washington, DC: The National Home Performance Council, 2014), http://www.homeperformance.org/sites/default/files/nhpc_nesp-recommendations_20140816.pdf (accessed August 25, 2016).
[57] Annie Gilleo, "Picking All the Fruit: All Cost-Effective Energy Efficiency Mandates" (paper presented at the 2014 American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings), http://aceee.org/files/proceedings/2014/data/papers/8-377.pdf (accessed August 25, 2016).
[58] Samuel P. Krasnow and Derek K. Murrow, *Best Practices for Advancing State Energy Efficiency Programs: Policy Options & Suggestions* (Rockport, ME: Environment Northeast, 2012), http://acadiacenter.org/wp-content/uploads/2014/12/ENE_StatePolicyOptions_BestPracticesWhitepaper_February2012.pdf (accessed August 25, 2016).
[59] American Council for an Energy Efficient Economy, *The 2015 State Energy Efficiency Scorecard* (Washington, DC: American Council for an Energy Efficient Economy, 2015), http://aceee.org/state-policy/scorecard (accessed August 25, 2016).
[60] For more information about these types of measures, see National Governors Association (NGA) Center for Best Practices, *Ten Trends to Track: State Policy Innovations to Advance Energy Efficiency & Renewable Energy* (Washington, DC: National Governors Association, 2012), http://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-eet-publications/col2-content/main-content-list/ten-trends-to-track-state-policy.html (accessed August 25, 2016). NGA also has a forthcoming paper on utility business models. Another document that discuss aligning utility incentives for energy efficiency is Marty Kushler and Dan York, "Utility Initiatives: Alternative Business Models and Incentive Mechanisms," *Policy Brief* (Washington, DC: American Council for an Energy-Efficient Economy, 2014), http://aceee.org/policy-brief/utility-initiatives-alternative-business-models-and-incen (accessed August 25, 2016).
[61] For more examples of state energy efficiency resource standards, see National Governors Association's State Clean Energy Actions Database at http://www.nga.org/cms/cleanenergysearch.