Hearing on

The Clean Energy Standard Act of 2012

WRITTEN TESTIMONY OF KAREN PALMER

Research Director and Senior Fellow, Resources for the Future, Washington, DC

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Summary of Testimony

This testimony discusses the effects of the Clean Energy Standard Act of 2012 on electricity prices and on carbon dioxide (CO_2) emissions from the electricity sector. Our modeling suggests that the act will result in substantial reductions in emissions from the electricity sector, resulting in 21 percent fewer cumulative emissions by 2035. The policy has very little effect on national average electricity price for the first decade and leads to lower prices in the near term in some regions of the country. However, after 2025, national average electricity prices will increase as a result of the policy, rising to 18 percent above baseline levels by 2035. The alternative compliance payment (ACP) mechanism will be triggered in all years, generating substantial revenue for states to invest in energy efficiency, while reducing the share of clean energy and the amount of CO_2 emissions reductions compared to a CES policy without an ACP. The small utility exemption, which applies to roughly 17 percent of electricity sales initially and roughly 12.5 percent after 2025, creates a difference in electricity prices between exempt and non-exempt utilities under the policy that grows to roughly 50 percent on average by 2035. The exemption results in electricity prices at exempt utilities that are lower *with* the CES policy than without it for the life of the policy. This large price savings provides an incentive for groups of electricity consumers to create their own small utility, an unintended consequence of the bill.

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Mr. Chairman, thank you for the opportunity to testify before the Senate Committee on Energy and Natural Resources. My name is **Karen Palmer,** and I am a senior fellow and research director at Resources for the Future (RFF), a 60-year-old research institution based in Washington, DC, that focuses on the economic dimensions of energy, environmental, and natural resource issues. RFF is independent and nonpartisan, and shares the results of its economic and policy analyses with environmental and business advocates, academics, government agencies and legislative staff, members of the press, and interested citizens. RFF neither lobbies nor takes positions on specific legislative or regulatory proposals. I emphasize that the views I present today are my own.

From both scholarly and practical perspectives, I have studied the performance of policies and regulations to reduce emissions of greenhouse gases from the electricity sector, including policies to promote renewable sources of electricity and energy efficiency. I have conducted analysis and modeling to support both state and regional efforts to design climate policy, including the Regional Greenhouse Gas Initiative in the Northeast and the California carbon dioxide (CO_2) regulations under AB32. Currently, I serve on the New York State RGGI Advisory Committee, advising the New York State Energy Research and Development Authority on how to use the RGGI allowance auction revenue, and on the New York State Independent System Operator Environmental Advisory Council. Additionally, I serve on the EPA Science Advisory Board's Environmental Economics Advisory Council. Recently, with colleagues at RFF, I have conducted economic analysis of different Clean Energy Standards policy designs, including the one specified in the Clean Energy Standard Act of 2012, S. 2146.

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Today I will focus on the effects of a Clean Energy Standard (CES) proposal embodied in S. 2146 on greenhouse gas emissions and electricity prices and the implications of two key features of the policy: the alternative compliance payment (ACP) and the small utility exemption.

I want to highlight four main points about the CES proposal:

- The CES as proposed in the bill will yield a substantial reduction in CO_2 emissions from the electricity sector, resulting in 21 percent fewer cumulative emissions by 2035 and 41 percent fewer emissions in 2035 alone.
- The CES will have very modest effects on national average electricity price through 2025 and lead to lower prices in the near term in some regions of the country. However, after 2025, national average electricity prices will increase as a result of the CES policy, rising to 18 percent above baseline levels by 2035.
- The alternative compliance payment mechanism will be triggered in all years, generating substantial revenue for states to invest in energy efficiency, while reducing the share of clean energy and the amount of CO_2 emissions reductions compared to a CES policy without an alternative compliance payment.
- The small utility exemption, which applies to roughly 17 percent of electricity sales initially and roughly 12.5 percent after 2025, creates a difference in electricity prices between exempt and non-exempt utilities under the policy that grows to close to 50 percent on average by 2035. And, the exemption results in electricity prices at exempt utilities that are lower *with the CES policy* than without it for the life of the policy. This large price savings provides an incentive for groups of electricity consumers to create their own small utility, an unintended consequence of the bill.

A Summary of the Bill

A clean energy standard is similar to a renewable portfolio standard in that it sets a floor on the share of electricity sales that must come from clean sources of generation, and then raises the floor over time as a way to squeeze CO_2 emissions out of the electricity sector. S. 2146 sets the clean energy requirement at 24 percent in 2015, rising by 3 percent per year to 84 percent in 2035. The CES obliges any nonexempt retail utility to hold clean energy credits equal to the required clean energy share multiplied by total retail electricity sales.

Generators designated as clean, and therefore qualified to receive clean energy credits for electricity production, are those that are renewable, natural gas, hydro, nuclear, or qualified waste-to-energy facilities that were placed in service after 1991. (This provision effectively excludes all existing nuclear and hydroelectric capacity from earning credits.) Coal units retrofitted with carbon capture and storage may also receive credits. To receive credits, a generator must have a carbon intensity of less than 0.82 metric tons of CO_2 per MWh. Credits may be banked for use in future years.

Retail utilities have the option of paying an alternative compliance payment (ACP) of $0.03/kWh in 2015, rising by 5 percent per year in real dollars, in lieu of purchasing clean energy credits, Thus, the ACP imposes a ceiling on the price of credits.

Small utilities are exempt from compliance obligation, and the threshold defining small utilities is 2 million MWh of sales per year in 2015, falling by 100,000 MWh per year to 1 million MWh of sales per year in 2025 and beyond. Any electricity sales generated by a nuclear or hydro facility placed in service before 1992 (almost all of them) are also exempted from the standard, meaning they neither generate nor are required to hold credits.

Modeling Approach to Analysis of S. 2146

To gain insights into how the CES specified in S. 2146 would impact the U.S. electricity markets and associated emissions of CO_2, my colleagues at Resources for the Future and I used our electricity sector market model, known as Haiku. Outputs from the model include investment in new generating capacity, generation by fuel and technology, and CO_2 emissions and electricity prices by region of the country as well as for the nation as a whole. In addition to analyzing the policy as specified, we also looked at the effects of different features of the policy, including the alternative compliance payment and the small utility exemption as well as other features.

Like all models, Haiku is an imperfect but useful tool for gaining insights into how policies like a CES affect the electricity sector. Specific model results will depend on particular assumptions about a variety of factors, including technology and fuel costs and the set of technologies included in the model.

The next several sections of this testimony discuss what we learned from this analysis about the likely effects of S. 2146 on greenhouse gas emissions and on electricity markets. Please note that all dollar amounts are expressed in real 2009 dollars.

CO_2 Emissions

The proposed CES legislation would reduce emissions of CO_2 from the electricity sector substantially. The CES would achieve 11.4 billion tons of cumulative CO_2 emissions reductions from electricity by 2035, or 21 percent of cumulative baseline emissions. In 2035 alone, the CES

would achieve 1.1 billion tons of emissions reductions, or 41 percent of annual emissions in 2035 without the policy.

The United States has pledged, as part of the United Nations climate change conferences in Copenhagen and Cancun, to reduce economy-wide CO_2 emissions to 83 percent below 2005 levels by 2050. To be on a linear path to meet this goal, the United States would have to reduce total CO_2 emissions in 2035 by roughly 4.1 billion tons from 2005 levels, and the CES would contribute 27 percent of the United States' pledged CO_2 emissions reductions in 2035.

Electricity Generation by Technology and Fuel

The proposed CES legislation would bring about important changes in the composition of electricity supply that evolves over time. In the short run, by 2020, the CES will effect a swap of generation from coal to natural gas of almost 600 terawatt-hours TWh. By 2035, the policy will result in a substantial decline in coal-fired generation. The roughly 1,200 TWh decline in coal generation would be offset partially by about a 330 TWh reduction in consumption. Offsetting the remainder of the lost coal generation would be a variety of new generation sources. Large growth in natural gas generation (about 600 TWh) would be accompanied by more moderate growth in wind and nuclear generation (about 100 and 140 TWh, respectively). The mix of generation under the baseline and different specifications of the CES policy are displayed in Exhibit 1.

National Average Retail Electricity Price

The CES in S. 2146 will have a moderate effect on average retail electricity prices during the first decade of the policy, followed by a period of substantial increases as the target and the alternative compliance payment levels both ramp up. Exhibit 2 shows national average retail electricity prices under the CES (red line) and the baseline (blue line) over time.

What explains the delayed price impact of the CES policy? Under a CES, retail electricity prices have two important components: the wholesale price of electric energy and the price of a CES credit, the latter of which is multiplied by the minimum clean energy share in each year. Because the CES leads to greater investment in clean technologies with low operating costs, such as wind or efficient natural gas, it will tend to increase the supply of electric energy and lead to lower wholesale energy prices, particularly in those regions with competitive wholesale electricity markets.

A CES policy also creates a new market for clean energy credits. The requirement for retail electricity suppliers to hold those credits in increasingly greater proportion over time as the clean energy standard rises means that the price of credits plays an increasingly bigger role in the determination of electricity prices over time. In the initial years of the program, the CES credit prices and credit requirements will be relatively low, with the small positive impacts on electricity prices typically offset by lower prices in wholesale energy markets. In cost-of-service regions, where prices are governed by average (or total) costs, the small short-run increase in prices resulting from credit requirements is offset by small reductions in costs resulting from a net export of credits to competitive regions. These countervailing effects of the CES yield approximately no short-run electricity price impacts for the nation as a whole. In the long run, the cost of the credit obligation increases as both the credit price and requirement rise, and it trumps all other factors affecting electricity prices. By 2035, the national average retail electricity price under the CES would exceed that in the absence of the policy by $0.016/kWh (18 percent).

Regional Retail Electricity Prices

The lack of a noticeable initial effect of the CES policy on national average electricity prices masks important differences across regions of the country. Exhibit 3 shows the effects of the policy on retail electricity price by region in 2020. This map reveals that the regions of the country that rely most on coal-fired generation stand to experience small retail price increases, while the Northeast and Texas stand to pay substantially less for electricity with the CES than without it. Retail prices are also lower throughout much of the western part of the country in 2020 with the CES. By 2025, more regions experience price increases, as shown in Exhibit 4, but electricity prices are still lower with the policy than without it in the Northeast, the Northwest, and Texas.

After 2025 the policy tends to result in price increases in all regions, although the regions with a relatively clean mix of generators or a relatively high proportion of small utilities would experience a relatively small average retail price increase due to the CES, while regions that rely heavily on coal or that have very few small utilities would experience relatively larger retail price increases.

The Alternative Compliance Payment

The ACP provision of the bill is triggered in every year, which means that some portion of the retail utilities required to comply with the legislation will pay the ACP instead of purchasing clean energy credits and that in each year the clean energy credit price will equal the ACP. Expressed in 2009 dollars, the ACP starts out at $0.026/kWh in 2015 and rises by 5 percent per year in real dollars to $0.068/kWh in 2035. Without an ACP, the clean energy credit price would reach $0.036/kWh in 2015 and $0.092/kWh in 2035.

The ACP provision of the bill results in slightly lower costs to electricity consumers but it comes at a cost of reduced environmental efficacy. Without the ACP, electricity prices would be higher from 2025 on (as shown by comparing the red and purple lines in Exhibit 2), and would be roughly 4 percent higher in 2035. The binding ACP will prevent the fraction of power supplied by clean sources under the CES policy from reaching the minimum requirements specified in the bill. The elevated credit prices in a version of the CES without an ACP would engender more generation from clean sources and greater emissions reductions, amounting to an additional 12 percent of cumulative CO_2 emissions reductions by 2035 beyond those reductions projected under the CES policy specified in the bill.

The ACP provision also creates a pot of revenue, 75 percent of which is to be transferred back to the states for investment in energy efficiency initiatives. Over the 21-year period from 2015 through 2035, the CES policy in S. 2146 generates roughly $9.5 billion dollars per year in annuitized ACP revenue. Adding 75 percent of this amount, or $7.1 billion, to state energy efficiency budgets would represent a substantial increase to the $8.5 billion (adjusted to 2009 dollars) that the Consortium for Energy Efficiency estimates was budgeted for expenditure on energy efficiency programs for both electricity and natural gas across the United States and Canada in 2011.

The Small Utility Exemption

Like the ACP, the small utility exemption provision of the bill also serves to dampen electricity price increases resulting from the CES. Without the exemption, the national average retail electricity price in 2035 would be 25 percent higher than baseline levels, compared to only 18 percent higher with the exemption in place. If both the ACP and the small utility exemption were struck from the policy, the national average retail electricity price would reach $0.13/kWh by 2035, or 42 percent above baseline levels.

The benefits to consumers of a lower electricity price due to the small utility exemption accrue exclusively to the customers of the exempt utilities. Based on the 2009 distribution of utility sizes, we estimate the fraction of regional consumption that would be exempted under each level of the threshold and find that in 2015, roughly 17 percent of regional consumption is exempt from compliance. By 2025 and thereafter, the small utility exemption is projected to exempt roughly 12.5 percent of national electricity consumption from having to comply with the standard.

As a result of the small utility exemption, consumers served by the exempt utilities pay an average retail electricity price of only $0.052/kWh in 2035 with the CES (assuming these utilities have the regional average mix of generating technologies), while the consumers of non-exempt utilities pay an average price of $0.116/kWh. This average difference will be even greater when comparing prices across different regions. For example, customers of exempt utilities in the Northwest pay only $0.012/kWh in 2035, while consumers on Long Island, where no consumers are exempt, pay $0.175/kWh. Eliminating the small utility exemption raises the average retail price at utilities that would have been exempted to $0.109/kWh, while customers of non-exempt utilities pay the same average price of $0.116/kWh. In other words, the small utility exemption allows consumers of 12.5 percent of total sales to enjoy an average retail electricity price reduction of $0.057/kWh, while consumers of the remaining 87.5 percent see no benefit at all.

Removing the small utility exemption also has no effect on the mix of technologies and fuels used to produce electricity or on the CO_2 emissions reductions resulting from the policy. The reason removing the exemption has virtually no effect on the performance of the policy outside of the price impact on consumers of exempt utilities is because the ACP is binding and thus the price of clean energy credits is equal to the ACP. If there were no ACP, the small utility exemption would reduce the electricity consumption basis to which the CES is applied, which would in turn reduce the total amount of clean energy required by the policy, the credit price, and electricity prices for all consumers. However, with and without the small utility exemption, the ACP is binding, so clean energy generation is unchanged by removing the exemption. Instead, the main effect of the small utility exemption is to reduce the ACP revenues available to be disbursed to the states to fund end-use energy efficiency programs. Our results suggest that for a CES with no small utility exemption, the annuitized value of ACP revenue for each year between 2015 and 2035 increases by roughly $10 billion per year to $19.5 billion, 75 percent of which would be allocated to states for investment in energy efficiency under the provisions of the bill.

One potential unintended consequence of the small utility exemption is that by creating a substantial gap between retail prices for exempt and non-exempt utilities, the policy also creates an incentive for new small utilities to emerge. For example, groups of geographically proximate customers, such as small cities or towns, could decide to break away from their local utility and form their own small municipal utility to take advantage of the lower electricity prices.

The Existing Nuclear and Hydro Exclusion

The exclusion of generation from existing nuclear and hydroelectric capacity from compliance responsibility is another aspect of the bill with evident consequences for ratepayers. If certain nuclear or hydro facilities would reduce their production under the CES policy because they do not earn clean energy credits, excluding generation from those units from compliance obligation will reverse this effect, keeping that clean production online. Our modeling suggests that the CO_2 emissions consequences of the exclusion for existing nuclear and hydroelectric capacity are virtually zero because the 17 TWh of nuclear generation from existing facilities that would be lost without the exclusion are made up by additional generation at new nuclear facilities.

The implications of the existing nuclear and hydro exclusion for electricity consumers varies across regions depending on how electricity prices are set. In cost-of-service regulated regions of the country, the exclusion has virtually no effect on electricity prices. In regions where electricity is priced in competitive markets, the exclusion amounts to a wealth transfer from consumers to the owners of existing nuclear and hydroelectric generators. In some states, like New York, where some hydroelectric capacity is publicly owned, the ratepayers presumably will recapture part of the wealth transfer. In other cases, especially with respect to nuclear capacity, the transfer will remain with utility shareholders.

Exhibit 1. Sources of Electricity Generation

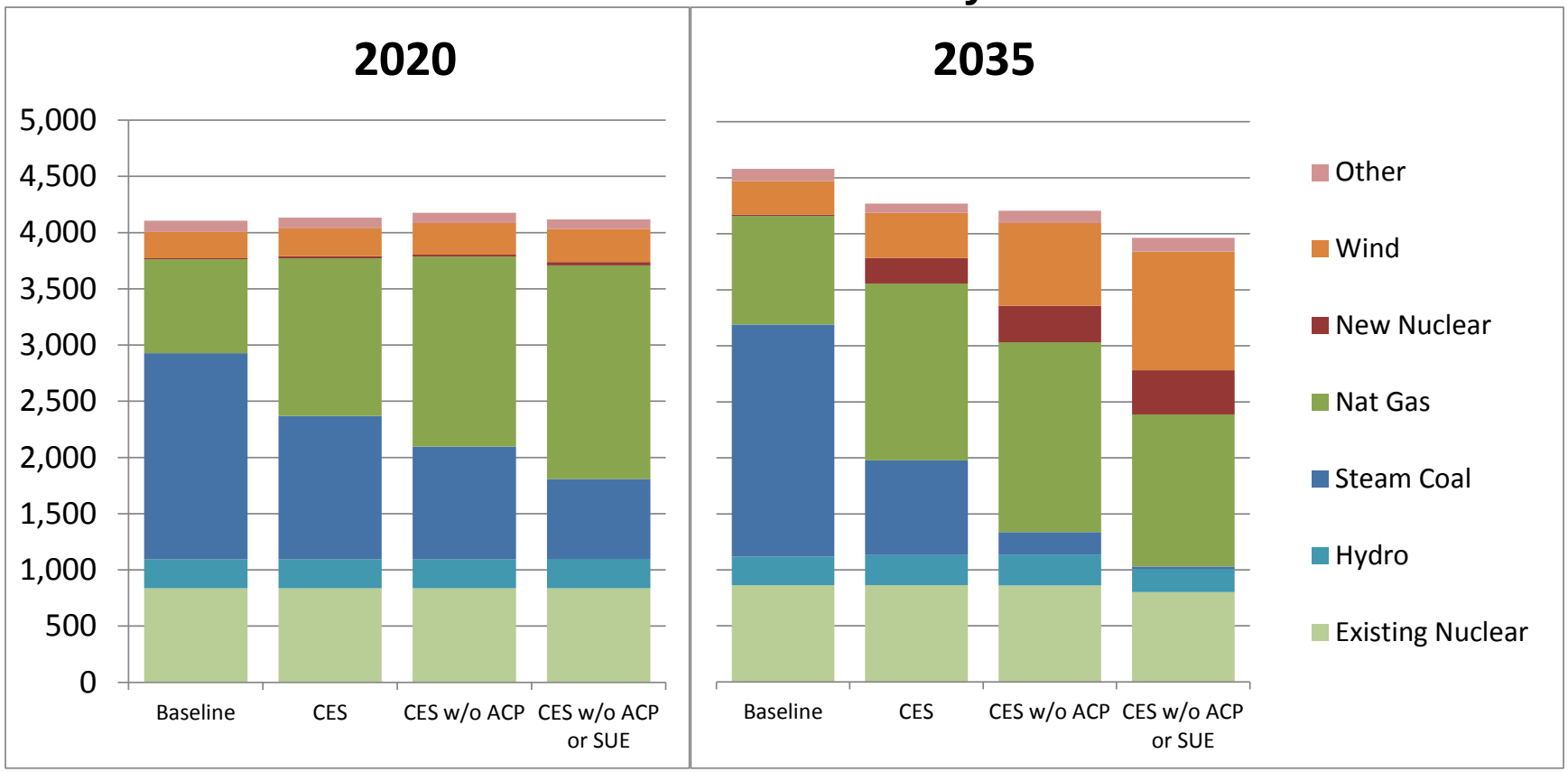

Exhibit 2. National Average Electricity Price (cents per kWh)

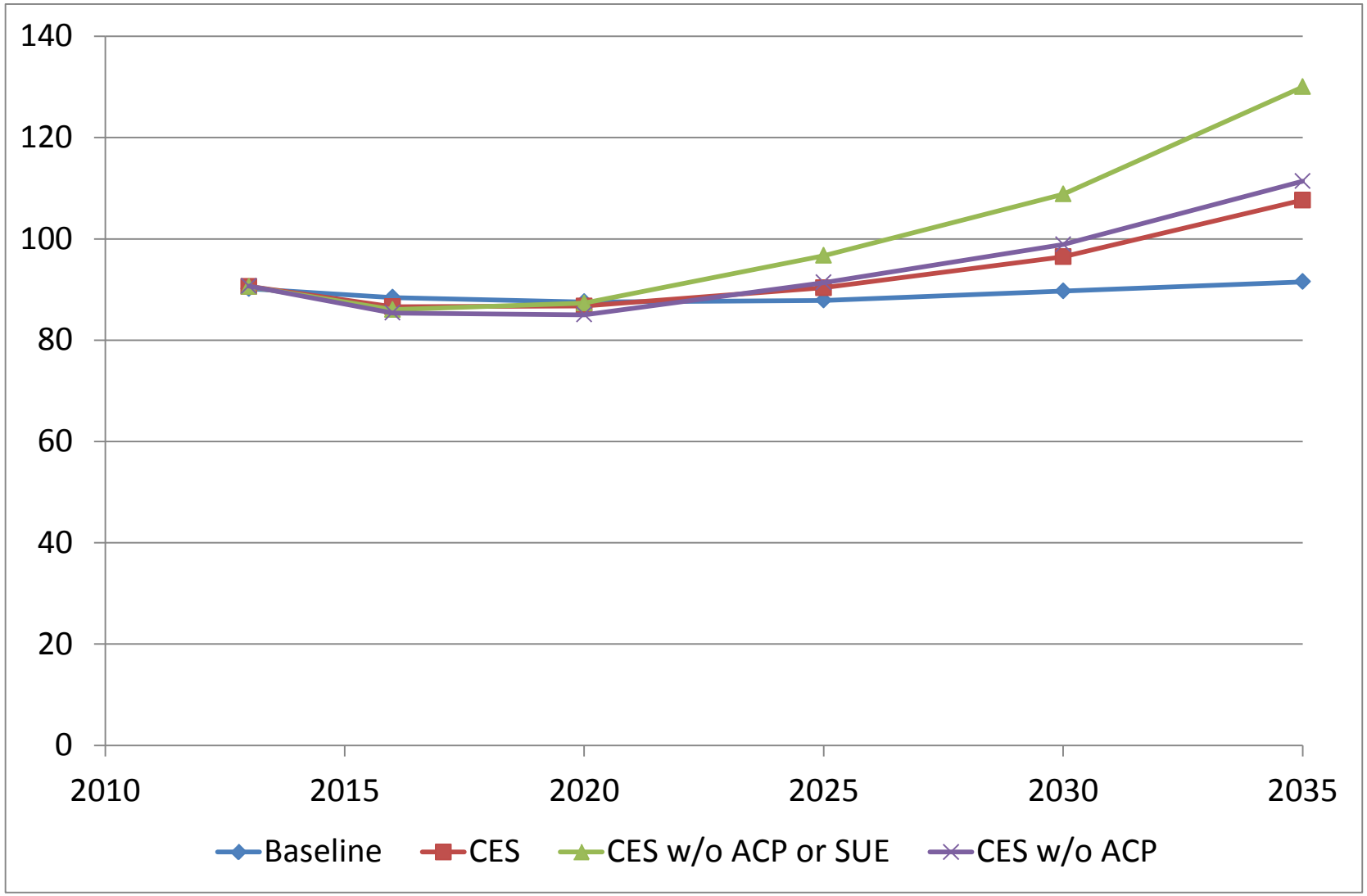

Exhibit 3. Regional Electricity Price Effects of the CES in 2020

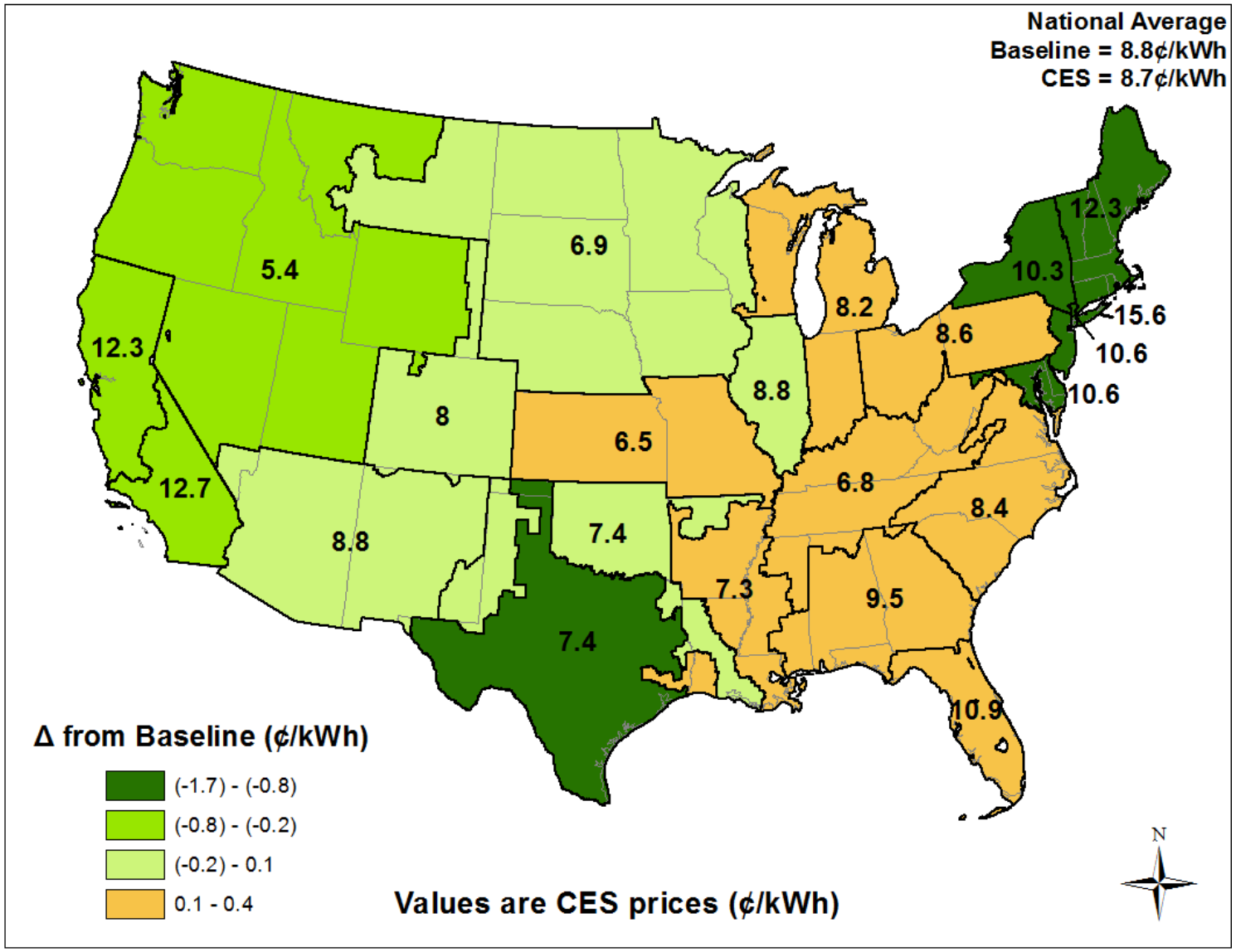

Exhibit 4. Regional Electricity Price Effects of the CES in 2025