energy future COALITION

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Union of Concerned Scientists

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Protecting the Midwest's Environment and Natural Heritage

A Comprehensive Approach to Setting Clean Energy Standards for the Electricity Sector

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A COMPREHENSIVE APPROACH TO SETTING CLEAN ENERGY STANDARDS FOR THE ELECTRICITY SECTOR

As the Obama Administration and Congress consider approaches to promote clean energy and reduce greenhouse gases in the electricity sector by 2020 and beyond, the optimum approach includes three clean energy policies – an Energy Efficiency Resource Standard (EERS), a Renewable Electricity Standard (RES), and a cap, or limit, on carbon and other heat-trapping emissions. An EERS and an RES are similar; they each require electric power companies to provide increasing amounts of efficiency and renewable energy, respectively. An economy-wide carbon cap would limit heat-trapping emissions from all major sectors of the economy, including electricity, coupled with the ability to trade emissions credits. **Both an EERS and an RES can reduce the costs of a carbon cap, basically returning wholesale electricity prices in 2025 to where they would be without any cap in place.** The current congressional strategy of combining energy and climate legislation in one bill provides a golden opportunity to recognize the beneficial synergies of a comprehensive "Three Pillars" approach that includes:

- An Energy Efficiency Resource Standard to reduce electricity usage by at least 15% and natural gas usage by at least 10% by 2020
- A Renewable Electricity Standard to increase renewable energy production to at least 20% by 2020
- A cap that would cut heat-trapping emissions by at least 35% below current levels by 2020 and at least 80% by 2050.

This comprehensive approach would establish the price signal needed to begin the transformation to a low-carbon economy while simultaneously containing costs and removing barriers that impede market uptake of efficiency and renewables. The "Three Pillars" approach for electricity is:

- **Affordable –** It yields the lowest cost for consumers to both reduce heat-trapping emissions and meet future electricity needs by reducing energy demand, substituting clean renewables for fossil fuel plants that will require expensive retrofits or replacement as the cap tightens, and reducing wholesale electricity and natural gas prices.

- **Practical –** It eliminates market barriers that will prevent cost-effective efficiency and renewables from entering the market, even with a carbon cap in place.

- **Fast –** It builds on the initial investments made in the American Recovery and Reinvestment Act to facilitate rapid investment in the cheapest clean energy technologies available today – efficiency and renewables.

- **Long-Term –** It sends market signals to invest in research, development, and deployment of more expensive, longer-term, or unproven technologies to limit carbon emissions from electricity generation – including carbon capture and storage and efficiency and renewables technologies still in the R&D phase.

- **Proven –** 13 states, including California, Colorado, Connecticut, Illinois, Maryland, Massachusetts, Minnesota, New Jersey, New Mexico, New York, Rhode Island, Vermont, and Washington have already adopted (or are actively considering) approaches just like it – showing that a comprehensive approach to climate and energy policy works.

WHY A CARBON CAP IS NECESSARY BUT NOT SUFFICIENT

A cap on heat-trapping emissions is a critical element of a comprehensive "Three Pillars" approach. In addition to requiring that emissions reduction targets are met, it sends a clear price signal that carbon emissions must come down, which requires deployment of zero or low-carbon technologies and which tells developers that it may be risky and expensive to invest in construction of new carbon-intensive power plants today that would need expensive retrofits or replacement later. A declining carbon cap also sends market signals that investment in research, development, and demonstration of technologies such as carbon capture and storage is sensible to deal with emissions from existing carbon-intensive infrastructure.

But a carbon cap alone is not enough to reduce emissions in the most efficient and cost-effective manner. While a cap sends important price signals, price signals are not optimally effective at driving energy efficiency and renewables, which are the options for reducing emissions that are fastest and lowest-cost for consumers. Instead, efficiency and renewables are impeded by various commercialization and market barriers and perverse utility incentives, including:[1]

- **Electricity sector rules & structure –** In most states, the rules that govern electricity reward utilities for building expensive power plants on which they can earn a rate of return, as opposed to investing in energy efficiency, which is only a cost that gets passed through to customers without earning a return. Utilities benefit from investing in higher-cost capital investments on which the state Public Utilities Commissions will let them earn a return. In addition, under the current rules in many states, when utilities increase sales, they increase revenue and profit, which means that even with a carbon price signal, most utilities will be reluctant to invest in energy efficiency, as it will lower sales and thus profits.

  When competing with more conventional technologies, renewable energy technologies must overcome several electric sector structure barriers. For example, undeveloped infrastructure, a lack of economies of scale, and price distortions from existing subsidies and unequal tax burdens between renewable energy and fossil fuel or nuclear power sources impede their wide-spread deployment. Typically smaller in size, a renewable energy project also faces higher transaction costs throughout the development process, including resource assessments, permits, and contract negotiations. In addition, many states' electricity rules make it difficult or expensive for independent renewable electricity producers to gain access to the grid. Furthermore, unnecessary and onerous interconnection rules for renewable distributed generation and arcane cost-recovery rules impede construction of transmission lines needed to bring renewable energy to market.

  Once they reach the grid, renewable energy sources may not receive full credit for the value of their power. Because of their intermittent nature, utilities often give a zero or low price for the "capacity value" of the generation.

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[1] For more information on barriers, see McKinsey and Company (2007). *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?* sponsored by DTE Energy, Environmental Defense, Honeywell, National Grid, NRDC, PG&E, and Shell and available for download at www.mckinsey.com/clientservice/ccsi/greenhousegas.asp. *See also* Richard Cowart, *Carbon Caps And Efficiency Resources: How Climate Legislation Can Mobilize Efficiency And Lower The Cost Of Greenhouse Gas Emission Reduction*, 33 Vermont Law Rev. 201 (2008), available at: http://lawreview.vermontlaw.edu/articles/12 Cowart Book 2, Vol 33.pdf

- **Lack of information** – Decision-makers often lack the necessary information or expertise to make the myriad choices inherent in investment in energy efficiency and renewable energy. This information barrier is a significant challenge for everyone making investment decisions about energy – from the homeowner considering a new air conditioner to the factory owner thinking about a combined heat and power system. Credit and insurance providers, utilities, and state Public Utilities Commissions may also lack information about renewable energy, thereby reducing developer access to financing, increasing capital costs, and reducing regulatory impetus for change.
- **Disconnect between decision-makers and bill-payers** – Many of the decisions on how initial energy investments should be spent are made by someone other than the person responsible for paying the energy bill. Typically, these decision-makers – often homebuilders and landlords – do not make investments in efficiency and renewables that may be cost-effective for the ultimate bill-payer because the decision-makers themselves cannot be assured of recouping their up-front costs. In the U.S., this disconnect affects almost half of residential space heating, 77% of residential hot water usage, and 90% of leased commercial space energy consumption.[2]
- **Up-front costs** – Unlike other energy technologies, renewable energy and energy efficiency almost exclusively involve up-front capital costs, as there is little or no cost for fuel over time. Lack of information about and familiarity with renewables can also increase the transaction costs involved in making renewable energy investments. These up-front costs for renewables can be daunting to those making energy choices – whether a homeowner, a business, or a utility, which can generally pass along higher fuel costs automatically. Decision-makers often have short investment payback horizons and are reluctant to invest in renewable energy technologies that require greater investment at the beginning but may be more cost-effective over their lifetimes.

As a result of these barriers, instead of efficiency and renewables, a carbon cap may lead utilities to seek options such as using more natural gas, which may appear less expensive in the short-run but cost more in the long-run, and which will also lead to natural gas price increases.

WHY AN EERS AND AN RES ARE EACH NECESSARY BUT NOT SUFFICIENT

An EERS and an RES can drive investment in renewables and efficiency, the options for reducing emissions that are fastest and lowest-cost for consumers.

Electric utility companies are uniquely positioned to overcome the market barriers described above. They can create market conditions for both efficiency and renewable energy, and, with appropriate regulatory incentives to overcome the profit-structure barrier,[3] they can profitably

[2] ACEEE for the International Energy Agency, *Quantifying the Effects of Market Failures in the End-Use of Energy*, February 2007, found at: http://www.aceee.org/energy/IEAmarketbarriers.pdf

[3] Such regulatory measures could include decoupling – separating utility revenues from sales volume, thereby removing the disincentive to pursue efficiency – and positive incentives to promote efficiency, such as allowing utilities to claim some share of the savings achieved. *See*, *e.g*., Frederick Weston, Regulatory Assistance Project, *Promoting Energy Efficiency: Regulatory Policies for Increased Investment*, Presentation to National Governors Association, Jan. 27, 2009, http://www.raponline.org/Slides/RW-PromotingEEPolicies-NGA-27Jan09.pdf.

offer rebates and information to their consumers and to other decision makers (e.g., homebuilders and landlords) to change investment decisions. Nineteen states have adopted an EERS, and utilities in those states are demonstrating that they can change consumer investment behavior with rebates for efficient investments at a cost of 3-4 cents per kWh – one-third to one-half the cost of power from new plants. The 28 states that have adopted an RES are also showing first-hand that they can reduce market barriers and stimulate new clean energy markets. While these state efforts are an excellent start, national EERS and RES policies are needed to fully overcome the nation-wide barriers to efficiency and renewables and to bring the benefits of efficiency and renewables to the entire country, including states without such policies now, as well as nearby states who will share in region-wide benefits that such policies bring.

The EERS and RES are much more effective as independent mechanisms working in tandem, rather than combined as an RES that can partially be met with energy efficiency, as passed the House in 2007. Adding efficiency as an option for meeting an RES is usually done as a "safety valve" for utilities by weakening requirements for renewable energy, but as shown in *Figure 1* below, a 2007 analysis by the American Council for an Energy Efficient Economy (ACEEE) showed that doing so would not take full advantage of the emissions reductions, electricity savings, job creation, and consumer savings potential that could result from having a separate RES and EERS.

Figure 1 – Comparison of RES and RES+EERS Results in 2030 Relative to Business-as-Usual

	CO_2 emission reductions (million metric tons)	Electricity usage saved (billion kWh)	Average net annual jobs	Net consumer savings, cumulative (million $)
2007 House RES (15% by 2020, though 4 of the 15 can be met with efficiency)	100	22	27,891	60,541
15% RES + 15% EERS by 2025	**588**	**507**	**142,068**	**590,723**

Data source: ACEEE 2007

In addition, energy efficiency and renewables are unique resources with unique characteristics. An RES would apply to the entity supplying power – often a competitive load serving entity – which in some cases is not the local distribution company that would be regulated under an EERS; attempting to merge an RES and EERS could create unnecessary regulatory complications.

Furthermore, having both a stand-alone RES and EERS as opposed to either one alone (or just pursuing business as usual) provides lower prices by 2025 even in the Midwest and the South, regions that are more heavily dependent on coal. This is illustrated in *Figures 2 and 3* below, which show what regional wholesale prices would be under business-as-usual compared to what they would be under the 2007 House RES (15% by 2020, though 4 of the 15 can be met with

Figure 2 – Midwest Regional Wholesale Prices

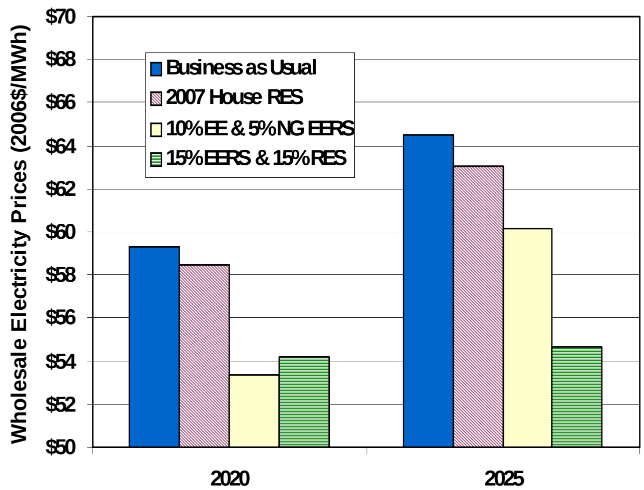
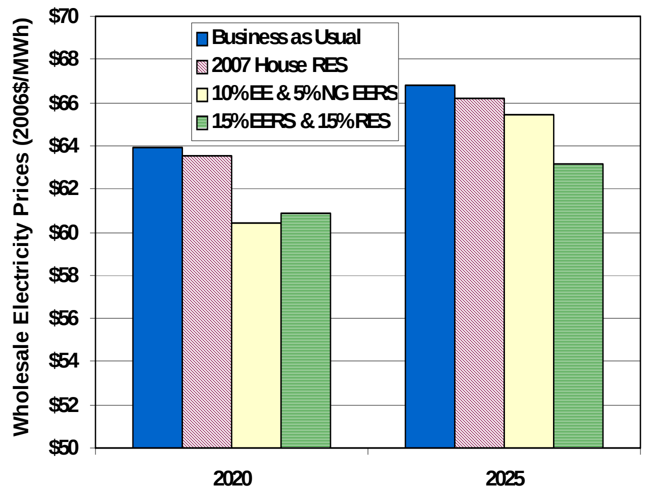


Figure 3 – Southeast Regional Wholesale Prices



Data source: ACEEE 2007

efficiency), a stand-alone EERS (10% reduction in electricity usage and 5% in natural gas usage by 2020), or a combination of a 15% RES (with no efficiency option) and a 15% EERS by 2025.

An EERS actually makes achieving an RES easier and less expensive, since an RES requires a percentage of total electricity sold to be from renewables, and energy efficiency reduces the total amount of electricity sold.

However, while establishing an EERS and an RES would achieve significant reductions in carbon emissions, still greater reductions would result from an economy-wide cap. Moreover, adding a cap would send the strong market signal needed to encourage significant investment in cleaner and more energy efficient technologies and head off construction of new carbon-intensive power plants that would need expensive retrofits to be economically viable. An economy-wide cap would also be more likely to incentivize research, development, and deployment of longer-term technologies such as carbon capture and sequestration.

BENEFITS OF A COMPREHENSIVE "THREE PILLARS" APPROACH

Implementing any one or even two of the policies described in this paper would not achieve the full benefits of a comprehensive "Three Pillars" approach. Only by having all three pillars can we achieve the optimal cost and energy savings, emissions reductions, and job creation.

In December 2007, ACEEE modeled the impacts of policies in various combinations, including an RES with an efficiency component (the 2007 House RES), an RES with a separate EERS, a climate cap-and-trade, and a climate cap-and-trade combined with an RES and an EERS.[4] ACEEE found that combining a 15%-by-2025 RES, a 15%-by-2025 EERS, and a cap to reduce heat-trapping emissions to 2006 levels by 2020 and 1990 levels by 2030 would, by 2030, yield

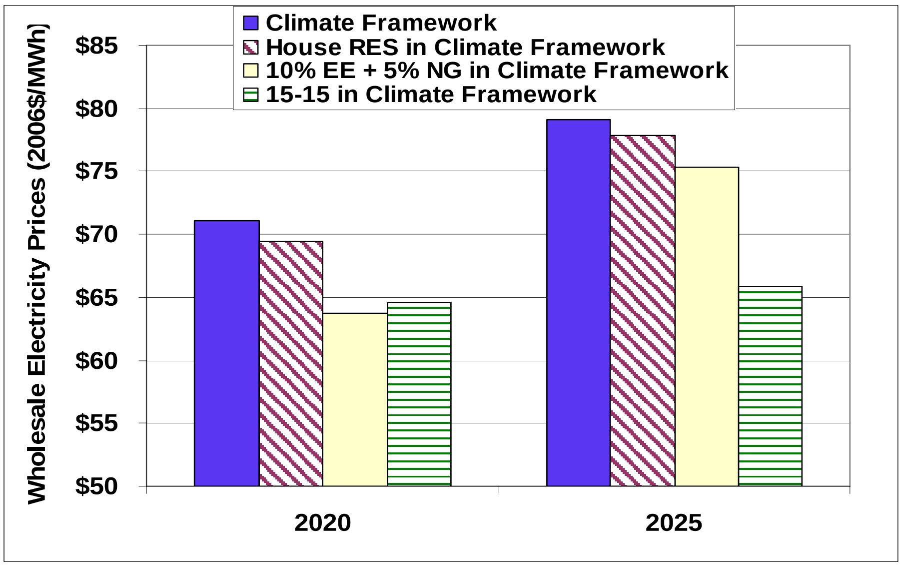
[4] ACEEE, *Assessment of the House Renewable Electricity Standard and Expanded Clean Energy Scenarios*, Dec. 2007. ACEEE used the Integrated Planning Model (IPM) developed by ICF International to model the U.S. electric power sector and used the Dynamic Energy Efficiency Policy Evaluation Routine (DEEPER) model for macroeconomic analyses.

the greatest benefits in terms of emissions reductions and energy savings compared to business-as-usual.[5] Such a combination would:

- Avoid the need for 153,000 MW of power;
- Save 700 billion kWh of electricity usage; and
- Avoid about 960 MMT of CO_2 emissions.

Explicitly promoting efficiency and renewables through an EERS and an RES in conjunction with a carbon cap also makes the cap more affordable. *Figure 4* shows what wholesale electricity prices would be with just a climate framework, as compared to a combined climate-

Figure 4 – National Wholesale Prices



Source: ACEEE 2007

RES framework, a combined climate-EERS framework (with the EERS requiring a 10% reduction in electricity usage and 5% in natural gas usage by 2020), and a "Three Pillars" climate-RES-EERS framework. The "Three Pillars" approach yields lower prices by 2025 than any other combination.

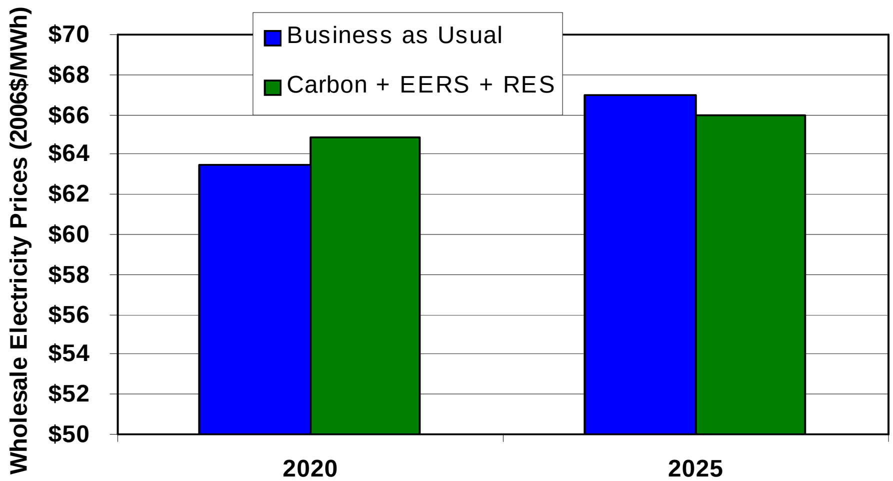
An EERS reduces the costs of a cap because it guarantees minimum investments in efficiency, which reduces energy demand and bills. Energy efficiency is the least-cost (often no-cost or negative-cost) means of reducing heat-trapping emissions, and the potential reductions from efficiency are immense.

An RES would spur deployment of existing clean energy technologies and drive the innovation needed for significant emissions reductions. Numerous studies have shown that an RES saves consumers money primarily by increasing the availability of renewables and therefore reducing

[5] Presentation of the results from this policy analysis is for illustrative purposes only. It does not imply that any of the signatory organizations support these emission reduction levels as being sufficient to avoid the most dangerous effects of climate change. Rather, total economy-wide global warming emissions should be reduced by at least 35% below current levels by 2020 and at least 80% by 2050.

demand for, and the price of, natural gas.[6] A March 2009 analysis by the Union of Concerned Scientists found that under a 25% by 2025 national RES, annual consumer natural gas prices would be as much as 4.1% lower compared with business as usual, with an average annual reduction of 2.3% from 2010 to 2030. As a result, cumulative consumer energy bill savings would reach $95.5 billion by 2030.[7] In addition, a 2007 analysis of a 25% by 2025 RES by the Energy Information Administration (EIA) found cumulative natural gas bills savings ($17 billion) that more than offset a slight increase in consumer electricity bills ($15 billion).[8] Because it has lower emissions than other fossil fuels, natural gas will be even more valuable under a carbon cap; EIA projects that many power suppliers trying to reduce carbon emissions would shift from coal to natural gas, driving up prices for natural gas and electricity, but that including an RES under a carbon cap could reduce those price increases by reducing the demand for natural gas.[9]

Figure 5 – National Wholesale Prices under a Carbon Cap with an EERS and RES as Compared to Business-as-Usual



Data source: ACEEE 2007

Both an EERS and an RES can therefore reduce the costs of a carbon cap. Indeed, as illustrated in *Figure 5* above, the 2007 ACEEE analysis found that adding a 15%-by-2025 EERS and a 15%-by-2025 RES to a cap on heat-trapping emissions (2006 levels by 2020, 1990 levels by 2030) basically returns wholesale electricity prices in 2025 to where they would have been without any cap in place.[10]

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[6] Wiser, R., M. Bolinger, and M. St. Clair. *Easing the Natural Gas Crisis: Reducing Natural Gas Prices through Increased Deployment of Renewable Energy and Energy Efficiency*, Lawrence Berkeley National Laboratory, January 2005.
[7] Union of Concerned Scientists, *Clean Power, Green Jobs*, March 2009.
[8] EIA, *Energy and Economic Impacts of Implementing Both a 25-Percent Renewable Portfolio Standard and a 25-Percent Renewable Fuel Standard by 2025*, SR/OIAF/2007-05, August 2007.
[9] EIA, *Analysis of Strategies for Reducing Multiple Emissions from Electric Power Plants: Sulfur Dioxide, Nitrogen Oxides, Carbon Dioxide, and Mercury and a Renewable Portfolio Standard*, July 2001.
[10] ACEEE, *Assessment of the House Renewable Electricity Standard and Expanded Clean Energy Scenarios,* Dec. 2007.

CONCLUSION

A comprehensive suite of policies will be needed to reduce carbon emissions and to increase deployment of energy efficiency and renewable energy technologies in the electricity sector. A well-designed economy-wide carbon cap, an RES, and an EERS each provides numerous benefits, but a synergistic approach utilizing all "Three Pillars" is needed in order to achieve the optimal cost and energy savings and emissions reductions.

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