How Clean Power Will Save Us Money in the Long Run

Compliance with the Clean Power Plan through increased investment in low-cost, clean energy resources paired with the retirement of inefficient, high-emitting units will lead to lower electric bills nationwide.

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With the August 3, 2015 release of its final Clean Power Plan rule, the U.S. EPA has provided clear goals for electric-sector carbon dioxide (CO_2) emissions reductions. Less clear is the best way to navigate complex compliance options to provide the best value for consumers.

Updated analysis of Synapse's Clean Energy Future (CEF) scenario, described in its Clean Energy Future policy brief series, shows that this scenario remains a win-win given the final targets in the EPA's Clean Power Plan. This third policy brief, together with an accompanying background report, explains how the switch to low-cost, clean sources of energy can lower both emissions and electricity bills nationwide.

How can investments in clean energy save households money?

The Clean Energy Future was designed to maximize cuts in electric-sector emissions while minimizing the costs of providing reliable energy, ultimately saving ratepayers money. Costs are compared to a business-as-usual, or Reference, case in which no new policies are set. CO_2 emissions are not only 84 percent lower than the Reference scenario, but also 58 percent below 2005 electric sector emissions.

This reduction is more than enough to comply with the targets of the final Clean Power Plan. At the same time, the average national household electric bill is lower in the Clean Energy Future modeling than it is either in the Reference scenario or in 2012. Electric bill savings vary by state, and depend strongly on households' degree of participation in energy efficiency programs. For a detailed discussion of how bill savings are expected to vary across households, see the accompanying report.

To some readers these results may appear to be counterintuitive: How can investments in emission reduction measures save households money? The answer is simple: Modern green technologies for generating electricity and getting each kilowatt-hour of electricity to go further are becoming cost effective when compared to old-fashioned fossil fuel generation.

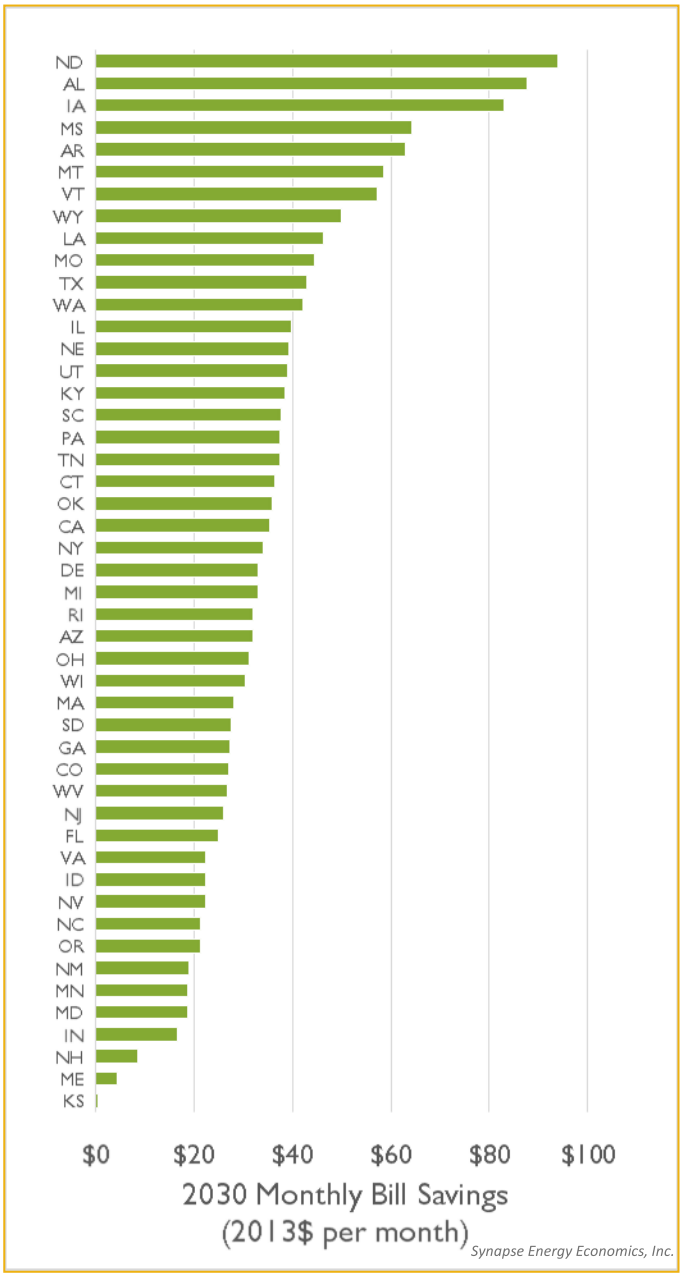

Figure 1. Clean Energy Future bill impacts by state under the final Clean Power Plan

How Can Greener Electricity be Cheaper?

As a result of increasing fuel prices and compliance with various non-Clean Power Plan regulations, the cost of producing a unit of energy from fossil fuels in the future is likely to increase significantly from today.

Concurrently, the cost of each megawatt-hour produced by renewable sources or saved by energy efficiency programs is expected to decline, leaving these cleaner sources of energy as the most economic choices in 2030.

Figure 2 shows that by 2030 electricity from renewables and energy efficiency measures are expected to be cheaper than electricity from coal and natural gas. In fact, some resources have already reached this point. These green technologies are good investments that will benefit consumers through lower bills and reduced emissions.

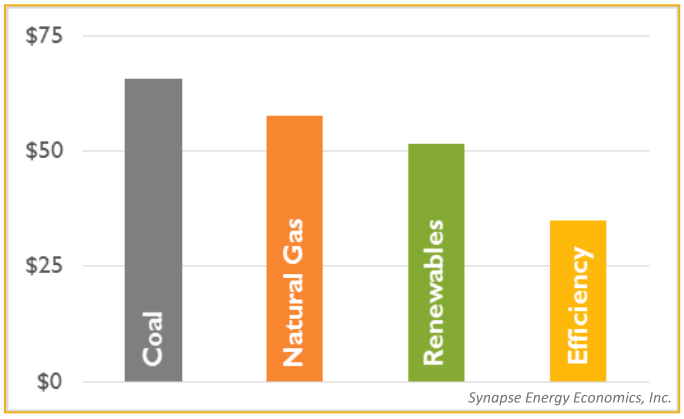

Figure 2. Estimated costs of producing electricity from various resources in 2030, 2013 dollars per megawatt-hour

Rising Costs of Coal

Even without the Clean Power Plan, coal plants will require costly upgrades and retrofits to comply with laws regulating water, sulfur, nitrogen oxides, and heavy toxic metals, such as mercury. These required retrofits contribute to making electricity from coal uneconomic, as they add to existing operating costs.

Figure 3 shows the expected coal retrofit costs through 2030 for both the Clean Energy Future and the Reference case. In 2030 alone, states following a Clean Energy Future pathway could avoid $21 billion by not investing in the coal plant retrofits that would be required to keep these plants running.

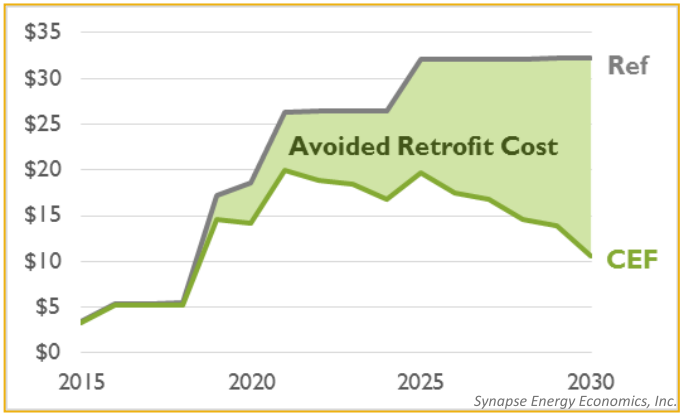

Figure 3. Costs of coal retrofits in 2030 for the Clean Energy Future (CEF) versus Reference (Ref) scenario in 2013 dollars (billions)

Non-Electric Cost Savings

In calculating the benefits associated with the Clean Power Plan, EPA predicts that the final targets could produce combined climate and health "co-benefits" with an upper range of roughly $50 billion in 2030, as seen in Figure 4. Reductions in CO_2 and other emissions improve national air quality and avoid future climate-related costs such as property damage, declining agricultural production, and water shortages.

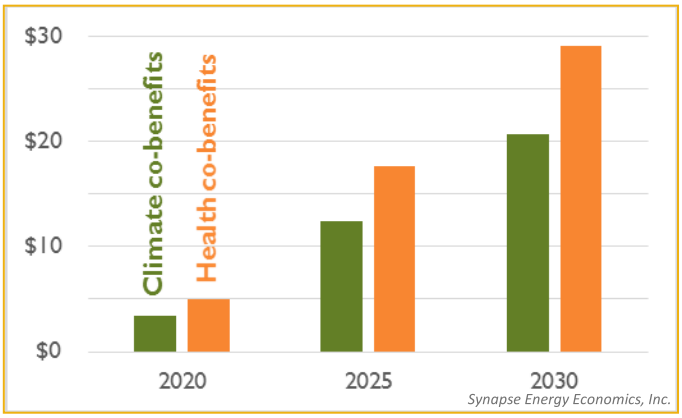

Figure 4. Climate and health co-benefits from the final Clean Power Plan, in 2013 dollars (billions)

The reported Clean Energy Future scenario bill savings calculations do not include these potential cost savings. However, the scenario's emissions reductions greatly exceed EPA targets, and would likely produce even greater climate and health co-benefits.

Why Haven't We Done It Already?

The price dynamic for electricity costs shown in Figure 3 is fairly new, and the traditionally slow-moving sector experiences a lag time in responding. As investors acclimate to the new market landscape, the shift to clean energy is likely to accelerate.

In addition, electricity grids face a number of perceived and real barriers that hamper the shift to clean, reliable energy. Yet, these barriers are breaking down and, as a result, the United States has already begun the transition to low-cost, clean resources, although natural gas (NG) capacity is still five times that of renewables (RE), as seen in Figure 5.

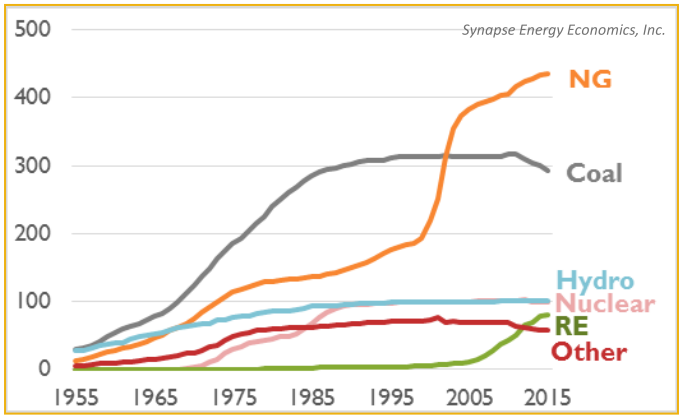

Figure 5. U.S. electric generating capacity in gigawatts

Barriers to Renewable Energy

In the past, many hurdles stood in the way of higher integration of renewable energy. These range from inconsistencies in policies and incentives across state borders, to insufficient transmission of renewable energy from where it's generated to where it's most needed, to concerns over the operational constraints of the system.

However, just as the scales of energy economics are beginning to tip in favor of renewable sources of energy, so too are many of the barriers to harnessing more renewable resources beginning to break down. First and foremost, the Clean Power Plan provides an impetus and incentive for states to invest in renewable energy over the next 15 years, demonstrating to developers across the nation that renewable energy will play an integral role in powering the United States into the future.

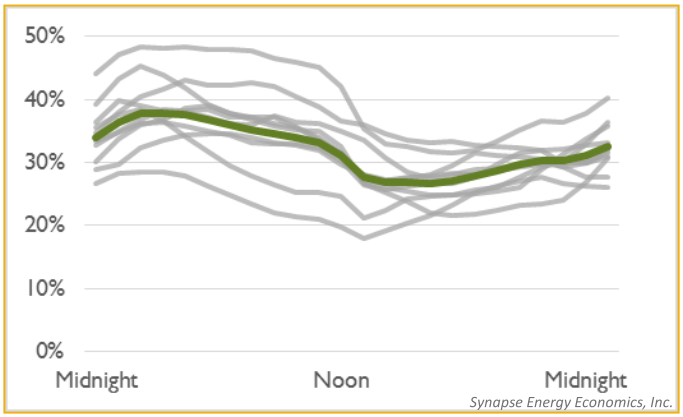

Figure 6. Hourly wind capacity factors from individual turbines versus aggregate over entire PJM region

In addition, as renewables begin to represent an ever larger portion of the power supply, system planners are finding lower-cost methods to integrate with the power system as a whole. For example, Figure 6 demonstrates that production from individual wind turbines (the grey lines) can vary greatly over the course of the day, causing system operators to adjust other resources to maintain a balance. In contrast, the aggregated output of all turbines spread over a larger region (the green line) is more consistent over time, with less need for balancing from other resources.

System planners in California take advantage of this factor through a new energy imbalance market, which was designed explicitly to access renewable resources across a larger geographic footprint. According to a 2015 report from the organization that oversees California's electric grid, in the first six months of 2015 the program saved over $15 million by utilizing renewable energy more efficiently.

> The California Energy Imbalance Market saved over $15 million through improved handling of renewable energy.

As more of the barriers to harnessing renewable energy disappear, momentum is building. Even now, developers are proposing expanding transmission lines into the center of the country to take advantage of high-quality, low-cost wind resources. As more policies and markets catch up with the economics and best practices of the new energy landscape, scenarios such as the Clean Energy Future will shift from "too good to be true" to just good decision-making.

Accommodating Energy Efficiency

Economic and institutional barriers also impede the high levels of energy efficiency modeled in the Clean Energy Future. Importantly, several leading states—such as Massachusetts, California, Rhode Island, Vermont, and Arizona—have already overcome these barriers, demonstrating that Clean Energy Future efficiency levels are feasible.

Figure 7 illustrates the problem of the traditional utility rate structure: If utilities invest more in energy efficiency, their sales begin to drop. While electricity sales in the Reference case increase continually through 2030, Clean Energy Future sales grow more slowly (with the addition of electric vehicle investment beyond that of the Reference scenario) and then begin to decline. As a result, under the current rate structure, utilities lose revenue and may lack incentive to save energy.

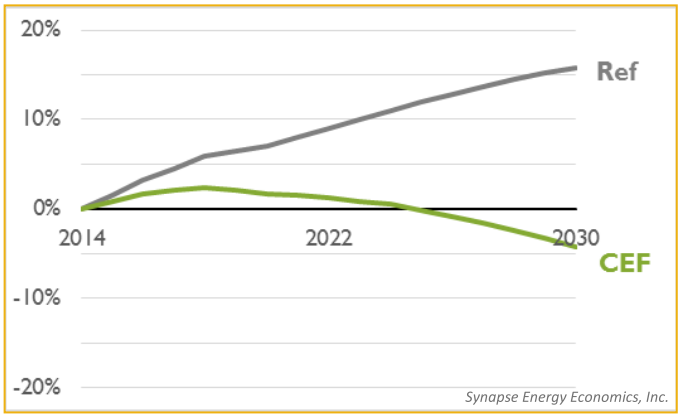

Figure 7. Sales growth compared to 2014, Reference (Ref) versus Clean Energy Future (CEF)

One method of addressing this disincentive involves "decoupling," which disconnects a utility's revenues from the amount of electricity it sells. This measure represents only one of several ways to encourage utilities to invest in reducing energy demand.

Is There a Catch?

Synapse tested the robustness of the Clean Energy Future modeling to address issues that may give planners pause:

- Synapse analysis found that households that have strong participation in efficiency programs stand to save $35 per month on bills. Even if savings were spread across every single household, bills would still be lower than in the Reference case by $21 per month on average nationally.
- While some states may be wary of investing in renewable energy before others, Synapse analysis found that first movers are actually at an advantage.
- Synapse modeled the high end of the range of potential consumer costs. We included 100 percent of the impact of investments made in fossil fuel plants that will be retired before the end of their economic life (these "stranded costs" may or may not be passed on to ratepayers), and modeled full, up-front payments by consumers for efficiency programs.

The Clean Power Plan Opportunity

The Clean Energy Future demonstrates that win-win compliance pathways for states do exist. Compliance with the final Clean Power Plan can reduce costs as well as emissions. In fact, on average, electricity consumers stand to benefit the most if states exceed Clean Power Plan targets by a wide margin and start their compliance earlier. Instead of asking why we haven't done it yet, maybe we should ask: ***How soon can we start?***

This brief is the third in a series exploring the impacts of the Clean Power Plan on consumers. It reflects up-to-date analysis of the newly released Clean Power Plan. For more information on these briefs, including how we modeled the Clean Energy Future, see www.synapse-energy.com/project/consumer-costs-low-emissions-futures.

About Synapse

Synapse Energy Economics, Inc. is a research and consulting firm specializing in energy, economic, and environmental topics. Since the Clean Power Plan was proposed in June 2014, Synapse staff have been actively analyzing and modeling the impacts of the rule. This work includes analyzing state-specific compliance options and providing planning support and resources to non-governmental organizations and state agencies. Synapse developed its open source Clean Power Plan Planning Tool, or CP3T, to assist state agencies and other stakeholders in planning for compliance (www.cp3t.com).

Acknowledgements

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