The Electricity Journal 29 (2016) 15–21

Contents lists available at ScienceDirect

The Electricity Journal

journal homepage: www.elsevier.com/locate/electr

Capitalizing on the Clean Power Plan and renewable energy tax credits

Alison Bailie*, Jeff Deyette, Steve Clemmer, Rachel Cleetus, Sandra Sattler

Union of Concerned Scientists, United States

ARTICLE INFO

Article history:
Available online 11 August 2016

ABSTRACT

The recent extensions of federal tax credits for renewable energy combined with the Clean Power Plan provide a powerful boost for clean energy development that will accelerate the shift toward a low-carbon economy and deliver significant economic and health benefits across the country. They will also help the U.S. to meet its international commitment to reducing economy-wide emissions by 2025.

1. Background

The U.S. power sector is in the midst of a major transition as electric utilities shift from coal toward cleaner energy sources, and policies that support investments in higher levels of renewable energy and energy efficiency are accelerating this transition. Recent Energy Information Administration (EIA) data shows that U. S. energy-related carbon dioxide (CO_2) emissions declined in 2015 (EIA, 2016c). This is in large part due to changes in the power sector including a continued shift away from coal to cheaper, lower-carbon resources such as natural gas, wind, and solar energy, as well as greater investments in energy efficiency. Wind accounted for the highest capacity additions in 2015, followed by solar and natural gas, and in 2016, solar additions are projected to rank first followed by wind and wind (UCS from AWEA, 2016; SEIA, 2016; EIA, 2016b and EIA, 2016d). The Clean Power Plan (CPP) and federal tax credit extensions for renewable energy are two recent policies that demonstrate the opportunities available for further leveraging federal policy into actions by utilities and state governments.

The Clean Power Plan, finalized in August 2015 by the U.S. Environmental Protection Agency, establishes the nation's first-ever limits on CO_2 emissions—the primary contributor to global warming—from power plants. The plan sets state-specific targets for cutting carbon pollution, starting in 2022 and leading to an estimated nationwide reduction of 32% below 2005 levels by 2030 (EPA, 2015). While most states are well positioned to meet their assigned emissions-reduction targets, given their ongoing transitions from coal generation and their commitments to invest in renewable energy and energy efficiency (Richardson et al., 2015), the CPP ensures that all states move forward on curbing power sector CO_2 emissions.

Last December, Congress passed a five-year extension of the production tax credit (PTC) and investment tax credit (ITC) for wind and solar, with a shorter extension of these credits for biomass, geothermal, and other renewable energy sources. These important tax incentives have been a major driver of new wind and solar development over the past decade (EIA, 2016e). Prior to the recent extensions a significant slowdown loomed for near-term growth; the PTC had expired at the beginning of 2015 and the ITC was set to expire at the end of 2015. Now, these industries have the market certainty they need to continue their recent growth trajectories through at least the year 2021.

That's when the CPP becomes binding and continues the market certainty for clean energy development. The CPP requires each state to submit a compliance plan that outlines how the state will meet a series of targets covering the period from 2022 to 2030. The CPP provides a number of options for cutting carbon emissions so that each state can develop a compliance strategy most suited to its own electricity-supply mix, resource availability, and policy objectives. These options include investing in renewable energy, energy efficiency, natural gas, nuclear power, or carbon capture and storage; making coal-fired plants more efficient; or generating less power from coal plants—and states are free to combine the options as they wish in order to meet their targets. With the extensions of the tax credits, states now have an even greater incentive to capitalize on near-term renewable energy development to help them achieve their CPP targets and avoid an over-reliance on natural gas.

States can also join together in multistate agreements to find the lowest-cost solutions for reducing their CO_2 emissions, including through market-based carbon-trading programs. Administering such a program by auctioning off emission allowances is an effective and proven way of preventing potential windfall

* Corresponding author.
E-mail address: abailie@ucsusa.org (A. Bailie).

http://dx.doi.org/10.1016/j.tej.2016.07.001
1040-6190/

profits among fossil fuel-based electricity generators and of allowing states to generate revenues that could be used to benefit all of their residents (Hibbard et al., 2015). Nine Northeast states that are part of the Regional Greenhouse Gas Initiative (RGGI) and California are already demonstrating the economic feasibility of implementing similar programs.

The final rule for the CPP required states to submit a final compliance plan, or an initial plan with a request for an extension of up to two years, by Sept. 6, 2016. However, in February 2016, the Supreme Court issued a procedural ruling that put a temporary stay on CPP implementation until legal challenges to the rule have been resolved. States may continue to develop their compliance plans in the interim and many have chosen to do so (E and E Publishing, 2016). Power providers in even more states are not waiting for the resolution of legal challenges and are instead taking advantage of the market opportunities to shift to cleaner generating sources today.

2. Analyzing the combined effect of the federal tax credits and the Clean Power Plan

Our analysis examines the likely economic and environmental impacts of both implementing the federal renewable energy tax credit extensions and achieving the emission reductions required by the CPP.

For the tax credit extensions, we modeled the credits that were part of the *Consolidated Appropriations Act of 2016*, announced in December 2015. The act extended the PTC to Dec. 31, 2019, for wind facilities and to Dec. 31, 2016, for other facilities such as geothermal, biomass, landfill gas, and hydro. For the PTC extension for wind, the tax credit value ramps down for facilities starting construction in 2017 and later (DSIRE, 2015a). The act also extended the timeframe of the ITC's full tax credit (30% of development costs) for utility-scale and commercial solar from 2016 to 2019; the credit value then declines to 10% of development costs in 2022 and subsequent years (DSIRE, 2015b). Facilities qualify for the PTC and ITC if they "commenced construction" prior to the expiration date of the tax credit for wind, utility-scale solar, commercial solar plants, geothermal, biomass, and qualifying hydro power.[1] Residential solar photovoltaics projects must be placed in service prior to the expiration date.

In our modeling of the Clean Power Plan, we assumed all states adopt the mass-based targets with a "new source complement" provided by the EPA. The EPA has given states a choice between a rate-based emissions target (measured in pounds of CO_2 per megawatt-hour of electricity generated) and a mass-based target (measured in short tons of CO_2 emitted by generating units). To avoid undermining the environmental integrity of the target, states must also address the potential for "leakage," or emissions that might arise because of a shift from existing to new fossil fuel–fired power plants (which are not covered under the CPP because they are regulated under a separate section of the Clean Air Act). One way that the EPA suggests the states should address leakage is through the adoption of a mass-based target with a "new-source complement," which represents an increase in a state's emissions target based on an estimate of new power plants required to meet additional electricity demand after 2012. A mass-based target that includes CO_2 emissions both from new and existing power plants is the most straightforward way of bringing all power plants under an emissions cap and ensuring an accurate accounting of the emissions that contribute to climate change.

We modeled the CPP compliance as if the states develop a market for carbon allowances and auction these allowances to the operators of the electricity generating units (EGUs). Each EGU operator must own sufficient allowances to cover its carbon emissions each year and the cost of the allowances becomes part of the operating cost of the plant and is passed through to consumers via electricity prices.

We compared four scenarios to illustrate the impacts of these policies:

- A "Reference Case" that does not include the CPP or any state or federal policies beyond those in place as of October 2015;
- A "Clean Energy Transition Case" that includes the extensions of the tax credits and the CPP with mass-based targets including the new source complement; this case assumes a single nationwide carbon allowance market that includes all states.[2] We also adopted EPA's assumption that all states, as part of their compliance strategy in each scenario with the CPP, invest in energy efficiency at a level that achieves a reduction in electricity sales of at least 1% per year from 2022 to 2030.[3]
- A "Limited Carbon Markets Case." This sensitivity on the Clean Energy Transition Case also includes the extensions of the tax credits and uses the mass-based targets, including the new-source complement, but in this case, each state develops its own carbon allowance market for EGUs only in that state and there is no interstate market for allowances.[4]
- A "CPP Only Case." This sensitivity on the Clean Energy Transition Case uses the mass-based targets, including the new-source complement, and a nationwide carbon market but excludes the extensions of the tax credits.

We quantified each of these scenarios using a modified version of the Regional Energy Deployment System (ReEDS)—a power-sector model developed by the National Renewable Energy Laboratory (NREL). ReEDS determines through simulation the electricity-supply mix that would meet electricity demand in the future (through 2050) throughout the contiguous United States at the lowest overall system cost while meeting reliability, environmental, and other legal requirements. Our technology cost and performance assumptions are based on information used by the Energy Information Administration for the Annual Energy Outlook 2015 (EIA, 2015), supplemented by data from the recent Wind Vision and SunShot Vision studies (DOE, 2015; DOE, 2012), and NREL's Annual Technology Baseline (NREL, 2015). We also updated the model's data for existing power plants to include recent retirements and plants under construction (Deyette et al., 2016).

3. Electric sector becomes more diverse, cleaner and lower cost

[1] On May 5, 2016 the Internal Revenue Service (IRS) provided guidance on the beginning of construction language, stating "if a taxpayer places a facility in service by the later of (1) a calendar year that is no more than four calendar years after the calendar year during which construction of the facility began or (2) December 31, 2016, the facility will be considered to satisfy the Continuity Safe Harbor" (IRS, 2016). This guidance extends the qualification period for wind facilities to four years, rather than two years. Our analysis does not include this updated guidance and assumes facilities will qualify only if constructed is completed within two years of the PTC expiration.

[2] This is equivalent to other analyses that assume all states can 'trade with each other'

[3] This energy efficiency assumption serves a proxy for state or utility action; it is needed because our model does not include choices on energy efficiency. States with stronger mandatory energy efficiency resource standards that exceed 1% savings per year are assumed to continue meeting their higher respective targets.

[4] While the "Limited Carbon Markets Case" does not allow carbon allowances to flow between states, it does implicitly permit trading of allowances among entities within each state. It also includes a single carbon market that covers the nine Northeast states that participate in the Regional Greenhouse Gas Initiative (RGGI). The Limited Carbon Markets Case also allows for interstate trading of electricity, which can serve as a means of CPP compliance.