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SUBJECT: Analysis of the Federal Renewable Electricity Production Tax Credit (PTC) Policy
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Executive Summary

In order to reduce the use of fossil fuel and the emission of greenhouse gas, federal production tax credits(PTC) for renewable energy have been enacted. This memo uses externality models to analyze how the PTC works. In addition, this memo estimates benefits and costs of carrying out the PTC and provide an unintended consequence of this policy. Lastly, this memo gives a recommendation for the unintended consequence.

Background

Power plants are a leading source of air pollution and carbon dioxide because 63% of US electricity is still from fossil fuels like coal and oil. When fossil fuels burn, these release harmful gas and carbon dioxide. As the amount of carbon dioxide increases, global temperature rises and then sea levels rise. Extreme weather becomes more commonplace, like wildfires, flooding, extreme heat and drought. Moreover, when people are living in places with serious air pollution for a long time, they have a high possibility of getting cancer. If we do nothing to change present situation, we will face the worst consequences of climate change and air pollution. Thus, industrial nations like U.S. need to significantly reduce the use of fossil fuels and encourage US power sector to use renewable energy. In order to promote the development of renewable energy resources, the federal government adopted an extension and expansion of the tax incentives for renewable energy projects. One main policy is the production tax credits(PTC).

Issues

In the past two decades, US government did not attach great importance to renewable energy resources. They preferred to concern the energy policy about next-generation fossil fuel and nuclear energy technologies over renewable energy such as wind and solar. They also cast about the need to reduce greenhouse emissions so Bush Administration refused to signal the the Kyoto Protocol. In contrast to major budget initiatives for clean coal and nuclear generation, renewable energy sources garnered far lower federal support. Now the federal government start to pay more attention to encouraging using renewable energy and trying to make adequate policy on this issue. The PTC has proved to be a significant tool in encouraging renewable energy development. However, the PTC has still been subject to short-term policy extensions, and has even been allowed to expire. These regulations has been to create uncertainty in the marketplace thereby reducing the ability of developers to achieve energy-efficiency goal.

Policy

The federal renewable electricity production tax credit (PTC) is an inflation-adjusted

per-kilowatt-hour (kWh) tax credit for electricity generated by qualified energy resources and sold by the taxpayer to an unrelated person during the taxable year. The credit can be claimed for a 10-year period once a qualifying facility is placed in service. The maximum credit amount for 2013, 2014, 2015, and 2016 was 2.3 cents per kWh. The maximum credit amount for 2017 and 2018 is 2.4 cents per kWh. Wind (before applying the 2017-2019 phaseout rates), closed-loop biomass, and geothermal energy technologies qualify for the maximum credit amount . Under current law, the credit is not available for nonwind projects that begin construction after December 31, 2017. For wind facilities, the credit is available for facilities for which construction begins before January 1, 2020. However, for facilities that begin construction during 2017, the credit is reduced by 20%. The credit is reduced by 40% for facilities that begin construction in 2018, and reduced by 60% for facilities that begin construction in 2019.

How the Policy Addresses the Issues

This policy has two goals. The first one is to form fewer air pollutants, less disruption to surface land needed to mine coal, and fewer carbon dioxide emissions linked to potentially human-caused climate change. The second goal is to help clean energy companies compete with the political and economic power of the coal, gas, and oil industries. Further, the federal government should examine if they provide long-term benefits to investors and help stabilize electricity prices when they are carrying out PTC.

The reason why the federal government intervene in energy market is that market failure exists when a free energy market system fail to allocate resources efficiently. An externality is an example of a market failure. When there is an externality, the market does not produce the efficient quantity of the good(see figure1). The free energy market equilibrium is at Q1 because S=D. People maximize their welfare where private marginal benefit equals private marginal cost but social efficiency occurs at Q2 (where SMB = SMC). Therefore, at the free market equilibrium, the social marginal benefit is greater than the social marginal cost. Society would benefit from increasing output until Q2. If the federal government want to develop clean energy, they should offer a subsidy to reduce the price and increase quantity.





Externalities can be either positive or negative. Pollution is a negative externality and using renewable resources is a positive externality. Power plants will burn coals and oil too much without government intervention. Harmful gas and greenhouse gas emissions will affect everyone's health condition in one district. Using renewable resources could benefit everyone in one district because alternative energy could alleviate air pollution. Nonetheless, no electricity sector would like to develop clean energy without any subsidies from government. Tax subsidies for clean energy resources are one policy option for addressing the inefficiencies and market failures in the energy sector(see figure 2). When the federal government grant PTC(PTC = P0-P2), the supply curve shifts to S2 because more and more power plants would like to develop and employ renewable energy. Thus, electricity price falls from P1 to P2 and the electricity consumption increases from Q1 to Q2. The output (Q2) is social efficient because here social marginal cost (SMC) equals social marginal benefit (SMB).





Tax credit phaseout also encourages more wind power plants to be added in the market by the end of 2019. The PTC provided a maximum tax credit for wind generation of 2.3 cents per kWh for the first 10 years of production. Under the PTC phaseout, the amount of the tax credit decreases by 20 percentage points per year from 2017 through 2019. Facilities that begin construction after December 31, 2019, will not be able to claim the PTC.

Outcomes

PTC contribute to the development of renewable power and PTC phaseout contribute to the development of wind resources. Further, the federal government has achieved the two goals of this policy.

Although the PTC has contributed to increased use of renewable electricity resources, it also has potential problems. First, PTC may encourage power plants to be inefficient and they choose to rely on tax credit rather than improve efficiency because tax credits reduce the average cost of electricity and increase the demand for electricity. However, improving energy efficiency is still the cheapest way to reduce the use of fossil fuels. Power plants may ignore the importance of researching better way to enhance fossil energy efficiency because

of the PTC policy. Second, the PTC's effect depends on the elasticity of demand. For the federal government, greenhouse gas emission reduction and development of clean energy sources remain secondary policy priorities. They will not very responsive to provide financial support on using renewable resources. For power plants, the large part of their income still comes from using fossil fuels so they will not very responsive to the PTC on developing clean energy.

PTC uncertainty is an unintended consequence of this policy. For example, over the past decade, one characteristic of US wind power plants is a boom-burst investment pattern which all they have. This dramatic stop-and-go investment pattern attributed to ongoing uncertainty over the new extensions of PTC. Therefore, stability is a significant criterion for evaluating the effectiveness of policy incentives. Five- to ten-year PTC is an ideal policy for the wind industry but Congress only extended for only one or two years at a time.

Recommendation

A longer-term PTC would improve stability but it is still used as a short-term policy instrument. Therefore, we consider alternatives to the PTC. Mandatory renewable portfolio standards (RPS) is an option. RPS require electricity suppliers to meet a certain percentage of their load from renewable energy sources. To date, 30 states in the US have passed mandatory RPS requirements and these state governments reported that renewable portfolio standards (RPS) policies are more effective than the PTC in stimulating renewable energy development at a low cost to government. Thus, the federal government should consider a federal-level RPS requirement now.

References

Sherlock, Molly F. "The Renewable Electricity Production Tax Credit: In Brief." Congressional Research Service: Report, Nov. 2018, pp. 1–12.

Byrne, John, et al. "American Policy Conflict in the Greenhouse: Divergent Trends in Federal, Regional, State, and Local Green Energy and Climate Change Policy." Energy Policy, no. 9, 2007, p. 4555.

Barradale, Merrill Jones. "Impact of Public Policy Uncertainty on Renewable Energy Investment: Wind Power and the Production Tax Credit." Energy Policy, vol. 38, no. 12, Jan. 2010, pp. 7698–7709.

Subsidies for positive externalities. https://www.economicshelp.org/micro-economic-essays/marketfailure/subsidy-positive-ext/