Policy Brief

International Renewable Energy Investment Credits Under a Federal Renewable Energy Standard

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Key Findings

Allowing regulated entities to comply with 3% of a new 20% by 2020 renewable energy standard with investments in international clean energy projects or programs could reduce overall compliance costs by about $3 billion per year in 2020. Including this mechanism could also increase greenhouse gas emissions reductions by 50 million tons per year in 2020 and generate about $700 million per year for clean technology deployment in developing nations.

Introduction

One of the most widely discussed energy policy proposals in the 111th Congress has been a national renewable or "clean" energy standard (RES or CES) that would require utilities to generate or purchase a certain percentage of their electricity from qualifying sources (a RES includes only renewable sources such as wind and solar, a CES also includes nuclear, coal with carbon capture and storage and in some cases natural gas). However, under existing proposals, standards are set too low in early years (through 2020) to achieve sufficient renewable energy deployment or greenhouse gas emissions reductions when compared with scientific recommendations and the United States' international pledges. Also, while increasing standards could produce additional renewable energy jobs and lower emissions in the electricity sector (in the absence of a cap-and-trade program), some U.S. policy makers are concerned about how higher renewable or clean energy credit (REC or CEC) prices would affect household energy costs and other economic impacts.

A possible solution is to allow U.S. utilities to purchase newly created "International Renewable Energy Credits" (iRECs) and submit these credits for a certain percentage of their domestic compliance obligation. For example, under a RES, companies could reduce compliance costs (and pass those savings to households) by financing 1 kWh of renewable energy deployment in Delhi instead of California, achieving the same amount of technology deployment and greater greenhouse gas emissions reductions. Although long-term domestic employment impacts from clean technology manufacturing are not expected to be different whether renewable energy is deployed domestically or abroad, policy makers could also consider whether some type of "Buy America" provisions could be included for qualifying international credits. However, designing these provisions in ways that are consistent with World Trade Organization obligations is likely be challenging.

The remainder of this paper provides background on renewable or clean energy standards, initial economic and environmental analysis of allowing international credits and policy design recommendations.

Essential Background

A national RES or CES is intended to provide electric utilities with a financial incentive to increase the amount of renewable or clean energy in their supply mix relative to fossil fuels such as coal. The primary difference between the two policies is that a RES typically includes only renewable sources of electricity such as wind, solar and geothermal, whereas a CES allows all carbon-free sources, including nuclear power, carbon capture and sequestration and sometimes fractional credits for natural gas. At the end of a given compliance period entities are required to submit RECs or CECs equal to a statutorily defined percentage of their electricity sales, which can either be from their own generation or purchased through a REC or CEC trading program from other utilities that exceed the standard. Entities can also comply by paying the federal government a defined fee per kilowatt hour of renewable or clean energy not generated (known as an "alternative compliance payment") or, in some cases, by generating credits through energy efficiency improvements (so-called "white certificates"). Policy objectives include diversifying energy portfolios, promoting research and development in renewable energy technologies, creating jobs in clean energy industries and reducing the rate of emissions of greenhouse gases and other harmful air pollutants.

Three leading energy proposals in the 111th Congress have included a national renewable or clean energy standard. As a complement to its cap-and-trade program, the "Waxman-Markey" (H.R. 2454) bill passed by the House of Representatives in June 2009 includes a RES that increases from 6.0% per year in 2012 and 2013 to 20.0% per year from 2020-2039.[1] The "American Clean Energy Leadership Act" (ACELA) of 2009 (S. 1462) passed by the Senate Energy and Natural Resources Committee in 2009 includes a RES that increases from 3.0% per year in 2011, 2012 and 2013 to 15.0% per year from 2012-2039.[2] The "Practical Energy and Climate Plan" introduced by Senators Lugar (R-IN), Graham (R-SC) and Murkowski (R-AK) includes a "diverse" energy standard – allowing some nuclear power and carbon capture and sequestration to qualify – that starts at 15% from 2015-2019 and increases to 50% by 2050.[3] As the U.S. climate and energy debate moves forward it is highly likely that one of or a combination of these standards will be included in a bill that is brought to the Senate floor, possibly followed by a conference committee and final vote.

Several states and both developed and developing countries have already adopted a version of a renewable energy standard. As of February 2009, 28 U.S. states and the District of Columbia had adopted renewable electricity standards.[4] The standards are concentrated in the Northeast, West, and North and South Central regions of the country, and some allow trading of RECs across state lines (but within regional electricity generation networks). The European Union has also set an overall renewable electricity target across the economic zone, but it allows individual countries to comply with their specific targets using a variety of policy mechanisms. Most countries have adopted feed-in tariffs and national renewable energy standards with tradable certificates, but there is no trading across national boundaries.[5] China has also adopted national and provincial targets for different energy technologies, supported in some cases by feed-in tariffs and other policies, while some Indian provinces have adopted standards and the government is considering a national RES to supplement its policies focused on promoting solar energy.[6] Implementing a national RES or CES in the United States that allowed international trading would build on domestic experience and incentivize other countries to continue developing similar policies to deploy clean energy and reduce greenhouse gas emissions.

Economic and Environmental Analysis

The economic and environmental impacts of allowing compliance with a RES or CES through iREC purchases could vary considerably based on the initial and final level of the standard, what technologies qualify and what countries supply the credits. Because of data limitations and expected political outcomes, we compared two policies:

1) A national RES similar to the one included in the Waxman-Markey bill that requires utilities to generate or purchase 20% of electricity from qualifying sources by 2020.

2) An identical RES with a target of 20% for 2020 that collectively allows firms to achieve up to 3 percentage points of their compliance obligation by purchasing iRECs.

<u>Renewable Energy Standard with iRECs</u>

Estimating the economic benefits of iRECs in this scenario requires knowing domestic compliance costs in both cases and the expected costs of renewable electricity credits in developing nations. Estimating environmental benefits also requires knowing what other types of policies are in place, especially cap-and-trade programs.

The U.S. Energy Information Administration (EIA) analyzed the impacts of the Waxman-Markey RES (a 20% by 2020 standard) on domestic energy prices and greenhouse gas emissions. The EIA report included two scenarios, one that assumed the full use of energy efficiency credits and one that assumed no energy efficiency credits were used. The effective standards in these scenarios differ by about 3%, and can thus be used to compare a 20% standard that does not allow iRECs with one that allows iRECs for 3% of compliance.[7]

EIA found that the price of credits in the core 20% scenario (without efficiency credits) would be 1.7 cents per kWh. Assuming that the average cost of renewable energy deployment is half the price of credits (a linear marginal cost curve), overall compliance costs would be $5.0 billion.

The costs of compliance with a 20% target that allowed iRECs to be used for 3% of compliance would be roughly equal to the cost of complying with a regular 17% target plus the cost of international credit purchases (assuming full use of iRECs). EIA found that the price of credits in their full efficiency credit scenario (our 17% scenario) would be 0.6 cents per kWh. Although it is uncertain what the cost of renewable energy credits would be in developing countries, one proxy is the cost of greenhouse gas mitigation using renewable energy standards, which analyses suggest could be 38% of the average cost in developed countries for twice the mitigation potential.[8] Using this approximation, the cost of international renewable electricity credits would also be about 0.6 cents per kWh.

Thus, overall compliance costs for a 20% RES that allowed 3% of compliance with iRECs would be about $2.1 billion ($1.4 billion domestically and $700 million for iREC purchases), compared to $5.0 billion for a domestic 20% standard that did not allow international credits. Allowing companies to use iRECs for compliance purposes could reduce costs of meeting a renewable energy target by about $2.9 billion per year in 2020.

Environmentally, the benefits of combining renewable energy standards with international REC trading depend on both practical and policy matters. The emissions intensity of generation displaced by renewable electricity can vary according to what fuel source is utilized on the margin, which can be quite different from the average . However, to provide an initial, illustrative basis for comparison, we have analyzed the emissions outcomes using national average emissions factors. Based on national emissions factors for 2010, each kWh of electricity generation in the United States produced 0.00056 tons of greenhouse gases. Each kWh of electricity generation in India produced almost twice the amount, about 0.001 tons of greenhouse gas emissions.[9]

Thus, replacing one kWh of renewable energy generation in India could produce about twice the greenhouse gas emissions reduction impact as replacing one in the United States, assuming generation with the average emissions intensity is displaced. Assuming countries that supply credits have average emissions intensity equal to India, allowing iRECs for compliance would increase the greenhouse gas mitigation benefits of a RES by 50 million tons per year in 2020 (see Appendix for further details).

Policy Design Recommendations

Allowing international renewable energy credits to be used for compliance in a domestic RES or CES introduces several policy design issues that need to be resolved. Most of these relate to the environmental integrity of developing country renewable electricity programs, but others relate to the employment effects and other local benefits of domestic compliance with an RES or CES.

What energy technologies qualify? Since renewable or clean energy standards can be diverse, U.S. policy should clearly define what types of energy in developing countries can qualify for crediting, and require countries to set parallel standards that include only those technologies (as long as countries have a national target, they can meet the standards through a variety of policies including a national RES or feed-in tariffs). For example, the United States may decide that because of environmental concerns, iRECs should not be issued for large hydropower generation even if it is defined by a developing country as "renewable energy". In addition, the United States may choose not to provide financing for developing countries to deploy nuclear energy. Some countries, such as China, already have targets for several different technologies or groups of technologies. Requiring all countries to set parallel standards that only include qualifying technologies would prevent adverse outcomes and should not impose too high a technical burden on developing nations.

How should policy makers address "additionality" concerns? Policies should also be included in U.S. legislation to prevent incentives from being used for renewable energy deployment that would have been built anyway. This factor is often referred to as "additionality", and the needed safeguard is to require developing countries to create a national "baseline", and only provide crediting for renewable energy deployment or emissions reductions that occur above this level. This baseline should account for the full mix of policies currently incentivizing renewable energy deployment. The baseline should be discussed by technical experts from both countries and revised if necessary. This baseline could also be included in a low-carbon development plan as part of a developing country's participation in international climate negotiations.

Should policy makers account for emissions reductions, and if so, how? For international renewable energy credits, U.S. RES legislation that allows international credits could also include a mechanism to ensure renewable energy deployment is producing emissions reductions equal to or greater than those that would have been achieved through deploying that energy in the United States. One way to achieve this goal is to require "ex-post" crediting, so that credits generated by developing countries can only be purchased by U.S. entities once the country has provided a full report on renewable electricity deployment and emissions reduction outcomes that have been achieved. This report should include accounting for the emissions factor of electricity generation that was displaced by the new renewable electricity. Once technical experts from both countries certify that the report is accurate and complete, credits can be issued.

How can domestic employment benefits be enhanced? One of the objectives of renewable energy standards is to create U.S. construction and manufacturing jobs in renewable energy industries by driving local or national deployment of clean energy. Since domestic renewable energy projects have no domestic content requirements, allowing iRECs is unlikely to reduce the long-term domestic employment benefits of these policies (domestic and international renewable energy projects often use technology from a variety of countries). However, in order to incentivize further domestic job creation, policy makers could explore whether "Buy America" requirements for qualifying international renewable energy projects and programs could be included in ways that are consistent with WTO obligations. This requirement could include stipulations that a certain percentage of the overall project or program cost go towards American technology, products or services and stipulations that American technology, products or services must be used unless there are no feasible alternatives. However, typically these types of requirements are only permitted under the WTO if they are applied to government funding and not private sector regulations, and even then in very specific cases.

Overall, policy makers need to pay attention to key design issues to ensure international credit programs under a RES or CES achieve maximum economic and environmental benefits. Key considerations include the scope of technologies under developing country programs that should qualify for credit, structuring programs so that renewable electricity deployment or emissions reductions in developing countries is above business-as-usual trajectories , accounting for emissions reduction outcomes and ensuring maximum domestic employment benefits.

Appendix: Analytical Assumptions

The analysis in this paper relies on several assumptions about the cost of deploying renewable energy and reducing emissions that could affect the results.

First, a future U.S. renewable electricity standard will be similar in its targets and permissible technologies to that included in the Waxman-Markey legislation. We chose this assumption because the Waxman-Markey RES was the most recent standard analyzed by the U.S. government and can thus provide the most accurate prediction of likely costs. The Waxman-Markey RES also represents one likely outcome of U.S. policy discussions in 2010. If a weaker target such as the one included in ACELA or a target that includes nuclear power and carbon capture were analyzed, results could be substantially different. In the former case there would likely be a lower incentive to purchase iRECs because of lower credit prices, but it is uncertain how the latter case would affect costs. Furthermore, EIA modeling used for this study did not include the interaction between a cap-and-trade program and RES policy. Thus, our analysis assumed that there would be no cap-and-trade program. In general, combining a cap-and-trade program with a RES would lower REC prices.

Second, the cost of deploying renewable electricity in developing nations that supply iRECs will be 38% of that in the United States. This assumption was chosen based on the cost of greenhouse gas mitigation using a RES in developed and developing countries, and the general lack of data about REC prices in developing countries. Since the emissions intensity of power generation in developing countries is generally higher than developed countries, this could be an underestimation of the cost of generating iRECs in developing nations. However, others have argued that renewable electricity deployment in developed nations is likely to displace less emissions-intensive generation such as natural gas, which could reduce the difference in costs between greenhouse gas mitigation through a RES and generating RECs in developed countries. Overall these competing effects make this a plausible assumption given available data. There are a variety of other reasons the cost of deploying renewable energy in developing countries would be lower than the United States, including better solar or wind resources, lower costs of land and lower costs of labor.

Third, U.S. regulated entities would be allowed to use iRECs for 3 percentage points of their compliance obligation, and there would be sufficient demand for and supply of iRECs such that this full amount would be used. This number was chose primarily for simplicity of analysis based on available data, but is a plausible assumption since it is roughly equal to the allowable limit on efficiency credits under the Waxman-Markey RES. This indicates that it is roughly the level at which policy makers are willing to forgo domestic renewable electricity development incentives in order to capture other benefits. The sufficient supply and demand assumption was also chosen partly based on availability of data, but is a plausible assumption given the rate of increase in compliance costs with increased RES levels and the likely low cost of deploying renewable electricity in developing nations.

Fourth, we made several assumptions about the relative emissions reduction benefits of deploying renewable energy in developing countries versus deploying renewable energy in the United States. For the United States, we assumed that renewable energy would displace existing or new energy that had emissions intensity equal to the annual average. A review of the EIA analysis of the Waxman-Markey RES reveals that the emissions intensity of displaced generation is likely to be lower than the national average, meaning that our figure is likely to overestimate the additional mitigation achieved by allowing iRECs. Overall emissions reductions are likely to be lower than in our analysis since the actual reductions will be equal to the marginal generation technology displaced and not the overall average. For supply countries, we assumed average emissions intensity equal to India's national average. We believe this is a realistic assumption since many developing countries that could supply credits, including India, are heavily dependent on coal for energy generation. Again, since actual emissions reductions depend on the marginal generation displaced and not the average, our analysis is likely to overestimate total emissions reductions achieved by RES policies. We believe our estimate provides an initial, illustrative basis to estimate greenhouse gas emissions reduction benefits from iREC trading, but further analysis is needed.

Fifth, our analysis assumed that only developing countries would be eligible to sell iRECs to the United States. We used this assumption because of initial analysis that the policy goal of achieving cost savings is more likely to be achieved by incentivizing renewable energy deployment in developing nations instead of other developed nations. In addition, developing countries may be more likely to benefit from the additional renewable energy financing generated by iRECs, compared to developed countries.

Sixth, we assumed that a RES would not be combined with a cap-and-trade program. This assumption was based on political considerations about the likelihood of these policies being adopted and the desire to explore ways to generate international renewable energy investment under policies aside from cap-and-trade systems. If RES and cap-and-trade policies are combined the emissions reduction benefits of iRECs would be greater since U.S. domestic emissions reductions would only be achieved to meet the cap.

Seventh, we assumed RES policies were set in relation to energy generation and not use, and did not assume different transmission loss rates for renewable energy versus fossil fuel generation. We believe these are reasonable assumptions based on our review of existing RES policies and available data. If these assumptions were incorrect, our estimates about the emissions reduction benefits of allowing iRECs could be affected (in either direction).

Notes

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[1] Entities are permitted to use efficiency improvements for 25% of their compliance obligation, increasing to 40% with a successful state petition. The bill also includes an alternative compliance payment of $25 per megawatt hour (2.5 cents per kilowatt hour). See H.R. 2454, 111th Congress

[2] Entities are permitted to use efficiency improvements for 26.67% of their compliance obligation. The bill also includes an alternative compliance payment of 2.1 cents per kilowatt hour. See S. 1462, 111th Congress

[3] Any energy source that achieves an 80% reduction in greenhouse gas emissions to the average of "freely emitting sources" in the United States can qualify for credits, with certification by the Secretary of Energy. The bill includes an alternative compliance payment determined by the Secretary, but set at a minimum of 5 cents per kilowatt hour. See S. 3464, 111th Congress

[4] Union of Concerned Scientists (2009) *Renewable Electricity Standards at Work in the States,* Washington, DC.

[5] Europa (2010) *Summaries of EU legislation: Renewable energy,* Brussels, Belgium. http://europa.eu/legislation_summaries/energy/renewable_energy/index_en.htm
See also the IEA Database of Global Renewable Energy Policies and Measures, http://www.iea.org/textbase/pm/?mode=re.

[6] Levine, M. et al. (2010) *Assessment of China's Energy-Saving and Emission-Reduction Accomplishments and Opportunities During the 11th Five Year Plan*, Berkeley, CA: Lawrence Berkeley National Laboratory. http://china.lbl.gov/sites/china.lbl.gov/files/LBNL_3385E.Ace_Study_Report_FINAL.pdf
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[7] According to the EIA, a 20% by 2020 renewable portfolio standard would actually produce a lower compliance requirement, due to the definition of the target as a percentage of total electricity sales, and the exemption of small retailers, hydropower generation and non-landfill gas municipal solid waste generation. See: Energy Information Administration (2009) *Impacts of a 25-Percent Renewable Electricity Standard as Proposed in the American Clean Energy and Security Act Discussion Draft*, Washington, DC.

[9] Project Catalyst (2009) *Limiting atmospheric CO2e to 450 ppm – the mitigation challenge*, San Francisco, CA: ClimateWorks Foundation. page 13

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