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Before

House Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight
&
Subcommittee on Energy and Environment

April 19, 2012

on

Impact of Tax Policies on the Commercial Application of Renewable Energy Technology

Mr. Chairmen and Members of the Subcommittees—on behalf of the Congressional Research Service, I thank you for the opportunity to appear before you today.

I have been invited here to discuss tax incentives for renewable energy. In this testimony, I will provide background on tax incentives designed to support renewable energy technologies. In doing so, I will highlight several recently expired provisions that were enacted as part of the American Recovery and Reinvestment Act in 2009. I will also provide a brief overview of the renewable energy tax policy proposals contained in the President's FY2013 Budget request. Finally, I will comment on the characteristics of an economically efficient renewable energy tax policy.

I. Tax Incentives for Renewable Energy

Tax incentives for renewable energy were first introduced in the 1970s. Historically, the renewable energy investment tax credit (ITC), and later the renewable energy production

tax credit (PTC), have been the primary tax incentives supporting renewable energy technologies.[1]

Investment tax credit

The investment tax credit (ITC) for renewable energy was first introduced in 1978.[2] The 1978 version of this incentive was scheduled to expire in 1982. Prior to the scheduled expiration date, the provision was further extended through 1985. Since the mid-1980s, the renewable energy ITC has repeatedly been modified and extended.[3] For most technologies, the ITC is set to expire at the end of 2016.

Currently, several renewable energy technologies qualify for the ITC. A 30% tax credit is available for investments in solar energy property, fuel cells, and small wind systems. Geothermal systems, microturbines, and combined heat and power (CHP) property can qualify for a 10% tax credit.[4] There is a permanent 10% ITC for solar that will remain available after the 30% rate expires at the end of 2016.

Historically, the annual revenue cost associated with the renewable energy ITC has been small. Prior to 2011, Joint Committee on Taxation (JCT) estimates of annual revenue loss from the renewable energy ITC were less than $100 million.[5] The estimated annual revenue cost of the renewable energy ITC is expected to increase in coming years. For

[1] For background information on the current status of U.S. energy tax policy, see CRS Report R41769, *Energy Tax Policy: Issues in the 112th Congress*, by Molly F. Sherlock and Margot L. Crandall-Hollick and U.S. Congress, Joint Committee on Taxation, *Present Law And Analysis of Energy-Related Tax Expenditures*, committee print, 112th Cong., March 23, 2012, JCX-28-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4414.

[2] A history of U.S. energy tax policy can be found in CRS Report R41227, *Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures*, by Molly F. Sherlock.

[3] The investment tax credit for solar was allowed to lapse at the beginning of 1986, before being retroactively extended through the end of 1988. The credit was again extended in 1989 and 1991. In 1992, the 10% investment tax credit was made permanent. Legislation in 2005 temporarily increased the renewable energy investment tax credit for solar from 10% to 30%. Subsequent legislation in 2006 and 2008 extended this 30% rate through the end of 2016.

[4] Currently, PTC-eligible property can elect to receive a 30% ITC in lieu of this PTC. This option is available through 2012 for wind, and through 2013 for other PTC-eligible technologies.

[5] Past JCT tax expenditure tables are available online at: http://www.jct.gov/publications.html?func=select&id=5.

2011, the JCT tax expenditure estimate for the renewable energy ITC was $300 million. Over the 2011 – 2015 budget window, the JCT estimates that the renewable energy ITC will cost $2.3 billion. The JCT estimates also indicate that nearly all of the expected revenue loss is due to investment in solar technologies, as opposed to other qualifying resources.

Production tax credit

Since being introduced in 1992, the renewable energy production tax credit (PTC) has been the primary federal incentive supporting wind power. While the PTC is a temporary tax provision, in the past, it has regularly been extended.[6] Under current law, the PTC for wind-produced electricity will expire at the end of 2012.

Several other technologies also qualify for the renewable energy PTC, including closed-loop and open-loop biomass, geothermal energy, landfill gas, municipal solid waste, certain hydroelectric, and marine and hydrokinetic technologies.[7] The PTC expiration date for qualifying technologies other than wind is the end of 2013.

The JCT has estimated that the renewable energy PTC resulted in $1.4 billion of forgone revenue in 2011. Of this, roughly 80% (or $1.1 billion), was claimed by wind. Between 1992 and 2010, cumulative PTC revenue losses were approximately $7.9 billion (in 2010 dollars).[8] Over the 2011—2015 budget window, the JCT estimates that the renewable energy PTC will cost $9.1 billion.[9] Of this $9.1 billion in revenue cost, roughly 75% (or $6.8 billion) is for credits paid for the production of electricity using wind.

[6] The PTC has been extended seven times since 1992. In three of these cases, the PTC was allowed to lapse prior to being extended.
[7] Open-loop biomass, geothermal energy, landfill gas, municipal solid waste, hydroelectric, and marine and hydrokinetic technologies qualify for a tax credit that is half of the amount available to other qualifying technologies.
[8] See CRS Report R41227, *Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures*, by Molly F. Sherlock, Appendix B.
[9] This cost likely would have been higher absent the Section 1603 grants in lieu of tax credit program discussed below.

Other incentives for renewable energy

A number of other specially targeted tax incentives are available for renewable energy. Technologies that qualify for the renewable energy ITC or PTC also qualify for accelerated depreciation under the Modified Accelerated Cost Recovery System (MACRS). The cost of investments in most renewable energy property is recovered over a five-year period.[10]

Other provisions that have supported renewable energy in recent years include tax-credit bonds (specifically, Clean Renewable Energy Bonds (CREBs) and Qualified Energy Conservation Bonds (QECBs)).[11] Further, renewable energy benefits from a number of other tax provisions that are not industry-specific. For example, investments in renewable energy may be eligible for temporary bonus depreciation deductions[12] and those producing electricity using renewable energy resources may qualify for the Section 199 domestic production activities deduction.[13]

2. Incentives for Renewable Energy in the American Recovery and Reinvestment Act

The American Recovery and Reinvestment Act of 2009 (ARRA; P.L. 111-5) introduced two new tax-related provisions for renewable energy.[14] First, under ARRA, investors eligible for the renewable energy PTC or ITC could elect to receive a one-time grant from the Treasury in lieu of these tax benefits. Second, ARRA provided funds for an

[10] Certain biomass property is treated as seven-year property under MACRS. Accelerated depreciation for renewable energy property is a permanent feature of the tax code.
[11] CREB financing is not currently available, as all CREB authority has been allocated. For additional background, see CRS Report R41573, *Tax-Favored Financing for Renewable Energy Resources and Energy Efficiency*, by Molly F. Sherlock and Steven Maguire.
[12] For more information on bonus depreciation, see CRS Report RL31852, *Section 179 and Bonus Depreciation Expensing Allowances: Current Law, Legislative Proposals in the 112th Congress, and Economic Effects*, by Gary Guenther.
[13] For more information on the Section 199 production activities deduction, see CRS Report R41988, *The Section 199 Production Activities Deduction: Background and Analysis*, by Molly F. Sherlock.
[14] For information on all energy-related provisions in ARRA, see CRS Report R40412, *Energy Provisions in the American Recovery and Reinvestment Act of 2009 (P.L. 111-5)*, coordinated by Fred Sissine.

advanced energy technology manufacturing tax credit. Many of the beneficiaries of this program were in the renewable energy sector.

Allowing PTC-property to claim the ITC and the introduction of Section 1603 grants

Under ARRA, property that was generally eligible for the PTC could instead elect to receive a 30% ITC. This option is scheduled to remain available until the current PTC expires at the end of 2012 for wind, and at the end of 2013 for other technologies.

In addition, under ARRA, in lieu of either the PTC or ITC, renewable energy investors could elect to receive a one-time grant from the U.S. Treasury.[15] This provision—commonly referred to as the "Section 1603 grant"—was intended to compensate for weak tax-equity markets.[16] Initially, the Section 1603 grant program was made available for property either placed-in-service or under construction in 2009 and 2010. The placed-in-service and construction start date was extended through 2011 as part of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312). As of the end of 2011, the grant option is not available for new projects.[17]

As of March 15, 2012, more than $11.0 billion had been paid out under the Section 1603 grant program.[18,19] Through the end of 2017, it has been estimated that another $11.5 billion will be paid out in Section 1603 grants,[20] bringing the total estimated cost of the

[15] See CRS Report R41635, *ARRA Section 1603 Grants in Lieu of Tax Credits for Renewable Energy: Overview, Analysis, and Policy Options*, by Phillip Brown and Molly F. Sherlock.
[16] Before the recession, large-scale renewable energy projects relied on tax-equity markets to convert tax credits into cash. Tax-equity markets dried up during the recession, making it harder for many market participants to realize the value of renewable energy tax benefits. The Treasury grants in lieu of tax credits program supported the renewable energy industry during the recession, when tax equity availability was limited.
[17] Tax credits for wind are scheduled to remain available for one year, through the end of 2012. Currently available credits for other technologies are scheduled to expire in 2013 or 2016. Grants are still being paid out to qualifying projects as these projects come online.
[18] A frequently updated list of Section 1603 grant awards can be found on the Treasury Department's website, available at: http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx.
[19] This includes $1.7 billion paid out in 2009, $3.3 billion paid out in 2010, $4.7 billion paid out in 2011, and $1.3 billion paid out through March 15, 2012.
[20] See Analytical Perspectives, Budget of the United States Government, FY2013, available at: http://www.whitehouse.gov/omb/budget/Analytical_Perspectives.

program to nearly $22.6 billion. Through March 15, 2012, $8.2 billion (74.7%) of the grants paid were for wind and another $2.0 billion (17.4%) were for solar electricity.

The advanced energy manufacturing tax credit

The advanced energy manufacturing tax credit (Internal Revenue Code (IRC) § 48C) was also established in ARRA. This provision allowed the Treasury to award up to $2.3 billion in tax credits for qualified advanced energy manufacturing projects. These tax credits were competitively awarded. Selection criteria for projects, as laid out in ARRA, included: 1) commercial viability; 2) job creation; 3) pollution or greenhouse gas emissions reduction; 4) potential for technological innovation; 5) cost-effectiveness; and 6) time to completion.[21]

In January 2010, all $2.3 billion in advanced energy manufacturing tax credits were awarded to 183 projects.[22] There were a number of technically eligible projects that were not awarded tax credits through the competitive process. Specifically, the DOE and Treasury identified 235 technically eligible projects requesting a total of $5.8 billion in tax credits for which funding was not available.[23]

While the advanced energy manufacturing tax credit was available for a range of technologies, renewables accounted for an estimated 69% of credit recipients, in 2010.[24] Manufacturers of solar photovoltaics (PV) and wind turbines and related equipment among the largest recipients.

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[21] Section 1302 of ARRA.
[22] A full list of awards was included in a White House press release, available at: http://www.whitehouse.gov/the-press-office/president-obama-awards-23-billion-new-clean-tech-manufacturing-jobs.
[23] Testimony of Senior Advisor to the Secretary of Energy Matt Rogers, in U.S. Congress, Committee on Ways and Means, *Hearing on Energy Tax Incentives Driving the Green Job Economy*, hearings, 111th Cong., 2nd sess., April 14, 2010 (Washington, DC: GPO, 2010). Testimony available online at: http://energy.gov/sites/prod/files/ciprod/documents/Final_Testimony%286%29.pdf.
[24] U.S. Energy Information Administration (EIA), *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010*, Washington, DC, July 2011, available at: http://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf.

The actual cost of the advanced energy manufacturing tax credit program will likely be less than the $2.3 billion in tax credits awarded. Ultimately, the value of the credits that are actually claimed may be less than the amount that was allocated. This is because some credit recipients may have limited profits, or credits may be carried forward outside of the budget window. When ARRA was enacted, it was estimated that the program would have a 10-year revenue cost of $1.6 billion.[25]

3. Renewable Energy Tax Policy in the President's FY2013 Budget Request

The President's FY2013 Budget contains a number of proposals that would extend, expand, or reinstate certain tax incentives for renewable energy.[26]

Modify and extend the Section 1603 program

The President's FY2013 Budget proposes to extend the Section 1603 grant program, making the grant option available to property with a construction start date of 2012. This extended grant option would only be available to property that is also placed in service in 2012. The proposal would also extend the PTC for wind, as well as the option to elect the ITC in lieu of the PTC, through 2013.

For property that is placed in service after 2012, the Administration proposes replacing the Section 1603 grant with a refundable tax credit. Thus, PTC-eligible property placed in service during 2013, including wind energy property, would qualify for a 30% refundable tax credit. ITC-eligible property placed in service between 2013 and 2016 would also have the option of receiving a refundable tax credit under the Administration's proposal.

[25] U.S. Congress, Joint Committee on Taxation, *General Explanation of Tax Legislation Enacted in the 111th Congress*, committee print, 111th Cong., March 2011, JCS-2-11. Between 2010 and 2015, JCT estimates suggest forgone revenues of $1.8 billion due to advanced energy manufacturing tax credit awards.

[26] Additional details on the Administration's tax policy proposals can be found in Department of the Treasury, *General Explanations of the Administration's Fiscal Year 2013 Revenue Proposals*, Washington, DC, February 2012, available at: http://www.treasury.gov/resource-center/tax-policy/Documents/General-Explanations-FY2013.pdf

The JCT has estimated that extending the PTC and the option to elect the ITC in lieu of the PTC for wind through 2013, extending the Section 1603 grant in lieu of tax credit program through 2012, and converting the Section 1603 grant into a refundable tax credit for 2013 through 2016, would cost an estimated $5.7 billion over the 2012 – 2022 budget window.[27]

Provide an additional allocation for advanced energy manufacturing tax credits

The President's FY2013 Budget proposes to provide an additional $5 billion allocation for advanced energy manufacturing tax credits. The President's FY2012 Budget contained a similar proposal, which was not enacted.

The JCT has estimated that providing an additional allocation of $5 billion in tax credits would have a 10-year revenue cost of $3.3 billion.[28]

Extend certain expired and expiring energy tax provisions

As was mentioned above, the President's FY2013 budget proposes extending the PTC for wind through 2013. Under this proposal, the option to claim a 30% ITC instead of the PTC would also be extended. The President's FY2013 Budget also proposes to extend a number of other energy-related (but not necessarily renewable energy) provisions.[29]

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[27] See U.S. Congress, Joint Committee on Taxation, *Estimated Budget Effects Of The Revenue Provisions Contained In the President's Fiscal Year 2013 Budget Proposal*, committee print, 112th Cong., March 21, 2012, JCX-27-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4413. The Treasury estimated that this provision would cost $4.3 billion over the same time period. Both the JCT and the Treasury estimates include outlay effects. The Treasury estimates that outlays resulting from extending the Section 1603 grant program will be $1.3 billion, while the JCT estimates that outlays from extending the Section 1603 grant program under this proposal will be $4.7 billion.

[28] U.S. Congress, Joint Committee on Taxation, *Estimated Budget Effects Of The Revenue Provisions Contained In the President's Fiscal Year 2013 Budget Proposal*, committee print, 112th Cong., March 21, 2012, JCX-27-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4413.

[29] In addition, the President's FY2013 Budget would extend a number of other recently expired energy tax provisions. These provisions include those designed to support renewable and alternative fuels (e.g., incentives for biodiesel, renewable diesel, and alternative fuels; incentives for cellulosic biofuels and cellulosic biofuel plant property; and incentives for alternative fuel vehicle refueling property) as well as a number of incentives designed to promote energy efficiency (e.g., tax credits for energy-efficient new

Revenue estimates of provisions in the President's FY2013 Budget proposal do not separately estimate the cost of extending the PTC as a stand alone provision. The cost of extending the current PTC for one year, through 2013 for wind and 2014 for other eligible technologies, was estimated to cost $4.1 billion over the 10-year budget window.[30]

4. Characteristics of Economically Efficient Renewable Energy Tax Policy

From an economic perspective, energy prices would ideally reflect the full social cost of energy production and consumption. Having accurate cost and price signals would direct economic resources towards their most productive use. An economically efficient way to achieve this outcome would be to tax energy resources that have negative external social costs, such as pollution. Increasing the price of energy resources would not only reduce overall demand for energy, but would also create incentives for investment in non-polluting alternatives.

The history of U.S. energy tax policy indicates a preference for subsidies, rather than direct taxes. Given this preference, this testimony provides some economic analysis related to designing efficient energy tax incentives.

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homes; tax credits for energy-efficient appliance manufacturers; and residential energy efficiency tax incentives). The President's FY2013 Budget also proposes modifications to a number of other tax incentives related to energy efficiency and alternative technology vehicles.

[30] U.S. Congress, Joint Committee on Taxation, *Estimated Budget Effects of S. 2204, the "Repeal Big Oil Tax Subsidies Act" Scheduled for Consideration on the Senate Floor March 26, 2012*, committee print, 112th Cong., March 23, 2012, JCX-29-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4415.

Cost-effective incentives are those that encourage changes in behavior, rather than simply rewarding current practices

The goal of energy tax incentives is to encourage, promote, or support production or consumption of targeted energy resources. Tax subsidies for residential energy efficiency, for example, are intended to promote investment in residential energy-saving property. Tax subsidies for residential energy efficiency (as well as other energy-related tax subsidies) reward two types of consumers: those who would not have installed the energy-saving property without the tax incentive, and those who would have installed the energy-saving property even if a tax incentive were not available. In practice, it is very difficult to target tax incentives such that only the first group benefits.

Economists find that tax incentives are more efficient (and cost-effective) when a larger proportion of taxpayers change their behavior to become eligible for the tax incentive. If few taxpayers actually change their behavior to benefit from a tax incentive, tax incentives either 1) provide windfall gains to taxpayers already engaged in the activity the incentive was designed to promote; or 2) the incentive is ineffective.

For renewable energy projects with longer planning horizons, tax uncertainty might prevent marginal projects from moving forward. These marginal projects are those that would likely respond directly to the tax incentive, but without a tax incentive, are not viable. In the face of tax uncertainty, other investments in renewable energy are still likely to take place. These investments, however, are not those that are motivated by tax incentives. If tax incentives happen to be available when these projects are placed in service, these projects will benefit. For the latter class of projects, however, tax incentives did not cause additional renewable energy investment. Instead, tax incentives provided a windfall benefit without motivating additional investment in renewable energy.

To the extent that tax uncertainty prevents marginal projects from moving forward, and allows other projects to receive windfall benefits, tax uncertainty is inefficient and diminishes the cost-effectiveness of tax policies.

Effective energy tax incentives support technologies that would be competitive if energy prices reflected the full social cost of energy consumption and production

Subsidies for low-carbon energy resources can be viewed as compensating for the fact that polluting energy resources are under-priced. In other words, in a market where pollution is not priced, subsidies for clean energy can help level the playing field. Overly generous subsidies, however, might support technologies that would otherwise not be viable (or do not have the potential to become viable at some point in the future). Supporting technologies with limited viability can create economic distortions, diverting economic resources away from more promising alternatives.

Incentives made available to a broad range of technologies avoid "picking winners"

Renewable energy tax incentives may seek to achieve varied policy goals. One goal might be reduced CO_2 emissions. Another goal might be to strengthen domestic manufacturing and promote job creation. A third goal might be to enhance energy security. Ideally, energy tax policy should be designed to allow markets to choose which technologies best meet energy policy objectives. This point is illustrated by expanding on the policy goal of reducing CO_2 emissions.

If the policy goal is to reduce carbon emissions, a tax on carbon would create market incentives for businesses and individuals to find low-cost, low-carbon alternatives. A direct tax on carbon would prevent policymakers from making explicit choices regarding which low-carbon technologies should be employed. In contrast, subsidies for low-carbon technologies require the identification of certain technologies as being explicitly eligible for the subsidy. This may create a bias against newly emerging technologies, as it takes time to update the tax code to expand the list of qualifying technologies.[31]

[31] This point was made in U.S. Congress, House Committee on Ways and Means, Subcommittee on Select Revenue Measures, *Energy Policy and Tax Reform*, Statement of Donald B. Marron, 112th Cong., 1st sess., September 22, 2011.

If the goal is renewable energy production, incentives that reward production are preferred to those that reward investment

Production incentives reward the generation of electricity using renewable energy resources. When production is rewarded, investors will strive to maximize the output of qualifying energy, given the resources available. Alternatively, instead of directly rewarding energy production, investment tax incentives reward capital investment. By rewarding investment rather than production, there is a concern that investments may not translate into maximum production capacity. Further, incentives that reward investment as opposed to production may lead firms to use more capital at the expense of labor.[32]

Energy tax policy does not exist in a vacuum; tax policies may interact with or be redundant to other policies supporting energy

Tax incentives are one of many tools that can be used to support energy policy objectives. One goal for the design of energy-related tax incentives should be to avoid policy redundancy: if policy goals are being achieved through the use of another policy instrument, tax incentives may not achieve purported policy goals efficiently.

In the case of renewable energy tax credits, one concern is that state-level Renewable Portfolio Standards (RPS) might drive up the costs associated with federal tax incentives.[33] If energy investment is being driven by state-level policies mandating renewable energy use, then tax expenditures for renewable energy incentives may increase without an associated increase in renewable energy investment. In other words, if investment is being driven by state-level renewable energy policies, tax credits might simply be rewarding existing activity.[34]

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[32] This point was made in U.S. Congress, House Committee on Ways and Means, Subcommittee on Select Revenue Measures, *Energy Policy and Tax Reform*, Statement of Donald B. Marron, 112th Cong., 1st sess., September 22, 2011.

[33] Gilbert E. Metcalf, "Tax Policies for Low-Carbon Technologies," *National Tax Journal*, vol. 62, no. 3 (September 2009), p. 517.

[34] Similar concerns have been raised with respect to tax incentives for biofuels under the Renewable Fuel Standard (RFS). Consumption of biofuels is largely driven by the RFS. To the extent that biofuel consumption is driven by this mandate, tax credits do not lead to additional production. While tax

Thank you again for inviting me to appear today. I am happy to respond to your questions.

incentives for biofuels may have limited effects on production under the RFS, the tax credits still provide financial support to biofuel blenders, producers, as well as purchasers of blended fuel. See Congressional Budget Office, *Using Biofuel Tax Credits to Achieve Energy and Environmental Policy Goals*, Washington, DC, July 2010, p. 18 and U.S. Government Accountability Office, *Biofuels: Potential Effects and Challenges of Required Increases in Production and Use*, GAO-09-446, August 2009, pp. 99-105, http://www.gao.gov/new.items/d09446.pdf.