§1603 Treasury Grant Expiration: Industry Insight on Financing and Market Implications

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National Renewable Energy Laboratory

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NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

Technical Report
NREL/TP-6A20-53720
June 2012

Contract No. DE-AC36-08GO28308

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Prepared under Task No. SM12.3040

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Executive Summary

In the United States, the growth of the renewable energy sector is dependent on the U.S. tax code and the availability of "tax equity." Investments in new commercial and utility-scale renewable power production facilities are fostered by tax credits (the production tax credit and investment tax credit) and accelerated depreciation benefits. However, distinct from many industries receiving tax support, most renewable energy developers do not have significant tax liability internally to monetize the tax credits and depreciation benefits. Rather, they must rely on specialized, third-party investors (e.g., financial institutions)—known as tax equity investors—to finance projects in return for the tax benefits. This need for such specialized investors constrains the availability of private capital for renewable energy projects, particularly for projects that are developed by entities that are smaller, have less development experience, or that seek to deploy new or less-proven technologies.

During the 2008–2009 financial crisis, the number of tax equity investors willing to make new investments decreased from nearly 20 to approximately 5. This withdrawal of investors from the market contributed to a significant stagnation in new renewable power project development. In response, Congress established a temporary grant program pursuant to Section 1603 of the American Recovery and Reinvestment Act (the §1603 Program) to offer a cash payment in lieu of previously existing investment tax credit. The §1603 Program entitled project developers to receive 30% of a project's capital cost in the form of a cash payment, thus freeing developers of having to rely on tax equity investors to monetize the tax credits.

The §1603 Program expired on December 31, 2011, although projects that started construction prior to that date are eligible to receive the award. Accordingly, as of mid-2012, the §1603 Program continues to stimulate project development. That stimulus is expected to wane over the next several months, and projects will again need to rely more heavily on the tax equity markets to monetize federal tax benefits.

This study explores the likely project financing and market impacts from the expiration of the §1603 Program. The authors assembled an array of insights offered by financial executives active in the renewable energy market during conference panel discussions and in presentations, direct interviews, and email correspondences.

This analysis finds that the current form of tax benefits limit the pool of investors to a select few financial institutions and others who:

- Have a substantial current and future tax liability
- Have the financial acumen to engage in a complex project structure
- Are willing to hold their ownership interests in the projects for several years
- Are able to invest in illiquid assets (i.e., that tie up cash and cannot easily be resold)
- Are willing to invest in non-core assets rather than the firm's primary mission, debt reduction, shareholder dividends, or retaining cash for a contingency

- Are sufficiently sophisticated to account for a shifting tax policy environment in their investment decisions
- Are comfortable with modest returns generally earned by tax equity (unlike most corporations, financial companies are highly leveraged, which increases the value of the tax equity investment).

These constraints have resulted in a limited number of suppliers and supply of tax equity investment, which was consensually cited among experts interviewed for this analysis as critical to renewable energy project deployment. In 2010, the latest year for which industry data is available, 10 entities provided the large majority of tax equity (97%). Of these 10 substantial tax equity investors, all but one, Pacific Gas and Electric, were financial entities.

Through May 8, 2012, the §1603 Program had awarded $11.6 billion to almost 38,000 projects.

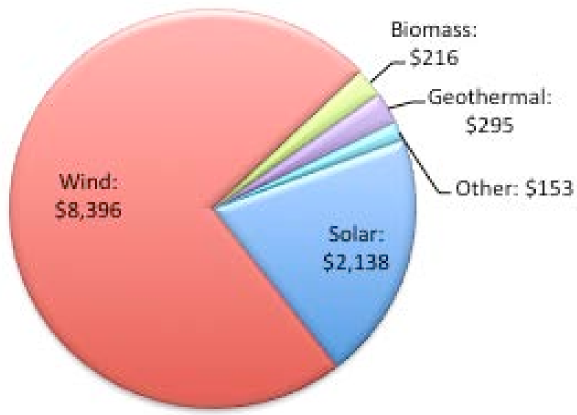

Figure ES-1. §1603 Program total funding ($millions)

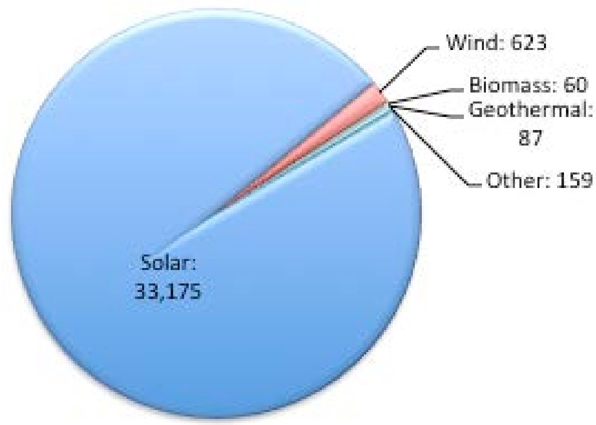

Figure ES-2. §1603 Program total projects awarded

Assuming §1603 awards equal 30% of total project costs, the program has supported, up through May 8, 2012, $38.6 billion in total investments. Awards under the program have been made to all 50 states. Eight states have received over $350 million in §1603 program awards, with the largest total award dollars going to Texas.

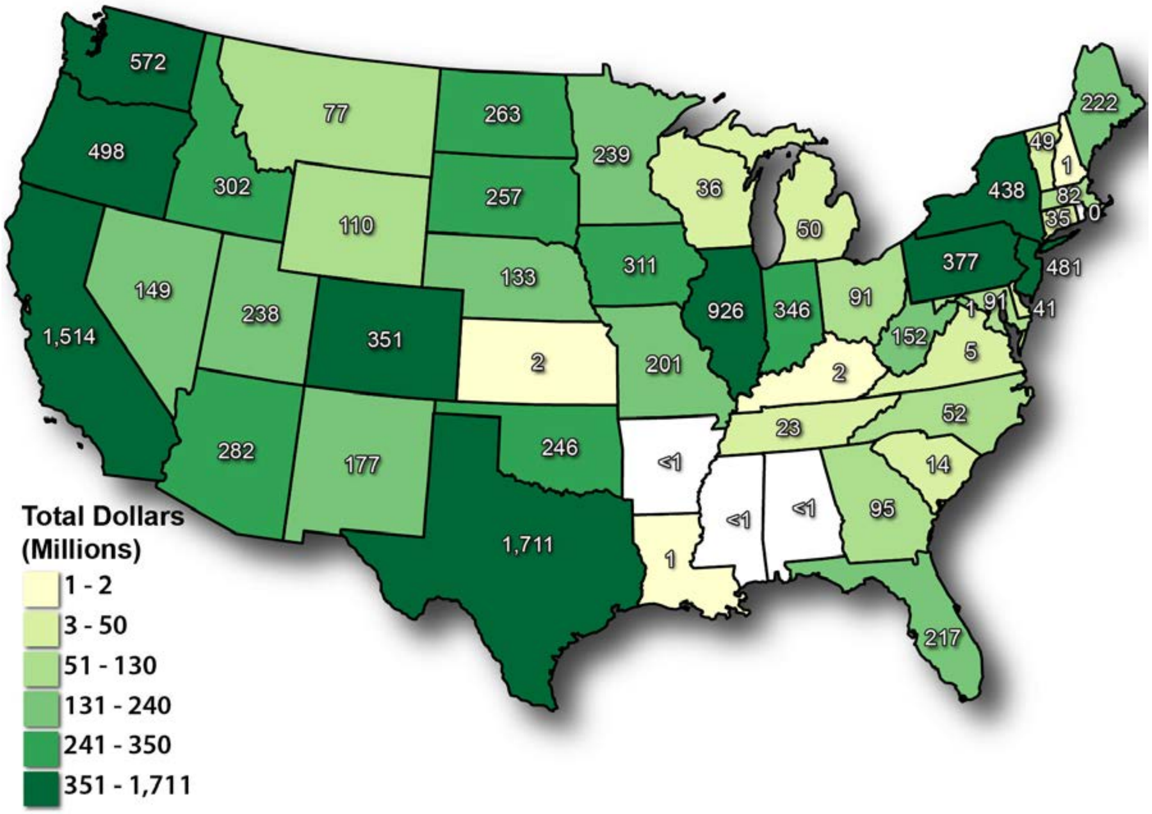

Figure ES-3. §1603 Program awards by state

The program has supported 16.9 gigawatts (GW) of new installed capacity, expected to produce 43,500 gigawatt-hours (GWh) annually, made up of a wide range of technologies, including hydroelectric, geothermal, biomass, and fuel cells.

The analysis also finds that the §1603 Program provided the following benefits to renewable energy projects relative to the tax credit program it replaced:

- Increased speed and flexibility
- Lower transaction and financing costs
- Stretched supply of traditional tax equity
- Support of smaller developers (including new entrants) and innovative technologies that were less capable to tap tax equity markets
- Improved economics of most renewable energy projects
- Allowed use of more debt, lowering developer or project cost of capital
- General support of an extensive build-out of renewable power generation projects.

Three potential and not mutually exclusive outcomes are expected as the §1603 Program ends:

1. Smaller or less-established renewable power developers, especially those with smaller projects, are expected to have more difficulty attracting needed financial capital and completing their projects. This is likely to lead to industry consolidation as well-funded developers acquire smaller firms.
2. Development of projects relying on newer or "innovative" technologies that have little operational track records will likely slow as many tax equity investors are seen as highly averse to technology risk in the projects they fund.
3. Projects relying on tax equity are usually more expensive to develop due to the transaction costs and potentially higher yields required to attract tax equity. This cost increase may slow new investment in renewable power projects by reducing developer returns. Moreover, alternative and new sources of tax equity are needed to meet market demand. GTM Research estimated total financing needs for renewable energy in 2013 will reach roughly $50 billion. Assuming roughly one-half of that value represents monetized tax benefits, approximately $25 billion in tax equity or similar investment will be needed, significantly exceeding the investment appetite of current tax equity providers. Over time, absent new tax equity investors entering the market or offsetting reductions in capital cost, the incremental cost to project financing might increase the cost to utilities and end-users who procure renewable power.

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1 Renewable Energy Policy and the U.S. Tax Code

1.1 Introduction

Tax policy is one of the government's main fiscal instruments to incentivize or disincentivize allocation of resources. Additionally, tax policy may intend to correct a perceived market failure. Examples include tax policy incentives for the oil and gas industry, research and development (R&D), manufacturing, and low-income housing. Renewable energy production has been supported via tax policies in order to reduce reliance on imported, foreign oil, while also addressing environmental concerns by reducing the use of fossil fuels.[1]

The federal government offers incentives through the tax code to promote private sector investment in new commercial and utility-scale renewable power projects. Investors benefit from these tax incentives in two ways. First, investors in qualifying renewable power generation projects can claim credits against their income tax obligations, including:

- Investment tax credit (ITC), which is currently 30% of eligible project capital costs, for projects using solar and certain other renewable technologies
- Production tax credit (PTC), which currently ranges from $0.011 to $0.022 per kilowatt-hour (kWh), depending on the technology[2] but which is prominently used for wind projects.

The ITC and PTC vary by technology in their availability and terms. Both reduce dollar-for-dollar federal income taxes owed by the owners of the qualifying property.

Second, investors in new renewable power generation projects also are able to accelerate the depreciation of the renewable project assets that in turn enables them to defer related federal taxable income and obligations in the early years of the projects. Specifically, renewable power investors are able to use the five-year Modified Accelerated Cost Recovery System (MACRS) accelerated depreciation method for most of their project capital costs.[3] Figure 1 compares the percentage of the assets deductible annually under the five-year MACRS schedule, the five-year MACRS schedule with a 50% bonus (for which renewable electricity plants generally are eligible in 2012), and a 20-year straight-line schedule.[4] Together, the tax credits and the accelerated depreciation compose what is referred to as the "tax benefits" of a renewable project. A Chadbourne & Parke tax attorney estimates the tax benefits for solar and wind projects—on a present value basis—amount to about 56% of the initial capital costs.[5]

[1] See CRS Report R40999, *Energy Tax Policy: Issues in the 111th Congress,* for a larger overview of various energy market failures and economic rationales for intervention.
[2] See 26 USC § 45 and 26 USC § 48 of the federal tax code. Also "Business Production Energy Tax Credit" and "Business Investment Energy Tax Credit." Database of State Incentives for Renewables & Efficiency, North Carolina Solar Center. www.dsireusa.org/incentives/index.cfm?state=us&re=1&EE=1. Accessed December 14, 2011.
[3] "Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation 2008-2012." www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US06F&re=1&ee=1. DSIRE. Accessed December 14, 2011.
[4] All depreciation schedules shown are based on the half-year convention.
[5] "Financing Rooftop Solar Projects in the US." *Project Finance Newswire*, Chadbourne & Parke LLP. November 2011. www.chadbourne.com/files/Publication/d97f5fc1-1924-4ea6-90cd-

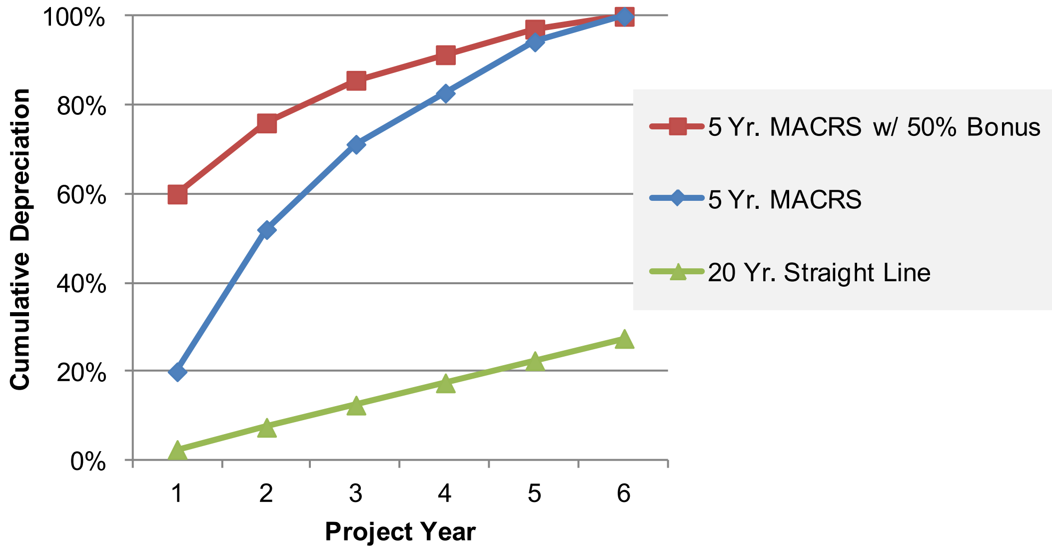

Figure 1. Reduction in asset value for tax purposes under accelerated and 20-year straight line depreciation schedules*

*First six years only; Source: National Renewable Energy Laboratory 2012

These benefits can represent a powerful incentive to private investment, but their realization is hampered by the complexity of monetizing their value, the illiquid nature of the investments, and the uncertainty of the policies. Since most renewable energy developers do not have significant tax liability internally to monetize the tax credits and depreciation benefits, developers have to rely on third-party specialized investors (e.g., financial institutions)—known as tax equity investors—to realize the benefits of the tax incentives and, in turn, finance projects. The need for such specialized investors constrains the availability of private capital, particularly for projects that are developed by entities that are smaller, have less development experience, or seek to deploy new or less-proven technologies.

During the 2008–2009 financial crisis, the number of tax equity investors willing to make new investments decreased from nearly 20 to approximately 5. This withdrawal of investors from the market contributed to a significant stagnation in new renewable power project development. In response, Congress established a temporary grant program pursuant to Section 1603 of the American Recovery and Reinvestment Act (the §1603 Program) to offer a cash payment in lieu of the ITC. The program entitled project developers to receive 30% of a project's capital cost in the form of a cash payment, thus freeing developers of having to rely on tax equity investors to monetize the tax credits.

The §1603 Program expired on December 31, 2011, although projects that started construction prior to that date are eligible to receive the award. Accordingly, as of mid-2012, the §1603 Program continues to stimulate project development. That stimulus is expected to wane over the next several months, and projects will again need to rely more heavily on the tax equity markets to monetize federal tax benefits.

48e96a8307f5/Presentation/PublicationAttachment/6d7a694c-94c9-4e23-ae3a-4b411d00f682/PFNewsWire_Nov11.pdf. Accessed December 5, 2011.

This study explores the likely project financing and market impacts from the expiration of the §1603 Program.

1.2 Analysis Motivation and Methodology

This report was developed as part of the National Renewable Energy Laboratory's (NREL's) ongoing efforts to inform business and policy decision making in the renewable energy sector and the impacts associated with §1603 Program expiration. Funds for the effort were from the U.S. Department of Energy.[6] While this report provides indicative viewpoints from participants in the renewable energy project finance community, it is not based on a formal survey. While the analysis focuses on the impact of the §1603 Program expiration on the renewable energy community, it does not include broader evaluations of the impact of this program on the federal budget deficit, the value and efficacy of tax incentives versus other policy tools (to either project developers or taxpayers), or other public policy considerations.

During the second half of 2011 and early 2012, the authors spoke with senior figures at several prominent renewable power developers, investment firms, and related financial advisory and law firms. These interviewees were selected due to their breadth of knowledge and experience regarding renewable energy finance. The authors spoke with individuals only within the renewable energy finance community directly using or otherwise advising on use of the incentives. These included: Matthew Meares, director of project finance at Amonix, a developer of concentrating photovoltaic (PV) systems; Jonathon Zurkoff, vice president of finance with US Geothermal, an international developer of geothermal power systems; Jacob Susman, founder and CEO of OwnEnergy, a developer of community wind systems; Mike Niver, former director of project finance with SolarCity, a developer of residential solar systems; Terry Grant, managing director of Marathon Capital, a renewable power financial advisory firm; Ed Feo, managing director of USRG Renewable Finance, an investment firm in the sector; Barry Neal, director of environmental finance at Wells Fargo, an investor of tax equity and other financing for renewable power projects; Steven Taub, senior vice president, Investment Strategy at GE Energy Financial Services, which invests globally in energy projects and companies, including renewable energy; Greg Rosen, vice president of solar finance for Union Bank, a financing firm; Brett Prior, senior analyst with GTM Research, a source of renewable energy financial analysis; and James Duffy, a partner with the law firm of Nixon Peabody LLP, and Adam Kobos, a partner with Stoel Rives, LLC, both large law firms with practice specialties in renewable energy and tax credit finance.

1.3 Background on How Tax Credits are Monetized

Renewable energy projects generally do not create sufficient income tax obligations to directly take full and immediate advantage of tax benefits. While the project owners can "carry forward" tax benefits to use them in future years, their present value is reduced, lowering the project's return. Tax benefits are generally realized or "monetized" in one of three ways:

[6] NREL benefits from the §1603 Program as it receives compensation for reviewing applications on behalf of the Department of Treasury. No funds from such compensation were used to support this article, no data collected through NREL's application review services were used in this analysis, and no NREL staff involved in such application reviews were interviewed or involved in preparation of this article.

1. *Sponsor Tax Appetite.* The project developer, or sponsor, may have the taxable income, referred to as "tax appetite," from other business activities that can use the project's tax benefits. In these instances, the project developer's tax benefits are passed through and consolidated with the developer's other taxable income and losses. Several large developers closed financing for projects in 2011, including NRG, Duke, Exelon, NextEra Energy, and MidAmerican Energy Holdings, and likely plan to employ their own tax appetite to monetize the tax benefits flowing from their equity investments in their projects.[7] For example, Mid-American Energy Holdings announced in December 2011 a plan to acquire a 550-megawatt (MW) solar farm from First Solar.[8] Such companies may also acquire these benefits from other developers. A common trait of such companies is their ability to make use of the tax benefits by virtue of links to large, recurring tax obligations from their other operations.

   However, most renewable energy developers cannot easily use tax credits due to their small size and/or lack of profitability at the project or corporate level, leading to a lack of tax liability necessary to monetize the tax benefits at full value. Thus, third-party "tax equity providers" emerged to fill this gap.

2. *Third-Party Tax Equity.* Developers who are unable to make full use of the tax benefits of their projects and are unwilling to sell their projects outright can seek investment capital from specialized third-party entities. The third parties invest in renewable energy projects specifically to use their tax benefits to reduce their own tax obligations.[9] Third-party tax equity is frequently cited as a critical source of tax-benefit monetization, without which many renewable energy projects would not be able to arrange financing.[10]

   The market for third-party tax equity investment has a relatively high barrier to entry because these entities need to have (1) a current and future tax appetite to absorb the tax benefits fully (requires visibility over future earnings that is particularly difficult in times of economic volatility), (2) the expertise to fully assess the array of technology and financial and contractual risks involved in renewable power projects, and (3) the acumen to negotiate the complex financial structures necessary to distribute risk and reward among the various parties involved. Innovative financial equity partnership and leasing structures have been created to respond to the varying goals and capabilities of project developers and tax equity investors, but implementing these can generate significant transaction costs and/or absorb some of the tax benefits designed to spur the

[7] Prior, B. "Assessing the State of Project Finance." GTM Research, U.S. Solar Market Insight Conference, November 16, 2011.
[8] Burger, A. "Buffett's Mid-American Buys First Solar's 550MW Topaz Solar Power Project." CleanTechnica.com. http://cleantechnica.com/2011/12/08/buffetts-mid-american-buys-first-solars-550-mw-topaz-solar-power-project/. Accessed December 14, 2011.
[9] However, most tax equity investors will require the deal to have a positive cash-on-cash return per IRS rules.
[10] See "U.S. Policy Outlook for Renewable Energy." Chadbourne and Parke, LLP, *Project Finance Newswire*, June 2011. See also Mendelsohn, M. "A Chicken in Every Pot? Is there Enough Tax Equity to Sustain the RE Market?" NREL, November 15, 2010. https://financere.nrel.gov/finance/content/chicken-every-pot-there-enough-tax-equity-sustain-re-market.

investment.[11,12] The community of tax equity investors and the tax benefit monetization capacity they bring to the renewable power industry are discussed in Section 2.1.

3. *§1603 Treasury Grant Program.* From 2009 to 2011, the §1603 Program essentially monetized the ITC tax credits by allowing a project sponsor to take a cash award, or grant, in lieu of the ITC tax benefits. By doing so, the program directly reduced the demand for tax equity. The §1603 Program expired at the end of 2011 and is discussed at length in Section 3.

1.4 ITC/PTC Policy Challenges

There are two major challenges with respect to the ITC/PTC policy that are most commonly cited by energy project developers and financers: policy uncertainty and complex and costly transactions.

1.4.1 Policy Uncertainty

Neither the PTC nor the ITC (in their current forms) has been made permanent. These tax policies have expired, or been renewed in the last quarter-year of their existence, at least seven times over the last 15 years (see Figure 2), creating significant market uncertainty. For example, since 1999, the PTC has been allowed to lapse by Congress on three occasions, with each lapse resulting in a precipitous drop in new wind installations. In the earlier years of wind project development, pending expirations of the PTC led developers to undertake extraordinary efforts to bring their projects online prior to the expiration date to manage the uncertainty associated with the renewal of the incentive policy. This reaction led to a boom-bust cycle in the wind sector from 1999 to 2005 that reduced investment levels and, as a consequence, the overall effectiveness of the PTC.[13] Figure 2 shows the subsequent growth in wind energy investments when the PTC was extended for a longer time period.[14]

The ability to qualify for the PTC will terminate at the end of 2012 (for wind projects) and 2013 (for projects using geothermal, biomass, landfill gas, and hydro technologies). Qualification for the current 30% ITC rate for solar projects is legislated to fall back to a 10% rate at the end of 2016. The eligibility period and rates vary by the renewable power technology. Projects only obtain/qualify for the ITC and the PTC when the project enters into commercial operations; that date must be prior to the expiration of the legislated availability of the respective tax credit.

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[11] Harper, J.; Karcher, M.; Bolinger, M. *Wind Project Financing Structures: A Review & Comparative Analysis*. LBNL-63434. Berkeley, CA: Lawrence Berkeley National Laboratory, September 2007. http://eetd.lbl.gov/ea/ems/reports/63434.pdf.

[12] "The Return – And Returns of Tax Equity for US Renewable Projects." Bloomberg New Energy Finance. November 21, 2011. http://www.reznickgroup.com/sites/reznickgroup.com/files/papers/taxequity_reznickgroup_wp112011.pdf.

[13] "Production Tax Credit for Renewable Energy." Published by the Union for Concerned Scientists. www.ucsusa.org/clean_energy/solutions/big_picture_solutions/production-tax-credit-for.html. Accessed September 12, 2011.

[14] The reduced investment levels in 2010 and 2011 shown in Figure 2 reflected more the national recession, which reduced the demand for new renewable power capacity and financial market turbulence, which reduced the supply of tax equity available to make use of the depreciation benefits.

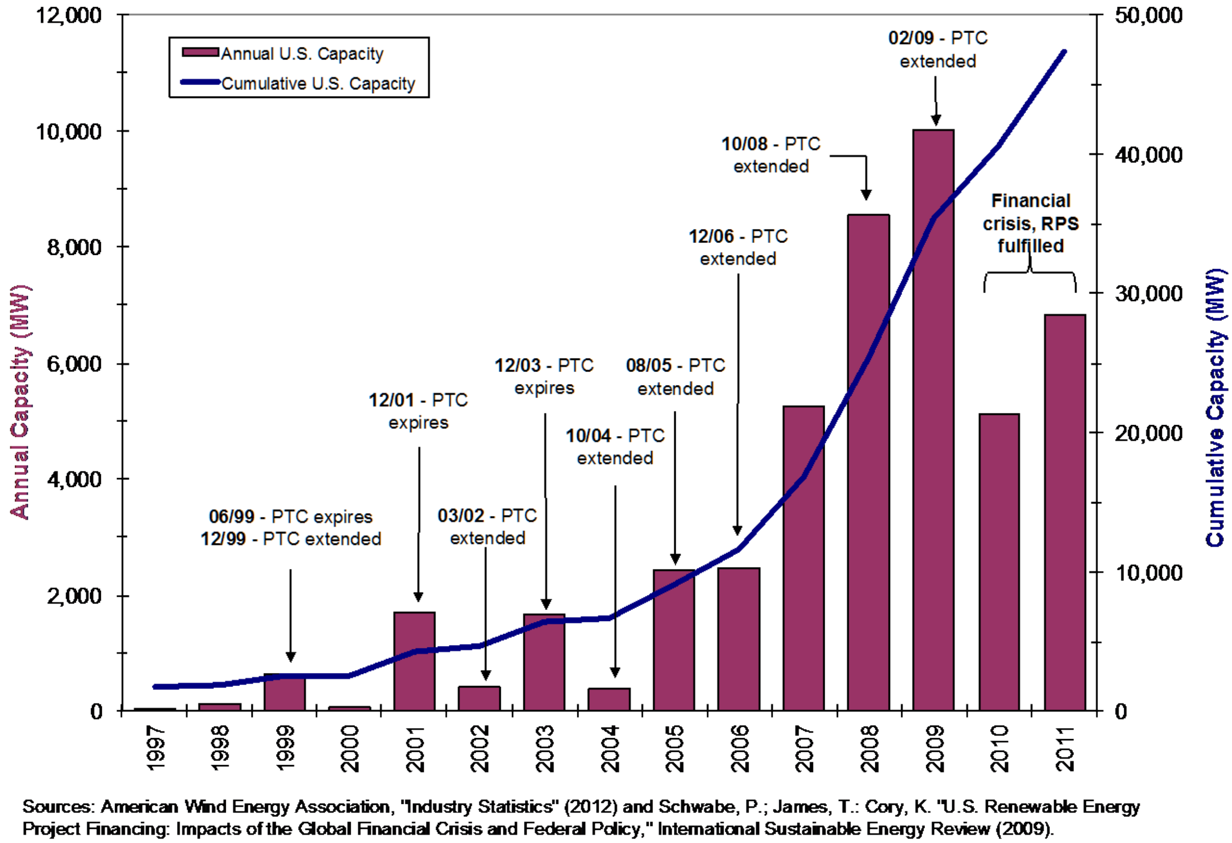

Figure 2. Wind energy investment in response to federal incentives

The drop in wind investment levels from 2009 to 2010 and 2011 did not reflect the PTC being unavailable (new projects can qualify for it through the end of 2012). Rather, it reflected lower natural gas prices, the economic recession, and utilities approaching or meeting their renewable portfolio standard (RPS) mandates, all of which reduced the demand for new renewable power.[15]

1.4.2 Tax Subsidies are Complex to Use and Increase Project Costs

Government incentives in the form of tax credits can be difficult for a renewable project to use efficiently and can cause the project to incur increased transaction costs. First, the tax benefits generated by most renewable energy projects substantially exceed the ability of the projects to make immediate use of the tax savings. That is, the tax credits and accelerated depreciation create tax savings in excess of the income tax obligations created by operation of the renewable power project itself. For projects using the ITC and the accelerated depreciation, most of the tax benefits are received in the first year of operations. Receipt of the PTC is tied to production during the first 10 years of the project. In either case, the tax benefits received in a given year are frequently larger than the project's income tax obligation for that year. While a project (or its owners) may "carry forward" these tax benefits to reduce tax obligations in subsequent years, doing so reduces the present value of the tax benefits.

[15] "As Expected, U.S. Wind Installations Down 50% in 2010." Renewable Energy World. www.renewableenergyworld.com/rea/news/article/2011/01/as-expected-u-s-wind-installations-down-50-in-2010. Accessed February 10, 2012.

Project developers can elect to use a project's tax benefits to reduce their income tax obligations from other operations. However, this option has limited value for developers because they often lack sufficient aggregate income tax obligations.

There are other barriers to effective use of the tax credits as well. Regulated investor-owned utilities (IOUs) cannot immediately pass the tax credit benefits through to their customers. Utility regulators require IOUs to spread the tax benefits over the life of the asset, rather than recognize them in the year(s) in which they are received, which reduces the competitiveness of utility ownership relative to independent developers.[16] Separately, the passive activity and at-risk tax rules make it difficult for most individuals (and certain closely-held corporations) to realize the full benefit of the tax credits and accelerated depreciation deductions.[17] Still other entities (e.g., municipalities and entities with non-profit status) do not pay federal income tax and thus gain no value from receiving tax benefits.

To secure the maximum value of the tax benefits, many project developers seek a separate investor or investors who can make immediate use of the benefits. The amount of legal and technical due diligence costs and time to source such tax equity can reduce the net value of the tax incentives and slow the pace of investment by having to secure agreement from more parties. Some economies are possible with experienced national-scale tax investors familiar with the due diligence process and forms of documentation. Still, the transaction costs remain higher than they would be if the developer or the site host could make use of the tax incentive and own the project directly without tapping third-party capital sources.

Continued reliance upon tax credits and specialized equity investment constrains the renewable energy industry from employing more liquid, tradable mechanisms that can access wider pools of public capital at lower yield requirements. Numerous financial innovations such as asset-backed securitization, real estate investment trusts, master limited partnerships, and long-term debt instruments offer the potential to pool renewable energy project portfolios, reduce risk for investors, and create a tradable security that offers a more accessible-investment environment for pension funds, private individuals, sovereign wealth funds, and other sources of currently untapped capital.[18]

Finally, the reliance on third-party tax investor capital subjects renewable power projects to broader financial market conditions and the investment preferences of the tax equity providers. While the tax credits are not capped, changes in the overall profitability of tax equity providers has affected the availability and cost of tax equity capital in recent years and, in turn, the rate of investment in the renewable power sector. While the tax incentives theoretically are available to all qualifying technologies, renewable power projects employing innovative technologies are

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[16] See "Normalization of Solar Investment Tax Credits." Technical Brief, Solar Electric Power Association, June 2011.

[17] See Tracy, S. "Passive Loss Issues in Connection with Solar Investments." Novogradac & Company LLC, February 2010.

[18] See Mendelsohn, M. "Securitization: A Dirty Word, or a New Opportunity for Renewable Energy?" NREL, November 28, 2011. Accessed May 22, 2012. https://financere.nrel.gov/finance/content/securitization-and-secondary-markets-renewable-energy.

See also Mendelsohn, M. "Tapping the Capital Markets: Are REITs Another Tool in Our Toolbox?" NREL, February 27, 2012. https://financere.nrel.gov/finance/content/capital-markets-reit-real-estate-investment-trust-renewable-energy-project-finance-prologis-KIMCO. Accessed May 22, 2012.

impeded from making use of the incentives due to the relative unwillingness of many tax equity providers to assume the performance risks of such technologies.

2 Third-Party Tax Equity

2.1 Market Entities

Third-party tax equity is the provision of equity investment specifically designed to take advantage of the tax benefits. A small set of large institutional investors supplies most of the third-party tax equity. Given the complex and long-dated nature of renewable energy tax equity deals, non-financial institutions have typically not been interested in serving as tax equity investors, especially if renewable energy is not part of their core operations.

Unfortunately, there is a paucity of formal data on the U.S. tax equity market. The Internal Revenue Service (IRS) does not publish information on taxpayers claiming the credits or accelerated depreciation for renewable power projects. Measuring renewable power investment flows also is hindered by confidentiality agreements established among the investment parties.

Third-party tax equity investors can be roughly defined as those businesses (individuals are all but ineligible)[19] who:

- Have a substantial current and future tax liability
- Have the financial acumen to engage in a complex project structure
- Are willing to hold their ownership interests in the projects for several years
- Are able to invest in illiquid assets (i.e., that tie up cash and cannot easily be resold)
- Are willing to invest in non-core assets rather than the firm's primary mission, debt reduction, shareholder dividends, or retaining cash for a contingency
- Are sufficiently sophisticated to account for a shifting tax policy environment in their investment decisions
- Are comfortable with modest returns generally earned by tax equity (unlike most corporations; financial companies are highly leveraged, which increases the value of the tax equity investment).

While formal data is lacking, an industry trade association and some private financial advisory and market intelligence firms do follow tax equity market developments and make their analyses available publicly.[20] These analyses represent the most coherent publicly available reviews of the tax equity market. In the fall of 2011, U.S. Partnership for Renewable Energy Finance (US PREF) estimated that 15 entities would make the majority of the third-party tax equity

[19] Existing "passive loss" and "at-risk" tax regulations make it difficult for most individuals to access the PTC, ITC, and accelerated depreciation incentives. For example, see Spector, P. "Update: Financing Renewables with Treasury Grants." Troutman Sanders LLP. www.troutmansanders.com/update-financing-renewables-with-treasury-grants-03-03-2010/. Accessed January 4, 2012.
Individuals are eligible for a residential energy tax credit for their home-based systems. See "Residential Renewable Energy Tax Credit." DSIRE. www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US37F&re=1&ee=1. Accessed May 22, 2012.

[20] Private firms actively assessing the tax equity market include, among others, the market research firms of Bloomberg New Energy Finance (a service of Bloomberg, L.P.) and GTM Research (a subsidiary of Greentech Media, Inc.) and the accounting and financial consulting firms of Reznick Group, P.C. and Novogradac & Company LLP.

investments in 2011, down from 20 such investors active in 2007 prior to the economic downturn.[21] Bloomberg New Energy Finance (BNEF) estimates only five third-party tax equity investors were active immediately after the financial crisis.[22] The number of such investors has recovered in the last year. An expert panel convened in February 2012 estimated there were 20–22 active players in the tax equity market as of early 2012, but that any project would have far fewer interested investors because many investors "have esoteric requirements, specific needs, or quirks" that limit their interest to a small set of projects.[23]

These estimates focus on the larger national players; they do not assess the small-scale, regional, or local investors who made only a few investments in small amounts. For the latter, only scattered, mostly anecdotal public data exists.[24] Importantly, many of the current tax equity providers have limited post-crisis income and, in turn, may exhaust their tax capacity before the end of the year.[25] Moreover, pending banking regulatory reforms (e.g., Basel III)[26] may place additional scrutiny on assets with questionable credit risks, such as financings involving power purchase agreements with weaker utilities.

Financial sector entities are the principal tax investors due to their familiarity with credit analysis and project investment and large and recurring tax obligations.[27] Table 1 identifies 16 tax investors in 2010, the top 10 of which provided 97% and the top two sources (JP Morgan and GE EFS) provided approximately 49%.[28] Of the top 10 providers of tax equity in 2010, 9 were financial entities (the sole exception being Pacific Gas & Electric). While this subset varies in composition from year to year, these financial entities provide the bulk of the third-party tax equity investment dollars. While specific data is not publicly available, anecdotal evidence indicates that financial institutions again provided the large majority of tax equity in 2011.

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[21] "Prospective 2011-2012 Tax Equity Market Observations." U.S. Partnership for Renewable Energy Finance, July 2011. http://uspref.org/wp-content/uploads/2011/07/US-PREF-Tax-Equity-Market-Observations-v2.2.pdf. Accessed September 12, 2011.
[22] Zindler, E. "The Renewable Energy Tax Equity Opportunity." Presentation to the U.S. Department of Energy/White House. Bloomberg New Energy Finance, March 13, 2012.
[23] "State of the Tax Equity Market." Chadbourne & Parke, LLP, Transcript from Infocast Wind Finance and Investment Summit, San Diego, CA, February, 2012. *Project Finance Newswire*, May 2012.
[24] As an exception, see Bolinger, M. *Community Wind: Once Again Pushing the Envelope of Project Finance* LBNL-4193E. Berkeley, CA: Lawrence Berkeley National Laboratory, January 2011. http://eetd.lbl.gov/EA/EMP/reports/lbnl-4193e.pdf. Accessed September 12, 2011.
[25] "State of the Tax Equity Market," Chadbourne & Parke, LLP, *op. cit.*
[26] Basel III is a "comprehensive set of reform measures designed to improve the regulation, supervision and risk management within the banking sector." Investopedia. http://www.investopedia.com/terms/b/basell-III.asp#ixzz1v99oqhHI. Accessed May 16, 2016.
[27] "Renewable Energy Project Finance in the U.S.: 2010 – 2013 Overview and Future Outlook," Mintz; Levin; Cohn; Ferris; Glovsky; Popeo, PC, produced in collaboration with GTM Research, January 2012. http://www.mintz.com/publications/3055/Renewable_Energy_Project_Finance_in_the_US_20102013_Overview_and_Future_Outlook.
[28] Mintz; Levin; Cohn; Ferris; Glovsky; Popeo. (2012). *op cit.*

Table 1. Large-Scale Tax Equity Investors by Year

2007	2008	2009	2010
Bank of America	Bank of America	Bank of America	**Bank of America**
GE EFS	GE EFS	Citibank	**Citibank**
HSH Nordbank	HSH Nordbank	Credit Suisse	**Credit Suisse**
JP Morgan	JP Morgan	GE EFS	**GE EFS**
Key Bank	Key Bank	JP Morgan	Google
Morgan Stanley	Morgan Stanley	Key Bank	**JP Morgan**
New York Life	New York Life	Morgan Stanley	Key Bank
Northern Trust	Northern Trust	Northern Trust	**MetLife**
Union Bank	Sempra Energy	Union Bank	**Morgan Stanley**
Wells Fargo	SunTrust	U.S. Bank	Northern Trust
ABN Amro *	U.S. Back	Wells Fargo	**PG&E**
AIG *	Wells Fargo		PNC
Citi			Sun Trust
Fortis *			U.S. Bank
John Hancock			**Union Bank**
Lehman Brothers *			**Wells Fargo**
Merrill Lynch *			
Northwestern Mutual			
Prudential			
Wachovia *			

(* Denotes that the company left the tax equity market entirely, bold denotes "main" investors in 2010)

Source: Mintz; Levin/GTM (2012)

To date, other corporates (i.e., non-financial companies) have been reluctant to take on tax equity. Renewable energy is not a core business for most of these companies, and most do not have dedicated in-house teams to grapple with the complexities of tax equity or to assess project risks of renewable assets. Non-financial firms may also prefer alternative investments to be more closely aligned with their primary mission, such as a relevant merger or acquisition, debt reduction, maintaining liquidity for a potential business contingency (e.g., unexpected required investment), or direct distribution to their shareholders via a stock dividend or share repurchase.

In addition, the returns on tax equity investments may not be sufficient for companies, such as oil majors or those involved in technology pure-plays, and particularly for companies without leverage. Finally, in the case of the PTC, engaging in a tax equity investment calls for confidence in the company's ongoing profitability—thus, having tax liabilities—over a long-term (e.g., 10-year) horizon. Companies that are less certain of their future tax liabilities are less willing to invest tax equity.

Generally, individual projects or project portfolios need to have a total capitalization over $25 million to attract tax equity from most of the investors identified in Table 1. Tax equity from regional and smaller financial institutions or through leasing entities, especially for smaller projects, is generally understood to be more expensive due to the higher cost of funds for such entities, the smaller number of potentially interested investors, and possible project-specific risk factors—all of which can increase the cost of development of smaller project portfolios.

2.2 Supply of Third-Party Tax Equity

The supply of third-party tax equity is constrained. US PREF surveyed all of the national tax equity players last year to assess the quantity of tax equity they intended to invest in 2011. Based on this analysis, US PREF estimated these investors would provide roughly $3.6 billion in 2011, excluding any funding from the §1603 Program.[29] While up from the recent low of $1.2 billion provided in 2009, US PREF considered the amount of tax equity invested would remain 40% below the $6.1 billion peak in 2007 (see Figure 3).[30] More importantly, US PREF has predicted that the *supply* of third-party tax equity investments will not increase significantly going forward, as these specialized investments require extensive due diligence and compete against similar tax-oriented investment opportunities, such as low-income housing. They estimate that the tax equity supplied for renewable power projects will remain flat between 2011 and 2012 at $3.6 billion. In an earlier July 2011 report, the group estimated the unavailability of the §1603 Program in 2012 would lead to a 55% reduction in total project investment.[31]

[29] "ITC Cash Grant Market Observations." U.S. Partnership for Renewable Energy Finance (US PREF), December 2011. http://uspref.org/white-papers. Accessed February 9, 2012. Some investment banks earlier placed the quantity of tax equity at $5 billion but based only on back-of-the-envelope estimates ("State of the Tax Equity Market," Chadbourne & Parke, LLP, *op. cit.*).

[30] US PREF. (December 2011). *op cit.*

[31] In this report, US PREF further estimated that this funding loss would lead to a reduction in U.S. renewable energy capacity installed (from 5,165 MW in 2011 to 2,291 MW in 2012).

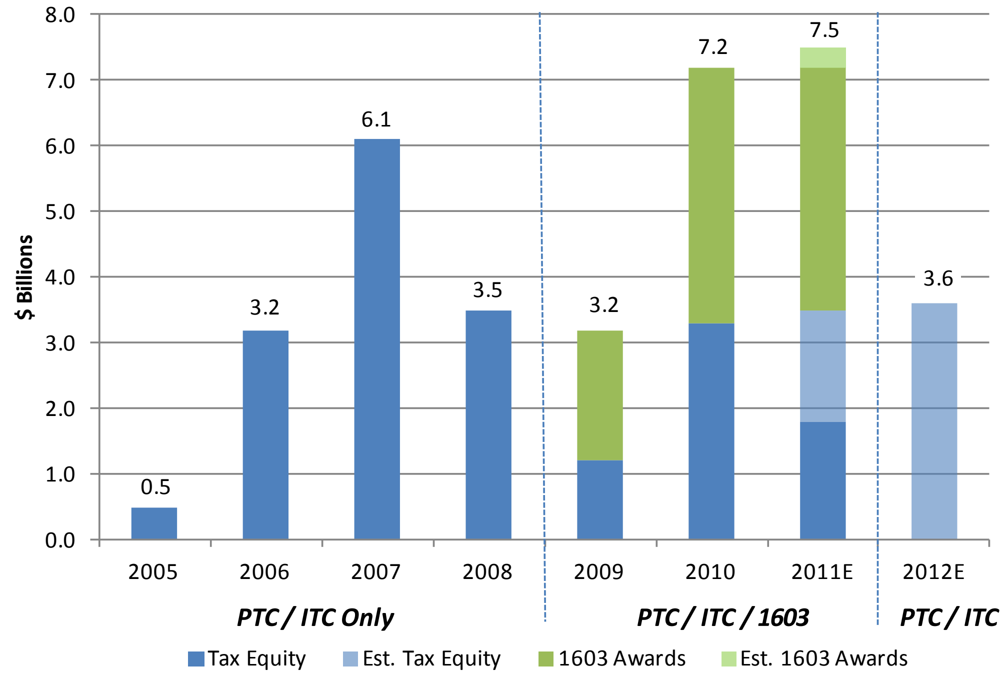

Figure 3. Estimates of historical use and projected availability of tax equity for renewable power projects (as measured by federal government support payments)

Source: US PREF (2011)

2.3 Demand for Tax Equity

The total *demand* for third-party tax equity for renewable power projects could be higher than the available supply projected by US PREF. US PREF anticipates that renewable power developers will seek \$7 billion–\$10 billion in tax equity for their projects in 2012.[32] Moreover, BNEF confirmed this estimate of \$7 billion in tax equity demand for renewable projects in 2012 and states that it exceeds the investment appetite of the established tax equity providers.[33]

GTM Research projects the gross demand for U.S. renewable power project financing will reach \$31.1 billion in 2011, \$41.2 billion in 2012, and \$48.9 billion in 2013.[34]

The amount of tax equity needed for individual projects varies by the type of financial structure employed and the relative financial attractiveness of the transaction. Sale-leaseback structures, popular in the solar PV sector, have the tax equity investor funding almost all of a project's capital costs. In the utility-scale wind sector, a partnership structure has been commonly used in which a third-party tax equity partner contributes 50%–60% of the total capital costs of a project.[35] Using 50% as a crude average estimate of the share of third-party tax equity financing

[32] US PREF. (December 2011). *op cit.*
[33] BNEF. November 2011. "The Return- And Returns-of Tax Equity for US Renewable Projects."
[34] Mintz; Levin; Cohn; Ferris; Glovsky; Popeo. (2012). *op cit.*
[35] Harper, J.; Karcher, M.; Bolinger, M. *Wind Project Financing Structures: A Review & Comparative Analysis.* LBNL-63434. Berkeley, CA: Lawrence Berkeley National Laboratory, September 2007. http://eetd.lbl.gov/ea/ems/reports/63434.pdf. Accessed December 14, 2011.

for projects of all types, industry tax equity demand to meet the projected aggregate financing requirements could top $20 billion in 2012 and $24 billion in 2013 (Figure 4).

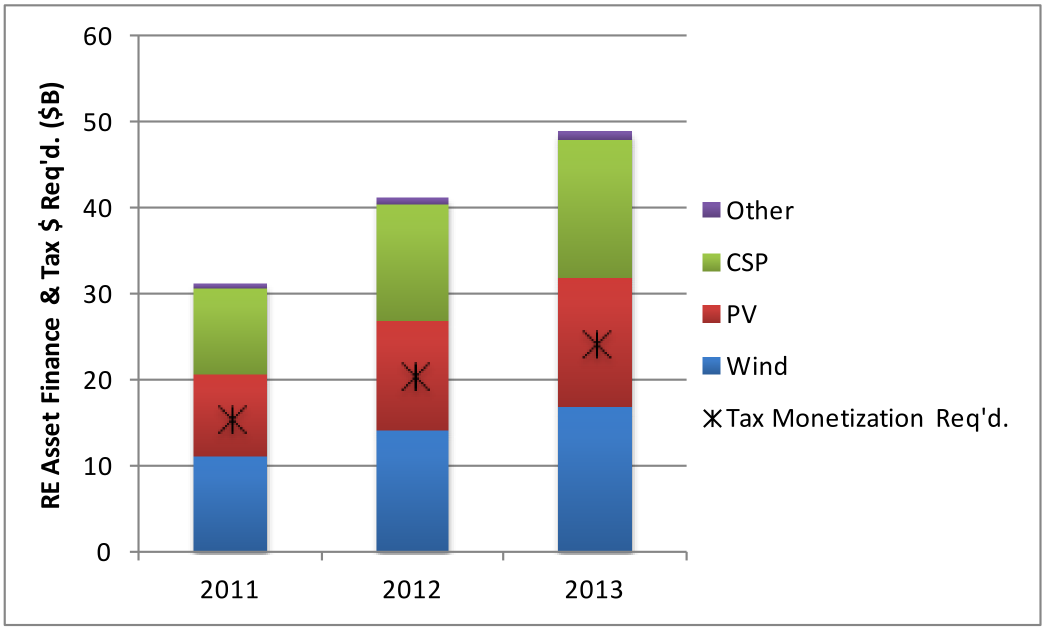

Figure 4. Potential renewable energy financing sought and tax monetization required

(Assuming 50% of project financing needs)
Source: Mintz Levin/GTM (2012), NREL (2012)

GTM's figures do not specifically differentiate among potential tax equity sources (e.g., direct sponsor investments, third-party tax equity, or grandfathered §1603 Program awards). Thus, future third-party tax equity requirements may well be less than the $20–$24 billion estimate.

The Mintz Levin/GTM report looks at all potential renewable energy investment regardless of regulatory need. Restricting the analysis to only the investments required to meet state RPS requirements suggests a smaller but still sizable demand for tax equity. According to a draft analysis by Lawrence Berkeley National Laboratory (LBNL), approximately 6,100 MW of new renewable energy capacity will need to be developed on average annually from 2013 to 2020 to meet the requirements of state RPS targets currently in effect.[36] Figure 5 provides the expected capacity additions through 2020.

[36] Barbose spreadsheet analysis of RPS requirements, LBNL, 2011.

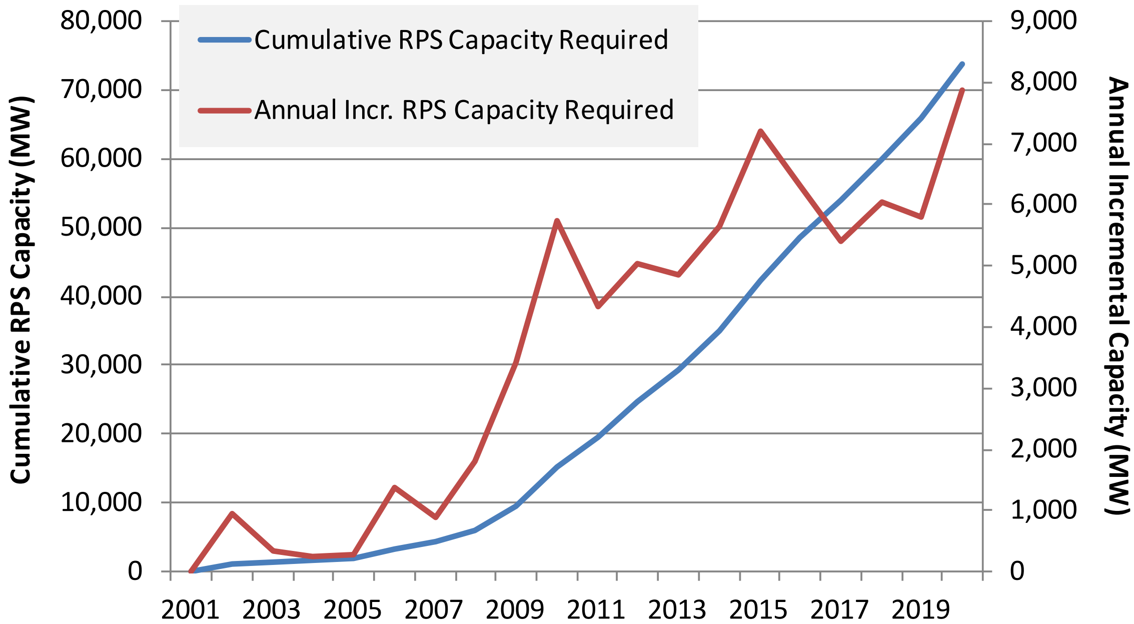

Figure 5. Renewable energy capacity additions needed to meet existing state RPS requirements

Source: LBNL (2011)

Assuming a portfolio mix of 60% wind and 40% of the remaining renewable power technologies, as outlined in Table 2, roughly $7.5 billion in tax equity will be needed annually, twice the quantity supplied in 2010 and more than the record of $6.1 billion US PREF reported for 2007.

Table 2. Potential Tax Equity Required to Fulfill Existing State RPS Requirements

Technology	% of Assumed Portfolio	Avg. Annual Capacity Addition (MW)	Estimated Avg. Project Cost per Watt[37]	Estimated Total Project Investment Required ($B)	Estimated Tax Equity Required (50% of Total Investment)
Wind	60%	3,660	$1.91	$6.99	$3.50
Solar[38]	30%	1,830	$4.00	$7.32	$3.66
Biomass	5%	305	$1.86	$0.57	$0.29
Geothermal	5%	305	$0.64	$0.20	$0.10
Total	**100%**	**6,100**		**$15.07**	**$7.55**

Source: LBNL/author estimates (2012)

From another perspective, NREL has reviewed public records of utility-scale projects and identified over 16,000 MW of utility-scale solar projects in advanced development (i.e., projects 5 MW or greater that hold a power purchase agreement with a major utility or are being developed by a major utility). If all of these projects reach financial close, just this single segment of the solar market alone could require approximately $32 billion in third-party tax equity over the next few years of project deployment.[39] Of course, projects in development suffer from very high attrition rates and many are never built; still, the figure gives perspective to the potential need for tax equity.

On January 1, 2017, absent Congressional action, the ITC will decline from 30% to its permanent level 10% of eligible solar facility costs. Even at that lower level, the combined tax benefits, including both the ITC and accelerated depreciation, represent approximately 35% of project installation costs—too large for many developers to monetize internally, thus requiring them to seek third-party capital.[40]

2.4 Tax Equity Investment Factors

Tax equity investors vary significantly in how they approach the market. Developers also differ in their needs and objectives. No two projects present the same risk-reward profile. This diversity in traits and preferences among tax investors, developers, and their projects effectively precludes a single and fixed investment hurdle rate, or market price, for tax equity. Instead, numerous

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[37] Wind, biomass, and geothermal installed cost values are from: Bolinger, M.; Wiser, R.; Darghouth, N. *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009*. LBNL-3188E. Berkeley, CA: Lawrence Berkeley National Laboratory, April 2010. Due to rapidly declining installed solar costs, this report was not used as the basis for solar. Instead, the solar installed cost value (PV) is based on personal communication with Alan Goodrich, NREL.

[38] Includes only PV. Concentrated solar power would likely increase the average cost per watt installed and tax equity required.

[39] Assumes $4/watt installed cost and tax equity contribution equal to 50% of initial project capital costs.

[40] Mendelsohn, M. "Will Solar Projects Need Tax Equity in the Future? Yes, but Baby Steps Toward Securitization Improve the Situation." NREL, April 2012. https://financere.nrel.gov/finance/content/solar-PV-photovoltaics-value-tax-credits-equity-accelerated-depreciation-securitization.

factors influence the price needed to attract tax equity to a given renewable power project at any particular point in time.

Key differentiating factors among tax equity investors includes their relative:

- Tolerance for technology-specific, regulatory, or other risk factors
- Interest in cash returns in addition to tax benefits
- Minimum threshold size for individual investments
- Desire to shape or participate in transactions
- Interest in continuing ownership after tax benefits have been utilized
- Desired level of control over project management
- Receptivity to project leverage (use of debt) and preferred investment structure
- Exposure to regulatory requirements (banks versus non-bank investors)
- Overall capacity for undertaking multiple investments ("tax appetite")
- Number of dedicated investment staff and their familiarity with analyzing energy projects.

Renewable power project sponsors also vary in their needs for and interest in the tax equity market. Factors distinguishing these project developers include their varying:

- Desire for sole ownership and control
- Ability to contribute cash to fund the project
- Intrinsic ability to use the tax benefits
- Desire for securing a quick financial return from selling the project versus ongoing returns from operations
- Comfort with project debt
- Interest in retaining or regaining full ownership at the end of the financing period
- Preferred investment structure
- Management experience, staff capabilities, and roles.

Lastly, the projects themselves vary in their attributes and, consequently, in their relative attraction to potential tax equity investors. These include:

- Project size
- Technology employed (e.g., wind or solar PV)
- Relative commercial acceptance of the equipment used and vendor credit quality
- Power and renewable energy certificate (REC) buyer contract terms (e.g., term, rates, and buy-out options)

- Credit quality of the proposed power and REC buyers
- Ongoing operating costs (e.g., fuel, spare parts, and major maintenance)
- Eligibility for state incentives
- Exposure to grid congestion (i.e., susceptibility to power sale interruptions).

2.5 Cost of Tax Equity

Several aspects of the tax equity market make it a more expensive form of investment than other sources of capital such as corporate bonds. First, the tax equity market is not "transparent." There is no market exchange with posted prices for investors to easily evaluate the associated risks. Ed Feo, managing director with USRG Renewable Finance, observes that the lack of a centralized exchange with posted bid/ask information makes it difficult for a developer to find third-party tax equity capital sources willing to take on a non-standard risk for the right price.[41] He says that virtually all developers and financial parties enter into confidentiality agreements and do not disclose the final rates or terms in completed transactions. In such an environment, the key focus is on relationships and informal anecdotal market knowledge.

Second, the unavailability of a single standardized price for tax equity means that the developer and the investor negotiate a price for each project. The developer has to prepare an investment summary of the project, identify and approach likely investors, and spend time explaining the project, likely to multiple potential investors. Terry Grant, managing director of Marathon Capital, points out that each tax investor then needs to invest time and effort to assess a project before deciding whether it is of interest and at what price (i.e., expected return).[42] Even after the initial credit decision, work remains for both parties to negotiate the full investment documentation.

Third, projects with anything other than a "plain vanilla" design will have to pay more to obtain tax equity capital. As an example, developers of projects employing novel technologies or equipment from new-to-market manufacturers can face difficulties in attracting tax equity. Even if a project features specific mitigating features and incremental pricing to offset perceived risks, tax investors may decline to invest, citing that such risks are best left to other types of equity sources until the technologies are deemed "proven" by having been used in multiple successful projects. In such cases, the project developers or equipment vendors may finance the project using their own capital or, if necessary, seek capital from a larger, well-funded strategic partner. Difficult to find, such strategic partnerships represent a significant advantage to developers who have them.

The overall market supply of tax equity seems to be inelastic to price (i.e., supply is not significantly affected by price), due primarily to the small number of investors. As a general rule, Grant notes that tax equity investors are conservative in their tolerance for risk.[43] Their willingness to accept a particular type of project risk (e.g., credit quality of the power purchaser) is relatively unaffected by the price of the return offered. Rather, a given risk level is either acceptable or not, and changing the rate of return often does not induce a change in willingness

[41] Feo, E. Email, 14 November 2011.
[42] Grant, T. Email, 9 December 2011.
[43] Grant, T. Email, 9 December 2011.

to accept such risk. Grant observes that higher offered prices can cause individual tax equity investors to favor one renewable power project over another or to shift some tax equity from alternate investment opportunities (e.g., low-income housing tax credits). Still, the complexity of such investments and the need to have large tax obligations represent significant market entrance barriers not overcome by simple increases in the proposed return.

Increasing the overall market's price elasticity in any substantive and sustained fashion would require attracting new capital sources that have not previously been involved in renewable power project financing. SolarCity, a major developer of residential solar systems, has closed tax equity financings with Pacific Gas & Electric and Google—a prominent example of a developer expanding the pool of third-party tax equity capital.[44] BNEF suggests that utilities and companies in certain other economic sectors "adjacent" to the power sector also might increase their investments in renewable power projects.[45] Such investors would increase the availability of tax benefit monetization capital if they invest actively and not passively as third-party tax equity investors.

Lastly, broader external factors, such as the 2008–2009 financial crisis and actual or possible legislative and regulatory rules changes, complicate the price negotiation process. The limited pricing information that is publicly available typically is anecdotal and emerges from conference speakers, panel discussions, and the occasional report. Such intelligence suggests that major tax equity investors have invested their capital in recent years with expected after-tax yields of 7%–11% (over the first 10 years of the project) for a high-quality, unleveraged, large wind project.

During robust periods (e.g., in 2007), tax equity yield requirements for such projects were near the bottom of the range referenced, according to Barry Neal, Director of Environmental Finance at Wells Fargo Bank.[46] During the 2008–2009 financial crisis, yield requirements rose sharply as tax investors left the market. Neal notes that required yields for investments in such high-quality wind projects gradually declined below 10% in 2010 and the first half of 2011 as the financial sector experienced renewed profits (and tax obligations), leading to the uptick in available supply. Industry participants suggested in February 2012 that rates for the best-in-market wind projects had declined to around and below 8%.[47]

There is no ready information for the yields required by regional and community-scale tax investors. Anecdotal experience suggests that their required returns are higher than returns for national-scale tax equity investors. This may reflect higher internal hurdle rates for allocating their capital, unfamiliarity with investing in power projects, and simply the market power that comes with their greater scarcity. Mark Bolinger of LBNL describes the challenges faced by several community-scale projects in a January 2011 report.[48]

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[44] "Google Partners with SolarCity to Create $280 Million Fund for Residential Solar Projects, Nation's Largest to Date." SolarCity. www.solarcity.com/pressreleases/92/Google-Partners-with-SolarCity-to-Create-$280-Million-Fund-for-Residential-Solar-Projects--Nation%E2%80%99s-Largest-to-Date.aspx. Accessed September 12, 2011.
[45] BNEF. (November 2011). *op.cit.*
[46] Neal, B. Phone call, 1 December 2011.
[47] "State of the Tax Equity Market," Chadbourne & Parke, LLP, *op.cit.*
[48] Bolinger, M. (2011). "Community Wind: Once Again Pushing the Envelope of Project Finance". Lawrence Berkeley National Lab, January, http://eetd.lbl.gov/ea/emp/reports/lbnl-4193e.pdf. Accessed March 2012.

2.6 Cost to Acquire Tax Equity

Acquisition of tax equity can be more costly than other financing approaches. It can require due diligence from lawyers, engineers, accountants, environmental consultants, and other specialists specific to the relevant risks. Arranging for tax equity is generally recognized as having high transaction costs. Sheldon Kimber, chief financial officer of Recurrent Energy, explained that the costs of securing tax equity capital can eat up 15%–40% of the ITC, benefitting large financial institutions and law firms rather than the renewable energy projects the program was designed for.[49] In contrast, the §1603 grant requires less time to apply for, is awarded faster, and is provided in the form of cash, thus funneling the benefits to the developer and the project more directly.

In October 2011, US PREF compared the costs of accessing tax equity capital to costs of obtaining a §1603 Program award for large-scale (5–100 MW) projects in Table 3.[50,51]

Table 3. Estimated Costs to Acquire Tax Equity and §1603 Program Awards

Category	Cost to Sponsor of Tax Equity	Cost to Sponsor of §1603 Award[52]
Attestation	n/a	$75,000–$150,000
Legal Documentation/Tax Opinion	$350,000	None
Independent Engineer	$150,000	None
Syndication Fees (may or may not be needed, depending on project size)	0.5% of tax equity amount (for large projects)	None
Cost of Capital During Construction (pending receipt of a §1603 award)	In absence of a §1603 award, funds provided by tax equity investor, at investor's equity rate of return	Funds provided by construction lender at debt rates (est. 3%–5% per year)

Source: US PREF (2011)

These initial costs also do not take into account the requisite sharing of ongoing cash flows and residual value of the projects required for tax equity partnerships. With a §1603 Program award, a developer has the option of retaining all of the ownership of the project assets, cash flows, and residual value. In contrast, participation by tax equity investors by definition involves some sharing of ongoing cash flows and residual value, with the percentage varying by the financing structure employed.[53]

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[49] Mendelsohn, M. "So, Why are Treasury Grants so Popular? Two Words: Transaction Costs." NREL. https://financere.nrel.gov/finance/content/treasury-cash-grant-transaction-costs. Accessed November 29, 2011.
[50] "Tax Equity, Tax Credits, and Alternatives to Spur Clean Energy Financing," U.S. Partnership for Renewable Energy Finance. http://uspref.org/white-papers. Accessed October 30, 2011.
[51] Eck, C. Email, 13 February 2012.
[52] The Treasury Department requires professional accounting reports for larger projects. See "1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits." http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx. Accessed May 22, 2012.
[53] Mendelsohn , M.; Kreycik C. *Federal and State Structures to Support Financing Utility-Scale Solar Projects and the Business Models Designed to Utilize Them*. NREL. April 2012.

Importantly, the transaction cost of raising tax equity is independent of deal size. The legal and engineering costs to evaluate the project and establish the associated partnership, lease, or other financial structure are relevant for a tax equity investment of $25 million or $250 million. Tax equity investors prefer to spread their due diligence costs over larger investments.

2.7 Limited Secondary Market for Tax Equity

Financial markets have a variety of techniques to spread and reallocate risk to improve access to capital for an asset or pool of assets. These securitization and syndication techniques can span the bundling and reselling of individual homes and auto loans into secondary markets to the bundling of real estate assets through a real estate investment trust and mineral extraction assets through a master limited partnership. In general, these techniques allow asset owners the opportunity to procure, trade, and sell positions in the assets and companies of interest, lowering their risk and greatly expanding the potential sources of capital investment to passive owners such as pension funds, mutual funds, and small investors.

Such benefits, however, are only minimally available to renewable power projects involving tax equity, at least during the early years of the projects. The ITC is available only to the owner of a project on the first day of commercial operations (i.e., the original owner).[54] Claiming the ITC negates the ability of the original owner to subsequently sell or transfer a project during the initial five-year period without risking "recapture" of credits by the IRS. This constraint limits both sales to another single party as well as secondary securitizations to multiple investors. In contrast, recipients of §1603 payments can sell the project during the first five years without triggering recapture as long as the sale is to an eligible entity and the project continues to produce energy. Finally, current rules do not allow master limited partnerships to invest in renewable power projects.

It is easier to sell a project receiving the PTC, since the credits are awarded based on actual production to the project owner at the time of the production. Nevertheless, no liquid market exists.

[54] Leasing structures allow for a limited 90-day window after commercial operations to complete the financing operation.

3 §1603 Treasury Grant Program

3.1 Background

Pursuant to § 1603 of the American Recovery and Reinvestment Act of 2009, the federal government temporarily enabled taxpayers otherwise eligible for the PTC or ITC to elect to receive a cash payment in lieu of the PTC or ITC (i.e., a grant).[55] Separately, the Recovery Act enabled entities qualifying for the PTC to make an irrevocable election to receive the ITC instead. As measured by the volume of activity, the §1603 Program has had a dramatic impact upon renewable power development. Unlike the use of the PTC or ITC, the Treasury Department has provided metrics on the use of the §1603 Program. Through May 8, 2012, the §1603 Program had awarded $11.6 billion to over 37,700 projects.[56]

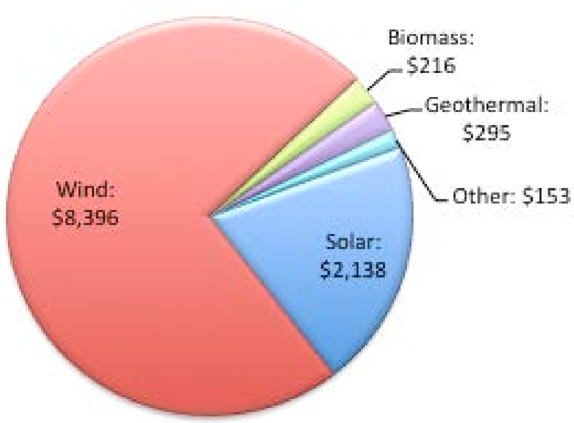

Figure 6. §1603 Program total funding ($millions)

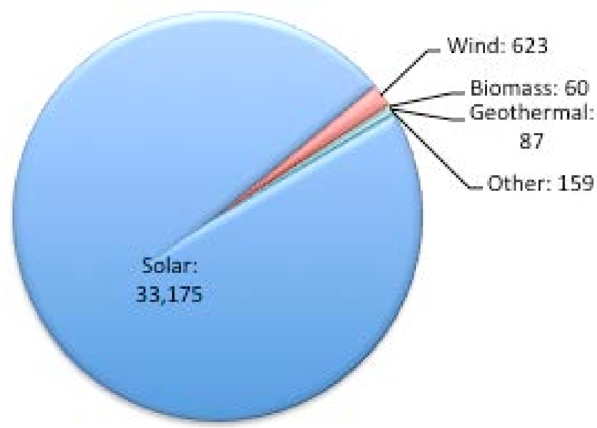

Figure 7. §1603 Program total projects awarded

Source: Adapted from the U.S. Department of the Treasury

Assuming §1603 awards equal 30% of total project costs, the program has supported, up through May 8, 2012, $38.6 billion in total investments. These projects have added 16.9 GW of new installed capacity, which is expected to produce 43,500 GWh annually.[57] A wide range of technologies have received cash awards under the program including geothermal (92 projects), biomass (63 projects), as well as hydro, fuel cell, and other technologies (176 projects combined).

Projects in all 50 of the U.S. states, Washington, D.C., and Puerto Rico have received §1603 Program awards. Eight states have received at least $350 million, with the largest funding amounts going to projects in Texas, California, Washington State, Oregon, and Illinois. Eight states have had at least 550 projects awarded.

[55] §1603 was written under Division B of the Recovery Act, as amended.
[56] "Overview and Status Update of the §1603 Program." U.S. Treasury, May 8, 2012. http://www.treasury.gov/initiatives/recovery/Documents/Status%20overview.pdf. (forthcoming).
[57] U.S. Treasury. (2012), *op cit.*

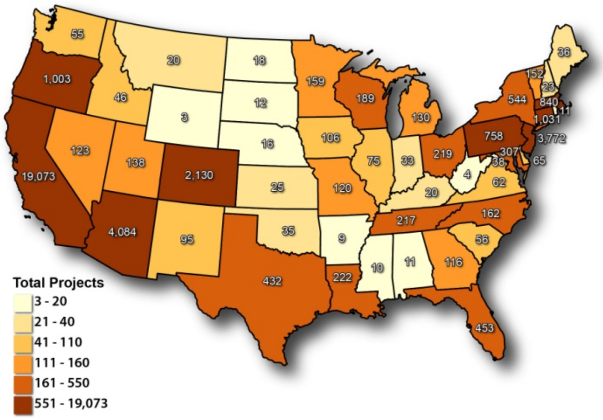

Figure 8. §1603 projects awarded by state

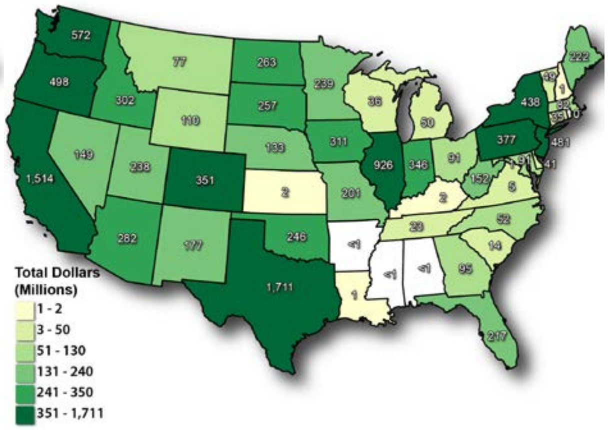

Figure 9. §1603 dollars awarded by state

While the §1603 Program expired at the end of 2011, program awards will continue for projects that began construction in 2011 or earlier. The §1603 Program will continue to pay out grants for such qualifying projects as long as the project is completed by the time the ITC expires (2012 for wind, 2016 for solar).[58]

3.2 Program Benefits

Although the §1603 Program provides the same level of support as the ITC—30% of eligible capital costs—industry members describe the program as providing an array of benefits relevant to renewable energy project developers. In general, the §1603 Program is considered to have sped project development and lowered associated financing costs. For example, interviewees offered the following list of benefits:

- The §1603 award is typically paid sooner than the benefits of the ITC can be realized.
- All projects can use cash, but not all projects or their developers can use the ITC.
- §1603 awards have made it possible for some projects to be financed with no tax equity, speeding the development process.
- A §1603 award eliminates the need for private capital for that portion of the project costs and thereby stretches the existing supply of tax equity capital.
- The §1603 Program reduces barrier entry to first-time developers, as tax equity is particularly difficult to raise for new entrants to the field, thus increasing competition in the marketplace.
- The §1603 Program supports small projects better than the ITC as these projects, unless incorporated in a large portfolio, generally cannot attract tax equity due to high due diligence expenses incurred.

[58] Department of Treasury offers two methods by which a project may be defined as having begun construction, referred to as the "physical work" method or "5% of costs" method. See www.treasury.gov/initiatives/recovery/Pages/1603.aspx.

- As §1603 allows a project to avoid tax equity investment, debt is easier to raise as inter-creditor issues and associated transaction costs are mitigated. In contrast, the required yield on tax equity increases with debt, sometimes negating the normally positive effect of debt on project return.[59]

3.2.1 Flexibility

The Treasury grant option has sparked variations in financing structures. The ability to assign the payment has enabled developers to use the grant to pay for a portion of the project costs, rather than just treat the credit as a component of the returns to the tax investor. In such cases, vendor financing or construction loans can bridge the timing gap between the incurrence of project costs and the Treasury's payment of the grant. James Duffy, a partner handling tax credit finance and syndication matters with the law firm of Nixon Peabody LLP, notes that this ability to assign has fostered use of leasing structures such as inverted "pass-through" leases that enable developers to maintain more control over their projects after the tax benefits have been utilized.[60]

Some developers have structured the tax equity investment to have the tax equity investor provide *de facto* bridge financing for the amount of the projected Treasury grant, thereby reducing the amount of or the need for third-party construction financing. There can still be a benefit in reduced transaction costs for these projects because investors view the §1603 award as relatively immune from operational risks.

In essence, the §1603 Program has provided a significant benefit by stretching the supply of traditional tax equity, thereby enabling the build-out of renewables. Some project developers have opted out of using tax investors altogether. Instead, they have relied upon the §1603 grant, their own equity capital, and bank loans to finance their projects and have retained and rolled forward the depreciation benefits to reduce the project's tax obligations for an extended period. Tapping the Treasury grant has not proved to be the best course for all projects. For example, investors in wind projects with low capital costs and high capacity factors can find it more rewarding to use the PTC in lieu of the Treasury grant.[61]

3.2.2 Speed

§1603 Program awards have a speed advantage over the ITC in two ways: (1) the speed to apply for a §1603 grant versus the time necessary to arrange for tax equity (for those who cannot monetize the tax benefits internally) and (2) the payout of the incentive.

First, the §1603 Program application process is straightforward and requires modest developer resources. In contrast, arranging third-party tax equity can be a very time-consuming process over several months requiring extensive negotiations between the developer and the tax equity investor. According to Adam Kobos, new tax equity financings (involving either entities who have not worked together before or perhaps a financial structure new to their relationship) could

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[59] Tax equity investors willing to invest in transactions with project-level debt currently require a premium of 725 basis points (or 7.25%) over the cost of their tax equity for investments without project-level debt. ("State of the Tax Equity Market." Chadbourne & Parke, *op cit*). This compares with earlier premiums of 250–300 basis points seen in transactions before 2008.

[60] Duffy, J. Personal communication, 14 November 2011.

[61] See Bolinger, M.; Wiser, R.; Cory, K.; James, T. *PTC, ITC, or Cash Grant? An Analysis of the Choice Facing Renewable Power Projects in the United States.* LBNL-1642E. Berkeley, CA: Lawrence Berkeley National Laboratory, March 2009.

require up to 6–9 months to conduct the relevant due diligence and execute the necessary documentation.

Second, the Treasury's goal of paying the grants within 60 days after application submittal or the date the property is placed in service, whichever is later, allows for the quicker repayment of any creditors associated with project development or construction.[62] In contrast, the ITC benefit is realized only when the investor pays its taxes (typically quarterly for large financial institutions). Accordingly, the lag time until the recoupment of the tax credit may be significantly longer than the 60-day turnaround promised under the Treasury payment.

In addition, the award payments are made irrespective of taxable income. In contrast, recovery of the ITC is tied to the availability of taxable income. Combined with accelerated depreciation, this may result in a sizable timing benefit. Under the ITC, it may take several tax payment periods to fully utilize the tax benefits, thus reducing the present value and hence overall benefit of the investment. As a result, it may reduce the effectiveness of the ITC as an inducement to private investment.

3.2.3 Lower Transaction Costs

As noted by US PREF, obtaining a §1603 Program grant, especially for smaller projects, is generally a low-cost exercise of submitting specific forms. A small amount of accounting assistance is required for larger projects. There are no extended due diligence or contract negotiation costs by a third-party investor. On the other hand, the transaction costs of monetizing the ITC can be substantial.

Adam Kobos of Stoel Rives notes that even where developers seek both the Treasury grant and third-party tax equity capital to monetize the depreciation benefits, the §1603 Program still can reduce due diligence costs for those transactions where the financing structure conveys mostly tax benefits with little cash flow to the tax investor and the operational risk of the low cash flow is acceptable.

3.2.4 Indirectly Supports Projects by Non-Profits and Communities

In a January 2010 LBNL report, Bolinger describes several ancillary benefits of the §1603 Program for community-scale projects.[63] Direct use of the tax benefits associated with traditional tax equity financing can only be made by tax-paying entities with sufficient taxable income, thus restricting use by non-profit enterprises and community-based groups.

By contrast, although non-profits are not directly eligible for a §1603 award, the award can be used by typically smaller developers of community wind and solar projects to monetize the tax benefit. Importantly, a §1603 award can make it easier to secure the remaining capital from fewer individual investors, following Securities & Exchange Commission securities registration requirements that limit the breadth of such solicitations, and thus, improve non-profits' abilities to develop renewable energy facilities.

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[62] See "U.S. Department of Treasury - Renewable Energy Grants." DSIRE. http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US53F. Accessed February 28, 2012.

[63] Bolinger, M. *Revealing the Hidden Value that the Federal Investment Tax Credit and Treasury Cash Grant Provide To Community Wind Projects*. LBNL-2909E. Berkely, CA: Lawrence Berkeley National Laboratory, January 2010. http://eetd.lbl.gov/EA/EMP/reports/lbnl-2909e.pdf. Accessed September 12, 2011.

3.2.5 Supports Innovative Technologies, Smaller Developers, and New Entrants

The §1603 Program has been especially beneficial to smaller developers and manufacturers of "innovative" technologies. For example, as of February 21, 2012, the §1603 Program awarded $18.9 million to small hydro and marine projects and $54.4 million to fuel cell projects. Although no one can say definitively whether these technologies would have been able to find tax equity sufficient to finance their projects without the §1603 Program, our interviewees generally agreed that smaller projects and ones using innovative technologies find it difficult to attract investment from the established tax equity sources.

Smaller developers without a deep project portfolio benefitted significantly from the §1603 Program. As of February 21, 2012, over 5,000 different entities were awarded §1603 grants. Although company size is difficult to gauge in the limited information made public by the Department of Treasury, the list indicates an extraordinary variety in awardees, ranging from Hassrick Farm LLC of Wisconsin receiving $2,340 for a solar electricity installation to Rio Grande Valley Sugar Growers, Inc. of Texas receiving $10.2 million for an open loop or cellulosic biomass facility.

Further, the §1603 Program reduces barrier to entry for first-time developers. Tax equity is virtually unavailable to development entities entering the marketplace, as the national-scale tax equity investors prefer to focus on experienced developers most likely to offer projects that can close quickly without unexpected complexities or delays. As §1603 awards can be obtained for a single small project, new entrants can acquire development experience necessary to establish a foothold as a going concern.

3.3 Weaknesses and Inefficiencies of Tax Subsidy Programs

The §1603 Program was conceived as a way to offset a temporary loss of availability of private tax equity capital. However, it is only a partial solution to alleviating the need for third-party tax equity. Foremost, the §1603 Program does not monetize the accelerated depreciation. Project developers still have to tap their own tax appetite, tap third-party sources able to make efficient use of these depreciation benefits, or simply forego the incentive.

Further, it retains the weakness of the underlying ITC in that non-tax-paying entities remain unable to own projects applying for the Treasury grant. The Treasury grant program, like the ITC, requires project owners to be taxpayers (but not necessarily have a tax appetite). For example, domestic pension funds seeking to invest in stable, long-lived assets still are essentially unable to invest in renewable power projects. Similarly, the §1603 Program, like the ITC, essentially constrains project developers from tapping international sources of capital interested in funding U.S. renewable power projects. International institutional investors seeking passive investments in the U.S. market remain all but shut out from directly buying into projects.

Similar to ITC program, the §1603 award criteria focus principally on whether qualifying expenditures have been spent and the project has entered operations. They do not address the ongoing technical or overall financial viability of the projects. As a result, some awards may go to projects that might not otherwise have passed muster by third-party tax equity investors, either due to the inexperience of the developer, the immaturity of the technology, or other aspects of the project. While neither the ITC nor the §1603 program were established to measure the merit or risk of individual projects, merit reviews effectively are conducted by the investors and/or lenders that decide to provide the remaining funds.

Where the §1603 award has been used as a replacement to the PTC (traditionally used for wind and geothermal projects), there could be lost impetus on project quality if the award enables the developer to fund the project otherwise using its own capital without reliance on outside investors. As the PTC pays out over a 10-year period based on actual generation, it provides an incentive to optimize operational performance (i.e., generating the most electricity with the investment made). By contrast, the §1603 award—like the ITC—is received upfront regardless of future project performance. However, sponsor (and lender) desires to maximize cash flows from project operations can provide a similar discipline to develop and operate a well-performing project.

4 Expected Impacts Due to §1603 Program Expiration

4.1 Small Developers May Lose Financing Ability, Causing Market Consolidation

The close of the §1603 Program is expected to have the largest impact on those renewable power projects and developers that had difficulty accessing the tax equity market prior to the commencement of the program. Smaller developers lacking a significant portfolio of projects or overall experience and financial strength to attract interest from a national-scale tax investor will likely find it harder to raise the necessary capital.[64]

The tax equity market's favoring of experienced developers with large projects predates the §1603 Program. National-scale tax equity providers often have a minimum investment threshold and are not able or willing to invest in projects calling for smaller amounts. Greg Rosen, vice president of Solar Finance for Union Bank, notes that the transaction costs of detailed due diligence requirements of many large tax investors simply are too high for smaller projects to absorb. He further notes that the time needed to review and close individual deals is largely independent of the project size, and that will lead to management pressure to optimize staff resources by focusing on larger projects.[65] Increased demand for tax equity that is likely to follow the end of the §1603 Program would enable tax investors to be more selective.

The end of the §1603 Program poses incremental challenges for developers who are using the tax benefits internally to shelter the project's own tax obligations and opting to carry forward the excess benefits. In part, this stems from the high amount of tax benefits that the 30% ITC can generate. While the economics of such projects may be able to tolerate not being able to fully utilize the accelerated depreciation benefit, a roll-over of excess amounts of the ITC could result in the lack of project viability.

The greater difficulties in sourcing tax equity following the program's end also may spark consolidation in one segment of the renewable power industry. Many developers have entered the solar sector in the last few years. The availability of the §1603 Program has been a key factor enabling such entry through simplification of the financing process. Developers unable to find tax equity for their projects may be obliged to sell their projects to, or even be acquired by, larger, better-funded industry players or risk seeing the projects stall.

4.2 Cost of Tax Equity Could Increase

As described above, the §1603 Program provides two distinct benefits relevant to the cost of renewable energy. First, it reduces transaction costs. Fixed fees to arrange tax equity are estimated to be many times larger than the fixed fees associated with acquiring a §1603 award. Further, the construction loan can require a significantly higher yield when the project monetizes the tax credits through tax equity rather than through a §1603 award.

Second, the §1603 Program has significantly reduced the demand for tax equity, up to about 50% according to the US PREF survey discussed above. Some tax equity sector participants expect a spur in demand in tax equity with the wind-down of the §1603 Program. The shift in demand is

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[64] It may be argued that this is a benefit of §1603 program expiration, not a disbenefit, by reimposing more rigor in the analysis of viable projects as well as reducing the pace of tax expenditures.

[65] Rosen, G. Personal communication, 14 November 2011.

forecasted to cause the required tax equity yield to increase by mid 2012, although there is a difference in opinion on how much of an increase may occur.[66] Mike Niver, former director of Project Finance with SolarCity, believes the demand for tax equity will increase greatly once the §1603 Program terminates and predicts that tax equity yields will increase at least 2% and possibly as high as 4% (i.e., 200–400 basis points).[67]

As a counterpoint, Matthew Meares, director of Project Finance at Amonix, a company specializing in concentrated PV technology with several utility-scale projects under development, notes that the size of the tax equity market for renewable energy projects pales in comparison to the competing markets for equipment leasing, low income housing, and "new markets" tax credits. A slight shift in return between these markets, according to Meares, could bring a substantial shift in supply.

Other experts argued that there are other mixed stimuli in the market. First, investment in the low-income housing market is driven by Community Reinvestment Act (CRA) regulations and general comprehension of real estate assets, with which banks have considerable experience. In contrast, investment supply for renewable energy assets is unique as no similar CRA regulations apply and experience in renewable energy project investment is generally very modest among the nation's lending institutions. An opposing force is the looming potential expiration of the PTC at the end of 2012. Experts reported that wind project developers are significantly scaling back development of projects not likely to enter into commercial service before the end of the year. Accordingly, the demand for tax equity capital to support wind projects is likely to shrink in 2013. Absent any other market changes affecting demand in other sectors or the sources of tax equity, this reduction in demand by the wind sector could result in downward price pressure on tax equity capital.

4.3 Differential Impact for Solar and Wind

The sunset of the §1603 Program may impact renewable technologies and market segments differently. GTM estimates that the wind sector will be able to weather the end of the program more easily than solar, all other things being equal. GTM notes that a significant portion of wind projects (25%) eligible for a §1603 award opt for the PTC.

Further, the larger size of utility-scale wind projects more closely fits the desired project profile of third-party tax investors, making it easier to win financing. That is, major tax equity investors slightly prefer the PTC, with its 10-year stream of credits, over the single year of the ITC as a more efficient use of their limited tax appetite and due diligence resources.

Among solar projects, interviewed experts had mixed expectations. Utility-scale solar projects may enjoy an advantage over distributed systems in raising tax equity investors—provided technology risk is low—as they represent larger investments tax investors seek. In contrast, some experts perceived smaller solar projects as more eligible to raise tax equity to the extent these projects can be aggregated by a single developer or through some process of securitization (such as mortgage backed securities or real estate investment trusts). However, without a means to

[66] "State of the Tax Equity Market." Chadbourne & Parke, *op cit.*
[67] Niver, M. Email, 3 June 2011.

effectively aggregate projects, developers of small-scale solar projects will likely find it difficult to raise tax equity.

4.4 Funding Challenges for Innovative Technologies

The impact of §1603 Program expiration is likely to go beyond simply increases in tax equity yields. According to Meares, the tax equity market is binary. The strongest projects (i.e., very mature developers, mature technologies, and power purchasers with excellent credit) will continue to be able to attract tax equity.[68] In contrast, projects by second-tier developers or utilizing newer technologies (e.g., marine hydro-kinetic and fuel cells) may watch from the sidelines.

Projects using new and untested technologies or newer manufacturers could be challenged in sourcing tax equity capital for their projects. Tax equity investors have a strong preference for commercially proven technologies and have been unwilling to assume either the risk of poor performance from the technology deployed or the financial risk (e.g., inability to honor warranties) associated with weak manufacturer balance sheets.

The situation could result in a further impediment to innovation and manufacturing competitiveness. Well-respected and financially strong manufacturers have the market credibility and financial wherewithal to introduce a product offering newer, innovative features. Smaller, newer, and/or less well-known manufacturing firms generally have not had such capabilities. Tax equity investors generally view the latter companies' products (and their warranties) as untested and risky. Even where such manufacturers have been able to tap state-backed debt financing for showcase projects using their technologies, tax equity investors have preferred to focus their attention elsewhere.

4.5 Impact on Cost of Renewable Power

The direct financial impact of an end of the §1603 Program on the cost of renewable power is uncertain. If tax equity yields increase significantly, as some financial leaders predict, it is reasonable to assume an increase in the cost of renewable energy from projects exposed to such market changes. To comprehend the impact of the predicted increases in required tax equity yields on generation cost, an analysis was conducted using NREL's System Advisor Model (SAM). To simplify the effort, the evaluation was conducted on a single generic utility-scale (20 MW) PV system in Phoenix, Arizona. Although the analysis is limited in scope, the results are illuminating.

Using SAM's capability to assess advanced financial structures, an analysis was conducted on both all-equity project structures and levered project structures (i.e., those with project-level debt). For the all-equity structures, a 200 basis point increase in tax equity yields increases the real levelized cost of energy (LCOE, a common metric representing the cost of energy over the life of the contract) by about 29% from \$0.177/kWh to \$0.228/kWh (assuming \$3.70/watt installed for a Phoenix-based system with single-axis tracking). Leveraged project structures fared far better with only a 4% increase in the LCOE. However, acquiring project-level debt is a

[68] Meares, M. Email, Amonix, 20 June 2011.

difficult and extensive process and unavailable for many projects.[69] This analysis suggests an increased cost of tax equity with the end of the §1603 Program that could constrain certain power projects, particularly those unable to attract debt. Developers would be happy to pass on the incremental cost of securing tax equity in the form of higher power prices. The current soft economic conditions, however, have shifted the price-setting power even more to off-takers. Flat load growth and reduced natural gas prices have enabled most utilities to slow their renewable power purchases and hold down prices under solicitations for new power purchase agreements. In states such as California where RPS requirements are increasing, the negotiating balance of power is more nuanced. Similarly, customers for distributed solar and other renewable power projects are reluctant to pay premiums for renewable power. The ultimate ability of developers to secure higher contract prices for their power to offset higher financing costs remains uncertain.

[69] Mendelsohn, M.; et al. *The Impact of Financial Structure on the Cost of Utility-Scale Solar.* NREL, 2012. The analysis conducted in this report was not meant to be representative of all projects. Different project structures or investment terms may yield unique changes in LCOE.

5 Conclusion

In its short life, the §1603 Program has supported significant deployment of new renewable power capacity. While impacts associated with program termination are highly uncertain, industry experts predict projects implemented by smaller developers and those utilizing newer technologies may have difficulty in raising financial capital. Even for those entities able to attract tax equity, renewable energy facilities may be more expensive to develop due to increasing transaction costs and potentially higher required yields in the third-party tax equity market. Over time, the incremental cost to obtain third-party tax equity could increase the cost of renewable power if additional supplies of tax benefit monetization capital are not attracted to the renewable power market or if offsetting capital cost savings are not achieved. Forthcoming analysis will evaluate the impact on renewable energy project costs associated with financing structures and terms after §1603 Program expiration.