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Renewable Energy Finance

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An Analysis of the Return to the Federal Taxpayer for Internal Revenue Code Section 48 Solar Energy Investment Tax Credit (ITC)

EXECUTIVE SUMMARY

- The investment tax credit (ITC) for solar photovoltaic (PV) projects, expanded under the George W. Bush administration as a part of the Energy Policy Act of 2005 and modified as a grant-in-lieu of tax credit program under the Obama Administration, has enabled financing mechanisms that generate a positive return for the federal government.

- Over the life of a solar photovoltaic (PV) asset, the initial cost of federal expenditures associated with the ITC can be more than offset by the tax revenues generated in lease and Power Purchase Agreement (PPA) scenarios, both of which create fixed payment structures and provide a positive financial return on investment to the federal taxpayer.

- This paper demonstrates that, over the life of solar assets, lease and PPA financing structures can deliver a nominal 10% internal rate of return (IRR) to the federal government on the federal investment tax credit (ITC) for residential and commercial solar projects.

- Based on this analysis, a $10,500 residential solar credit can deliver a $22,882 nominal benefit to the government and a $300,000 commercial solar credit can create a $677,627 nominal benefit in lease and PPA scenarios over a 30-year period (the minimum expected life of the assets).

- The fiscal return demonstrated in this model is independent of, and additive to the numerous other benefits of solar projects, including job creation, energy independence, the preservation of natural resources and the health benefits of cleaner air.

INTRODUCTION

The investment tax credit (ITC) for solar power projects, expanded under the George W. Bush administration as a part of the Energy Policy Act of 2005 and modified as a grant-in-lieu of tax credit program under the Obama Administration, has attracted substantial private investment for domestic solar projects and enabled financing mechanisms that generate a positive return for the federal government. Over the life of a solar photovoltaic (PV) asset, the initial cost of federal expenditures associated with the ITC can be more than offset by the tax revenues generated in lease and Power Purchase Agreement (PPA) scenarios, both of which create fixed payment structures and provide a positive financial return on investment to the federal taxpayer. This paper demonstrates[1] that, over a 30-year period (the minimum expected life of the assets), lease and PPA financing structures can deliver a nominal 10% internal rate of return (IRR) to the federal government on the ITC for residential and commercial solar projects; the weighted results and discussion below further detail the fiscal benefits of the ITC to the federal government. Based on this analysis, a $10,500 residential solar credit can deliver a $22,882 nominal benefit to the government, and a $300,000 commercial solar credit can create a $677,627 nominal benefit in lease and PPA scenarios. Moreover, this fiscal return is independent of, and additive to the numerous other benefits of solar projects, including job creation, energy independence, the preservation of natural resources and the health benefits of cleaner air. This finding is particularly significant given the increasing popularity of lease and PPA financing models in the solar industry. GTM Research's most recent Solar Market Insight report indicated that these investment structures accounted for more than 63 percent of California residential installations, and more than 80 percent of Colorado residential installations in the first quarter of 2012.[2]

BACKGROUND

The United States government has incentivized the development of a wide range of energy sources over the last century to fuel its economic growth. The majority of those investments have been focused on mining, transporting and burning fossil fuel more cheaply or building more nuclear power capacity. Even today, incentives for solar energy lag far behind other fuel sources. The University of Tennessee's Howard Baker Center published a report in May 2012 that indicated that "incentives per MWh of reserves for solar are less than any other fuel source by a factor of ten."[3] The ITC represents a notable exception that has fostered the growth of a vibrant, domestic solar power industry that has grown to employ more than 100,000 Americans. Also referred to as Internal Revenue Code ("IRC") Section 48, the ITC provides a tax credit equal to 30 percent of the eligible costs of a solar power project to the owner of the project.[4] The expansion of the ITC in 2005 and its 8-year extension in 2008 were inflection points that spurred significant activity in the U.S. solar industry. Prior to this extension, the solar industry had largely been dependent on piecemeal, stop-and-start incentive programs that discouraged long-term investment. Approximately 90 percent of the nearly 5,000 megawatts of solar capacity in the U.S. today has been installed since the ITC was increased at the beginning of 2006, according to data from the Solar Energy Industries Association and GTM Research.[2] The ITC contributed to the growth of the solar energy workforce at a rate of 6.8% between August 2010 and August 2011, which is nearly 10 times the overall national employment growth rate in the same period.[5] The Howard H Baker Center Study noted that the solar industry has produced more jobs per megawatt-hour than any other energy industry and predicted that the industry could grow to up to 430,000 jobs by 2020.[3] The ITC is making a positive impact for a nation attempting to recover from a period of high long-term unemployment and carefully weighing how to invest in job creation.

Along with the ITC, new lease and PPA-based financing models have emerged that allow the hosts of solar power projects to avoid or dramatically reduce the upfront capital cost of building the projects and see more immediate cost savings than were previously possible under purchase plans. Leases and PPAs are common ways to finance solar projects that are built on-site for commercial and residential hosts, and the subsequent analysis will focus on those scenarios, and not on utility-scale projects. Lease and PPA models have been a major driver of solar industry growth over the last three to four years, playing a role in increasing America's annual solar capacity from just 79 MW for all types of installations in 2005 to more than 1,000 MW for residential and commercial/non-residential projects in 2011.[2]

DISCUSSION

The ITC enables the development of projects that generate direct payroll taxes and other revenues which generate returns to the government. These government returns are generated by the direct participants in a solar transaction – the developer (or an investment fund established by the developer), the system installer, and the energy user.

The following table provides a listing of hypothetical scenarios that have been modeled (the "ITC Payback Model") using industry data for the purpose of assessing the impact to the government when providing a 30% ITC in a residential or commercial PV installation. As reflected in the table below, the ITC Payback Model addresses the impact of two of the most common methods in which the electricity user may pay for the solar-generated power with fixed payment structures: 1) the equipment lease and 2) the PPA.

ITC Payback Model – Scenario Description	
Type of PV Installation	**Payment Method for Power Consumption**
Commercial	PPA/Monthly Lease Payment Plan
Residential	PPA/Monthly Lease Payment Plan

Equipment Lease: When solar equipment is leased, the vendor typically designs, constructs and sells the system to a developer (or fund, if one has been created by the developer). The developer typically obtains financing for the acquisition by monetizing the tax benefits and future cash flows. The developer/equipment owner then leases the equipment to the electricity user, who makes either monthly or upfront lease payments under a lease agreement that typically runs from fifteen to twenty years.

Power Purchase Agreement: A PPA is like the structure of an equipment lease in that a vendor or installer designs, constructs, and sells the system to a developer (or fund, if one has been created by the developer) who has obtained financing for the acquisition by monetizing the tax benefits and/or borrowing funds. However, instead of leasing the equipment, the developer/equipment owner sells the power generated by the PV system to the electricity user for a contracted price and term under a PPA. As a result, the electricity user will purchase the electricity generated at a contracted price, typically on a monthly basis over a fifteen to twenty year period. The economics of a PPA are similar to the economics of lease, since both leases and PPAs are priced using the estimated value of solar energy generated. As such, the model uses the PPA and lease terms interchangeably.

The ITC Payback Model reflects these payment methods for two types of electricity users – corporations (i.e. commercial installations) and homeowners (i.e. residential installations). Due to the variation in local market dynamics such as the cost of electricity and availability of local incentives, the ITC Payback Model has been prepared using general assumptions for five geographically distributed states with a relatively high number of PV installations as recorded by the National Renewable Energy Laboratory, and the results are weighted based on the number of NREL-reported installations in each of the five states. The following tables summarize the five states used in the ITC Payback Model as well as the weighted results.

NREL's Top Five States By Number of PV Installations[6]		
State	**Total Number of Installations**	**% of Total**
CA	126,196	84%
AZ	9,028	6%
NJ	7,508	5%
NY	4,388	3%
MD	3,882	2%
Total	**151,002**	**100%**

ITC Payback Model – Weighted Results^					
Scenario Description	Initial ITC Outlay (Investment)	Nominal Gross Revenue	Nominal Net Benefits	Return on ITC Investment (ROI)	Internal Rate of Return on ITC Investment (IRR)
Commercial	300,000	677,627	377,627	126%	10%
Residential	10,500	22,882	12,382	118%	10%

^Please refer to Exhibit A for underlying assumptions and non-weighted results. Please refer to the link in Exhibit C for a full copy of the model.

These government returns have been generated by modeling taxable wages and revenues by the direct participants in a solar transaction – the developer, the installer, and the energy user. Assumptions used in the ITC Payback Model have been included in Exhibit A, and a copy of the ITC Payback Model is available in the link at Exhibit C & D. SolarCity Corporation hired audit, tax and advisory firm KPMG to assist it in performing certain advisory and tax services around the analysis of the fiscal impact of the ITC, including consideration of the application of current income tax law and evaluation methodology for Federal Government incentives. A copy of the KPMG report is included in Exhibit B.[8]

The ITC Payback Model does not account for other benefits such as taxable revenues and wages from other participants such as providers of modules, inverters, balance of system components and other materials, subcontractors, brokers, accountants and attorneys. Inclusion of these benefits would have an even greater positive impact on the return to the government. For purposes of illustrating the return on an ITC investment for the government, the ITC Payback Model does not account for the cost to the federal government from depreciation since the depreciation of capital improvements applies without regard to how the capital improvements

have been financed. Additionally, depreciation is not specific to the solar industry. However, should the cost of depreciation deductions be accounted for in the government return on ITC, the weighted results are as follows:

ITC Payback Model with Depreciation – Weighted Results^

Scenario Description	Initial ITC Outlay (Investment)	Nominal Gross Revenue, Net if Depreciation	Nominal Net Benefits	Return on ITC Investment (ROI)	Internal Rate of Return on ITC
Commercial	300,000	380,127	80,127	27%	1%
Residential	10,500	12,469	1,969	19%	1%

^Please refer to Exhibit A for underlying assumptions and non-weighted results. Please refer to the link in Exhibit C for a full copy of the model.

As illustrated in the table above, even with depreciation deductions factoring negatively against the tax revenues generated, the commercial and residential PPA/lease scenarios operate above breakeven. Monthly payments for electricity, made by residential and commercial customers, constitute taxable income for the lease or PPA provider; as such, the value of taxes paid on this income more than offsets the value of the ITC. Finally, due to the relatively nascent state of the domestic solar economy, depreciation benefits have proven difficult to efficiently monetize and are not always fully accounted for in existing solar financing structures.

The following discussion identifies certain other non-tax or indirect benefits that have not been included due to the difficulty in quantifying the benefit.

Job Creation: As of August 2011, over 100,000 solar jobs existed across all fifty states.[5] Solar jobs include only workers who spend at least 50% of their time supporting solar-related activities. Additionally, between August 2010 and August 2011, the solar industry created over 6,700 jobs, for an increase of 6.8%, which substantially outperforms the economy-wide growth of 0.7% over the same period.[5] The ITC model does not account for the long-term benefit to the country of job creation.

Health, Environment, Energy Independence: Another benefit of solar power projects is in the reduction of America's dependence on resources that can have an adverse effect on human health and the environment. In the quest to attain energy independence, policymakers have turned toward the exploration of natural resources such as natural gas or oil deposits. This alternative may deplete resources or have other adverse effects on the environment, such as gas/oil leaks, oil spills, carbon emissions, etc. Furthermore, population-based health impact assessments have estimated an average of $3.7 billion in public health damages each year from particulate matter emitted directly from coal-fired power plants.[8] Reductions in air pollution can lead to reductions in health care costs for a healthier population. The solar industry provides a mechanism for reducing harmful emissions and aids in the movement toward energy independence without damaging the environment and human health.

CONCLUSION

Energy is the lifeblood of industry and a key lever of American progress. As the U.S. continues to work toward economic recovery, the most effective energy policies will encourage private investment to generate maximum return on incentives. The ITC incentivizes the private sector to invest in the solar industry, and generates a measurable fiscal return to the taxpayer, in addition to creating positive impact on employment and the environment. This analysis demonstrates that over the life of a solar asset, the initial cost outlay of the ITC is more than offset by the tax revenues generated in lease and PPA scenarios. Even when viewed independently of its considerable environmental benefits, the ITC's long-term extension has created the foundation of an industry that can help America stake its ground as a global leader in domestic, renewable energy production.

1. This analysis is not intended to reflect a dynamic model for use in scoring purposes. Instead, it is intended to illustrate the basic economics in a solar installation for a given scenario. Total return is nominal, and not discounted for present value.

2. Source: GTM Research/SEIA U.S. Solar Market Insight.

3. Assessment of Incentives and Employment Impacts of Solar Industry Deployment, Howard H Baker Center for Public Policy, University of Tennessee, May 1, 2012.

4. In general, the ITC is equal to 30% of eligible costs for qualified energy property placed in service on or before December 31, 2016 pursuant to IRC Section 48 for businesses and IRC Section 25 for individuals. Qualified energy property place in service after December 31, 2016 will be generally restricted to a 10% ITC (instead of a 30% ITC).

5. National Solar Jobs Census 2011, as published by Solar Foundation, a 501(c)(3) nonprofit, non-lobbying organization funding solar research and education, with BW Research Partnership's Green LMI Division, Cornell University and others.

6. NREL data as of 5/11/2012, percentages rounded to whole numbers

7. SolarCity hired KPMG ("KPMG") to assist it in performing certain advisory and tax services around its analysis of the fiscal impact of the Investment Tax Credit ("ITC"). KPMG's assistance to SolarCity was provided under the Consulting Standards of the AICPA and is therefore solely for the use and benefit of SolarCity Corp. and not intended for the benefit of any person or organization other than SolarCity. KPMG did not audit, review, or compile the information or financial analysis included in this memorandum and therefore does not express an opinion or any other form of assurance on them.

8. Emissions of Hazardous Air Pollutants from Coal-Fired Power Plants. Environmental Health & Engineering, 2011.

EXHIBIT A – ITC PAYBACK MODEL ASSUMPTIONS

Monthly Lease/PPA Payment Plan	Commercial Installation				
Project Assumptions	**CA**	**NJ**	**AZ**	**NY**	**MD**
kW	200.0	200.0	200.0	200.0	200.0
kWh/kW	1,450	1,300	1,675	1,150	1,250
$/W COGS	$4.17	$4.17	$4.17	$4.17	$4.17
$/W Price	$5.00	$5.00	$5.00	$5.00	$5.00
ITC	30%	30%	30%	30%	30%
Energy Lease/PPA Price in $/kWh	$0.16	$0.10	$0.07	$0.12	$0.09
Solar Energy Escalator	1.4%	1.4%	1.6%	1.4%	1.4%
Energy Production – Degradation Rate	0.50%	0.50%	0.50%	0.50%	0.50%
Energy Price After Lease/PPA Term in $/kWh	$0.16	$0.13	$0.10	$0.16	$0.11
Energy Escalator After Lease/PPA Term	1.4%	1.4%	1.6%	1.4%	1.4%
Upfront Utility Rebate in $/W	$0.00	$0.00	$0.00	$1.50	$0.00
PBI/SREC Amount in $/kWh	$0.03	$0.10	$0.07	$0.00	$0.18
PBI/SREC Years	5	15	10	0	3
Federal Tax Rate	35%	35%	35%	35%	35%
Lease/PPA Term in Years	20	20	20	20	20
System Life in Years	30	30	30	30	30
Other Vendor Assumptions					
Payroll Taxes in $/W	$0.05	$0.05	$0.05	$0.05	$0.05
Income Taxes Owed on Wages Paid by the Vendor in $/W	$0.20	$0.20	$0.20	$0.20	$0.20
Federal Tax Rate	35%	35%	35%	35%	35%
Other Commercial Host/Energy User Assumptions					
Energy Cost Without SolarLease/PPA in $/kWh	$0.16	$0.13	$0.10	$0.16	$0.11
Energy Escalator Without SolarLease/PPA	1.4%	1.4%	1.6%	1.4%	1.4%
Initial ITC Outlay (Investment)	**$300,000**	**$300,000**	**$300,000**	**$300,000**	**$300,000**
Nominal Gross Revenue	**$685,084**	**$698,913**	**$619,231**	**$692,064**	**$513,511**
Nominal Net Benefits	**$385,084**	**$398,913**	**$319,231**	**$392,064**	**$213,511**
Return on ITC Investment (ROI)	**128%**	**133%**	**106%**	**131%**	**71%**
Internal Rate of Return on ITC Investment (IRR)	**10%**	**12%**	**9%**	**18%**	**7%**

References:

- The COGs and system price assume a 20% margin, and the system price is based on Treasury guidance issued June 30, 2011.
- The upfront utility rebate, Production Based incentive ("PBI"), and State Renewable Energy Certificates ("SREC") data are based off information obtained from http://dsireusa.org in conjunction with estimates provided by SolarCity for 2nd Quarter 2012.
- The energy price per kilowatt hour produced ("kWh") after the expiration of the lease/PPA term, the energy cost without solar, and all energy escalator assumptions are based on 2011 data form the United States Energy Information Administration ("EIA") except for the state of California, for which assumptions have been based on SolarCity estimates. The ITC Payback Model assumes the energy price will escalate for years after 2011.
- The energy lease or PPA price is based on a charge per kWh that is less than the EIA average.
- The federal tax rates are based on federal corporate tax rates. The assumptions for federal payroll taxes paid per watt and income taxes owed on wages paid by the vendor have been provided by estimates from SolarCity.
- Does not include depreciation.

Monthly Lease/PPA Payment Plan	Residential Installation				
Project Assumptions	**CA**	**NJ**	**AZ**	**NY**	**MD**
kW	5.0	5.0	5.0	5.0	5.0
kWh/kW	1,305	1,170	1,508	1,100	1,200
$/W COGS	$5.00	$5.00	$5.00	$5.00	$5.00
$/W Price	$7.00	$7.00	$7.00	$7.00	$7.00
ITC	30%	30%	30%	30%	30%
Energy Lease/PPA Price/kWh	$0.20	$0.13	$0.10	$0.14	$0.12
Solar Energy Escalator	2.4%	1.7%	2.1%	1.7%	1.7%
Energy Production – Degradation Rate	0.50%	0.50%	0.50%	0.50%	0.50%
Energy Price/kWh After Lease/PPA Term	$0.22	$0.16	$0.11	$0.18	$0.13
Energy Escalator After Lease/PPA Term	2.4%	1.7%	2.1%	1.7%	1.7%
Upfront Utility Rebate/W	$0.20	$0.00	$0.55	$1.50	$0.00
$/kWh PBI/SREC Amount	$0.00	$0.10	$0.00	$0.00	$0.18
PBI/SREC Years	0	15	0	0	3
Federal Tax Rate	35%	35%	35%	35%	35%
Lease/PPA Term	20	20	20	20	20
System Life	30	30	30	30	30
Other Vendor Assumptions					
Payroll Taxes/W	$0.05	$0.05	$0.05	$0.05	$0.05
Income Taxes Owed on Wages Paid by the Vendor/ W	$0.20	$0.20	$0.20	$0.20	$0.20
Federal Tax Rate	35%	35%	35%	35%	35%
Other Residential Host/Energy User Assumptions					
Energy Cost Without Solar Lease or PPA/kWh	N/A	N/A	N/A	N/A	N/A
Energy Escalator Without Solar Lease or PPA	N/A	N/A	N/A	N/A	N/A
Initial ITC Outlay (Investment)	**$10,500**	**$10,500**	**$10,500**	**$10,500**	**$10,500**
Nominal Gross Revenue	**$24,075**	**$18,122**	**$15,852**	**$18,120**	**$15,027**
Nominal Net Benefits	**$13,575**	**$7,622**	**$5,352**	**$7,620**	**$4,527**
Return on ITC Investment (ROI)	**129%**	**73%**	**51%**	**73%**	**43%**
Internal Rate of Return on ITC Investment (IRR)	**11%**	**8%**	**5%**	**10%**	**5%**

References:

- The COGs and system price assume a 20% margin, and the system price is based on Treasury guidance issued June 30, 2011.
- The upfront utility rebate, Production Based incentive ("PBI"), and State Renewable Energy Certificates ("SREC") data are based off information obtained from http://dsireusa.org in conjunction with estimates provided by SolarCity for 2nd Quarter 2012.
- The energy price per kilowatt hour produced ("kWh") after the expiration of the lease/PPA term, the energy cost without solar, and all energy escalator assumptions are based on 2011 data form the United States Energy Information Administration ("EIA") except for the state of California, for which assumptions have been based on PG&E tiered data as of March 1, 2012. The ITC Payback Model assumes the energy price will escalate for years after 2011.
- The energy lease or PPA price is based on a charge per kWh that is less than the EIA average.
- The federal tax rates are based on federal corporate tax rates. The assumptions for federal payroll taxes paid per watt and income taxes owed on wages paid by the vendor have been provided by estimates from SolarCity.
- Does not include depreciation.

EXHIBIT B – KPMG LLP DUE DILIGENCE METHODOLOGY

KPMG was retained to verify the accuracy of the mathematical formulas included in the Model and to verify the application of the current tax law in relation to the income tax assumptions in the Model for reasonableness. A full description of their due diligence analysis and methodology is available at this link: http://www.uspref.org/images/docs/KPMG-Final-Report-6-4-2012.pdf
Any questions for KPMG should be directed to jstanton@solarcity.com

EXHIBIT C – ITC PAYBACK MODEL

A link to the ITC Payback Model is available here:
http://www.uspref.org/images/docs/Exhibit_C-ITC_Payback_Model.xlsx

EXHIBIT D – ITC PAYBACK MODEL WITH DEPRECIATION

A link to the ITC Payback Model with depreciation is available here:
http://www.uspref.org/images/docs/Exhibit_D-ITC_Payback_Model.xlsx

PRIMARY AUTHOR

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ABOUT US PREF

US PREF is a coalition of senior level financiers who invest in all sectors of the energy industry, including renewable energy. Members educate the public sector to assure renewable energy finance legislation impacts the market as efficiently and effectively as possible, with the goal of helping to unlock capital flows to renewable energy projects in the United States. US PREF is a program of the American Council On Renewable Energy (ACORE), a Washington, DC based nonprofit organization dedicated to building a secure and prosperous America with clean, renewable energy.