

A Survey of State and Local PV Program Response to Financial Innovation and Disparate Federal Tax Treatment in the Residential PV Sector

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Market Context For This Report

The residential PV market in the United States is currently characterized by:

- declining installed costs
- dwindling state PV incentives
- booming demand
- high share (e.g., ~90%) of third-party ownership (TPO) in the largest markets, in part due to greater federal tax benefits
- a growing consensus that host-ownership can provide greater savings than TPO to many PV adopters, and
- a recent proliferation of solar loan products designed to encourage host-ownership

A number of state and local PV program managers have adapted their programs in response to these developments – this report describes and discusses these responses

Presentation Outline

Two waves of financial innovation in the residential PV sector:

- 1) 2008-2013: Rise of residential third-party ownership (TPO)
- 2) 2013-present: Proliferation of solar loan offerings
 - Survey of private sector loan products

State and local PV program response to private sector financial innovation:

- 1) Differentiate incentive levels by ownership type (TPO vs. host-owned)
 - Examples of differentiation by incentive level and/or structure
 - Considerations surrounding differentiated incentives
- 2) Initiate or enhance support for solar loans
 - Examples
 - Considerations surrounding support for solar loans

Conclusions

Appendix: Estimate of Federal Tax Benefits Provided to TPO vs. Host-Owned Systems

First Wave of Innovation (2008-13): Rise of Residential TPO

Began in CA when SunRun offered first PPA in late 2007, followed by SolarCity with first lease in 2008. Soon spread to other states and attracted other TPO providers. By 2013, TPO made up bulk of the market (as high as ~90%) in some states.

4 Main Drivers of TPO:

- 1) **Built-in financing** converts high up-front cost into affordable monthly payments that are easily comparable to existing utility bill
- 2) **Tax credit monetization** enables hosts with insufficient tax appetite to still benefit from ITC (and depreciation), assuming some degree of pass-through
- 3) **Reduced performance risk** because TPO provider owns, monitors, and maintains the system
- 4) **Incremental federal tax benefits** relative to host-ownership due to differences between the residential and commercial ITC, TPO basis step-up, and depreciation
 - TPO tax advantage is estimated (in Appendix of report and slides) to be ~\$2.2/W in 2008, ~\$0.7-0.9/W from 2009-present, and ~\$0.5/W in 2017 following the ITC reversion

First three drivers have begun to fade in recent years (as a result of declining costs, stronger warranties, and longer operational experience), while the fourth persists and will continue past 2016 (see Appendix slides 14-19)

Second Wave of Innovation (~2013-present): Proliferation of Solar Loans

Success of TPO (which is, at its core, a form of financing) and declining costs have attracted a variety of lenders intent on capturing some of TPO's market share

Drivers of Solar Loans:

- 1) Declining costs make PV ownership more affordable and third-party tax credit monetization less necessary
- 2) Research suggests that TPO PPA/lease pricing has not kept pace with cost decline; such “value-based pricing” leaves money on the table and invites competition
- 3) Interest rates at historical lows
- 4) TPO not available in every state (loans can help to expand the market)
- 5) Unfulfilled promise of residential PACE leaves door open to other options
- 6) Innovative new loan products breed familiarity and spark further interest and innovation (snowball or knock-on effect)

Survey of Private Sector Solar Loan Offerings

- **Most solar loan products are structured around a 12- to 18-month “same as cash” (i.e., 0% interest with balloon payment) tax credit loan for 30% of system cost – to be paid off upon realization of the 30% ITC**
- **Remaining 70% of system cost is amortized over longer term (ranging from 5 to 30 years), with fixed interest rates generally ranging (by product) from 2.99% to 8%**
- **Generally no down payment or prepayment penalties, often unsecured**
- **Other innovations include loan sizing based on projected bill savings (i.e., ability to pay), bundled performance guarantees and O&M services, finance crowd-sourcing, and per-kWh repayment**
- **Specific multi-state loan products described in the report include offerings from SunPower, Sungage Financial, Enerbank USA and GreenSky Credit, Admirals Bank, Digital Federal Credit Union, Mosaic, and SolarCity (see report for more details)**

State and Local PV Program Response to Private Sector Financial Innovation

Though responses to date have not been uniform (or even widespread), those programs that have responded generally fall into two camps:

- 1) Differentiate incentive levels by ownership type (TPO vs. host-owned)
- 2) Initiate or enhance support for solar loans

Motivations for both responses also vary, but generally include one or more of the following:

- Recognition of TPO advantage from larger federal tax benefits (see Appendix in slides and report)
- Increasing appreciation of benefits of host-ownership
- Simply a way to proactively manage market growth and sustain program funds

Response #1: Differentiate Incentive Levels by Ownership Type (TPO vs. host-owned)

An extension of the more common practice of differentiating incentive levels based on recipients' ability to use federal tax incentives

- For example, tax-exempt government or non-profit host-owners are often provided with larger state and local incentives than taxable host-owners (including TPO)
- This is an explicit acknowledgment that these tax-exempt host-owners are relatively disadvantaged by their inability to use federal tax benefits
 - The federal tax disparity between residential TPO and host-owned systems (see Appendix) is simply a more-nuanced extension of this same rationale

NOTE:

- **Given the pre-2009 and post-2016 statutory differences between the residential and commercial ITCs (see Appendix), disparity between the two should not necessarily be alarming (to the contrary, it has at times been Federal policy)**
- **On the other hand, the inequality of federal tax benefits provided to host-owners vs. TPO providers has had a significant impact on how the residential PV market has developed over time**
 - At a minimum, state and local PV program managers should understand these linkages, and perhaps consider whether responsive adjustments to their programs are warranted

Examples of Differentiation by Incentive Level and/or Structure (see report for more details)

- CO:** Different performance-based incentive (PBI) values and terms currently favor host-owners by $\sim\$0.05/W$ of present value (was $\sim\$0.15/W$ in 2014)
- CT:** In Step 7 of the program, host-owner gets “expected performance-based buy-down” (EPBB) that is $\sim\$0.19/W$ larger than TPO PBI on a present value basis (differential in Steps 1-6 ranged from $\$0.11/W$ to $\$0.74/W$)
- MD:** TPO no longer eligible for grant of $\sim\$0.20/W$ (assuming 5 kW system)
- MA:** Provided $\$0.40/W$ extra rebate to moderate-income host-owned
- OR:** Host-owners (in PGE territory) get $\sim\$0.25/W$ more than TPO
- TX:** Municipal utilities in Austin and San Antonio provide rebates (of $\$1.10/W$ and $\$1.60/W$, respectively) to host-owners but not to TPO

With the exception of TX, the other five programs noted above have differentiated by far less than the estimated $\$0.7-0.9/W$ federal tax advantage provided to TPO (see Appendix)

Considerations Surrounding Differentiated Incentives

1) Threshold question of whether or not to differentiate at all

- **No right or wrong answer – depends on program goals and philosophy, as well as market context**
 - **Goals/philosophy:** Acute focus on near-term deployment vs. a broader strategy of supporting a diversity of business models, potentially enhancing long-term economic development and maximizing ratepayer benefits
 - **Market context:** Current pace of residential PV deployment acceptable, too fast, or too slow? TPO already well-established in the local market or just getting started? Other financing options (other than TPO) readily available? Any other state or local incentives that favor either host-owned or TPO systems, and that should therefore enter into the calculus? Future funding levels expected to decline, increase, or stay the same?

2) If differentiating, do so by incentive level or structure (or both)?

- **Structural differences may be an effective way to provide an appropriate form of support to each business model without necessarily favoring (on a present value basis) one over the other**
 - For example, TPO arguably less in need of an up-front incentive (because system is pre-financed by tax equity fund) and more capable of dealing with a PBI (through metering and tracking) than are host-owned systems
- **Differentiating incentives levels may preserve funding and better leverage federal tax dollars (if implemented by reducing TPO incentive levels), as well as drive greater competition**

3) If differentiating incentive levels, how much differentiation might be considered?

- **All else equal, estimates of federal tax disparity in the Appendix might suggest an upper bound**
- **But each program should do its own analysis within the context of the market in which it operates**

4) If differentiating incentive levels, how best to implement any differentiation?

- **By reducing TPO incentive levels, increasing host-owned levels, or a combination of both?**
- **Various tradeoffs and considerations involved (see report)**

Response #2: Initiate or Enhance Support for Solar Loans (see report for more details)

- CT:** In addition to launching the *CT Solar Lease* program in 2008 (before private sector TPO was available in CT), CT was also the initial backer of Sungage Financial in setting up the *CT Solar Loan* program in 2013
- HI:** Green Energy Market Securitization (GEMS) program issues ratepayer-backed green bonds to fund PV financing and other green infrastructure programs; initially targeting non-profits who borrow GEMS funds to pre-pay a 20-year solar PPA (which monetizes tax benefits)
- MA:** In 2015, the new *Mass Solar Loan* program replaced the existing rebate program with three types of credit enhancement: an interest-rate buy-down, a loan loss reserve fund, and a “moderate income loan support payment” (i.e., a need-based rebate applied to loan principal)
- NY:** NYSERDA’s *Green Jobs-Green New York* revolving loan program can be structured as a traditional installment loan or can utilize on-bill repayment. More recently, the New York Green Bank has entered the market as a wholesale lender and/or provider of credit enhancements and warehouse facilities.

Considerations Surrounding Support for Solar Loans

- 1) **Are there already consumer-friendly solar loan products available in the local market?**
 - **If not, then a more comprehensive approach (like in NY, CT, MA, HI) may be needed**
 - **But does not necessarily require setting up a dedicated revolving loan fund (though that is an option – see NYSERDA)**
 - **Instead, the PV program could partner with a private sector loan originator/administrator and private sector lenders willing to buy the loans (perhaps enticed by credit enhancements provided by the PV program) – see CT**
 - **If so, then there may be opportunities to complement what's already on offer by using program funds to increase the attractiveness of existing loan products or to expand access to them**
- 2) **In either case, various forms of credit enhancements might be useful tools**
 - **Committing small amounts of low-interest subordinated debt might reduce interest rates (as well as the senior lender's loan-to-value ratio, which could become critical if the residential ITC – and the 30% “same as cash” tax credit loans that are based on it – disappears in 2017)**
 - **Establishing a loan loss reserve fund may reduce lender risk and, in turn, the loan interest rate. Alternatively, if targeted at a specific demographic, such a reserve could increase access.**
 - **Interest rate buy-downs involve a cash outlay (i.e., not simply a credit enhancement), but nevertheless make loans more affordable, thereby increasing attractiveness and/or expanding access**

Conclusions

- **The residential PV market in the United States is dynamic, currently characterized by declining installed costs, dwindling state PV incentives, booming demand, high TPO market share in the largest markets, a growing appreciation of the benefits that host-ownership provides, and a recent proliferation of solar loan products designed to encourage host-ownership**
- **Within this context, this report has explored two basic ways in which a number of (but not all) state and local PV programs have responded to these developments:**
 - 1) **Differentiating incentives by ownership type to account for TPO's federal tax advantage (see Appendix)**
 - 2) **Initiating or enhancing support for solar loan products**
- **Both responses potentially help to preserve scarce public funding for PV by using incentives more as a tool to fine-tune the market rather than to stimulate it outright, and/or by shifting away from cash incentives in favor of financial support that can better sustain fund balances and potentially even provide a return on capital**
- **Both responses will be as or even more relevant in 2017 if the residential ITC expires while the commercial ITC reverts to 10%, per current law**
- **PV program managers contemplating either of these responses are encouraged to consider the various tradeoffs involved (in light of their programmatic goals and philosophy), as well as the market context in which they operate**

Appendix

Estimate of Federal Tax Benefits Provided to TPO vs. Host-Owned Systems

*(see Appendix in full report for more context
and details surrounding these estimates)*

Federal Tax Disparity Differs Over Time: Three Distinct Periods of Relevance

- 1) **2006-2008:** 30% residential (Section 25D) ITC capped at \$2,000/system, while 30% commercial (Section 48) ITC not capped
- 2) **2009-2016:** Residential cap lifted, so residential and commercial credits nominally on equal terms (30% ITC, no cap)
 - Except for Section 1603 grant eligibility (available to TPO providers but not host-owners) and ITC basis “step-up” practices (more prevalent with TPO)
- 3) **Post-2016:** No residential ITC, 10% commercial ITC

NOTE:

- Given the pre-2009 and post-2016 statutory differences between the residential and commercial ITCs, disparity between the two should not necessarily be alarming (to the contrary, disparity has, at times, been Federal policy)
- On the other hand, the inequality of federal tax benefits provided to host-owners vs. TPO providers has had a significant impact on how the residential PV market has developed over time and – at a minimum – state and local PV program managers should understand these linkages and consider whether responsive adjustments to their programs are warranted

2006-2008: TPO advantage of ~\$2.8/W

- Given launch of residential TPO in late 2007, focus is really only on 2008
- Median residential PV price in 2008 was \$8.7/W or \$43,500 for a 5 kW system (from *Tracking the Sun VII*)
 - **TPO:** Assuming no “basis step-up” (see next slide), ITC of \$13,050 (\$2.6/W) and net depreciation benefits of ~\$2,800 (~\$0.6/W) for a total of ~\$15,850 (~\$3.2/W)
 - **Host-owned:** ITC capped at \$2,000 (\$0.4/W) and no depreciation benefit
- Difference between TPO and host-owned yields a TPO federal tax advantage of ~\$13,850 (\$2.8/W) for a 5 kW system
- This significant arbitrage opportunity, in place from 2006-2008, was a primary driver for adapting TPO to the residential sector
- Residential ITC cap was lifted starting in 2009, however, reducing (but not eliminating, due to ITC basis step-up and depreciation) the federal tax disparity between TPO and host-owned systems – see next slide

2009-2016: TPO advantage of ~\$0.7-0.9/W

- With no cap, resi and commercial ITC ostensibly provide same value (30%)
- But 30% of what?
 - ITC basis for host-owned system equals installed price (IRS Form 5695)
 - ITC basis for TPO system often equals appraised “fair market value” or FMV
- Table A-1 finds ITC difference of ~\$0.4-0.5/W from 2010-2013
- Depreciation adds another ~\$0.3-0.4/W (see report), for ~\$0.7-0.9/W in total
- TPO advantage may decline in 2015-16 (but slide 19 suggests not in 2014)

Table A-1. Calculation of Incremental 30% ITC/Grant Provided to TPO Systems

	Median TPO (FMV)	Median Host-Owned (Installed Price)	Difference (TPO - Host-Owned)	Incremental ITC/Grant	
	2013 \$/W _{DC}	2013 \$/W _{DC}		30% of Difference	Applied to a 5 kW _{DC} system
			2013 \$/W _{DC}	2013 \$/W _{DC}	2013 \$
2009	11.7	8.4	3.3	1.0	4,950
2010	9.0	7.2	1.8	0.5	2,700
2011	8.2	6.5	1.7	0.5	2,550
2012	7.0*	5.4	1.6	0.5	2,400
2013	6.0*	4.7	1.3	0.4	1,950

* TPO FMV and host-owned installed price data come from the *Tracking the Sun VII* (Barbose et al. 2014) data shown in Figure A-1, except for in 2012 and 2013, when the TPO FMV is set to match Treasury guidance of \$7/W_{DC} and \$6/W_{DC}, respectively (for reasons explained in the text).

Post-2016: TPO advantage of ~\$0.5/W

- Under current law, the residential ITC will expire at the end of 2016, while the commercial ITC will merely revert back to 10%
- Hence, even absent any TPO basis step-up (to appraised FMV), the TPO tax advantage will persist statutorily post-2016
- SolarCity's published cost projections for 2017 suggest that the size of TPO's federal tax advantage at that time could be ~\$0.5/W (see next slide)

Table A-2 summarizes the federal tax disparity over the 3 different periods there is, of course, uncertainty in these estimates, particularly during the 2009-2014 period, which requires insight into FMV appraisals and basis step-up practices (*but*...next slide finds same answer using SolarCity's numbers)

Table A-2. Summary of Estimated Federal Tax Benefit Disparity in 3 Periods Examined

	ITC Disparity (\$/W _{DC})	Depreciation Disparity (\$/W _{DC})	Total Disparity (\$/W _{DC})	Total Disparity (5 kW system)
2008	\$2.2/W	\$0.6/W	\$2.8/W	\$13,800
2009-2014	\$0.4-0.5/W	\$0.3-0.4/W	\$0.7-0.9/W	\$3,500-\$4,500
2017 (projected)	\$0.35/W	\$0.15/W	\$0.50/W	\$2,500

SolarCity's 3Q14 Numbers Provide Same Answer (plus insight into 2017)

~\$4.75/W

Renewal: \$0.55/W

Contracted
Customer
Payments:
\$2.40/W

Tax
Benefits:
\$1.80/W

ITC and Depreciation = ~\$1.80/W

- Investment tax credit at 30% of "fair market value" of ~\$4.75/W
- After-tax benefits of accelerated depreciation of \$0.30-0.40/W

3Q14: Total TPO tax benefit of ~\$1.80/W [=30%*\$4.75/W ITC + \$0.3-\$0.4/W net depreciation] is ~\$0.8/W larger than host-owner ITC of ~\$1/W [=30%*(\$2.9/W*120%)] if system sold (at assumed 20% margin) instead of leased

~\$2.90/W

Installation,
Sales,
and G&A

PV of Residential
Lease/PPA

Total Upfront
Investment

~\$3.50

Customer
Payments:
~\$3.00

Tax Benefits: ~\$0.50

PV of Residential
Lease/PPA

Total Cost Goal by 2017

2017: Residential ITC gone, so TPO tax advantage in this example is simply ~\$0.50/W [=10%*\$3.50/W ITC + ~\$0.15/W net depreciation]

~\$2.50