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BANKING ON SOLAR: DEBT FINANCE IN TODAY'S DISTRIBUTED MARKET

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Solar Loans: A Nascent Market

Over the last two years, several entities—from banks to credit unions to solar finance companies—have rolled out distributed solar-specific loan programs in the United States. These solar-specific loans are a distinct loan in that the underwriting, loan terms, lender security interest, and other programmatic aspects are designed exclusively for the financing of solar installations. Until recently, loan financing for distributed solar installations was largely through home equity loans, commercial loans, and other standardized loan products available to homeowners and businesses for general expenditures. However, as the U.S. solar market matures, so too are its financing options, and solar-specific loans stand to gain market share.

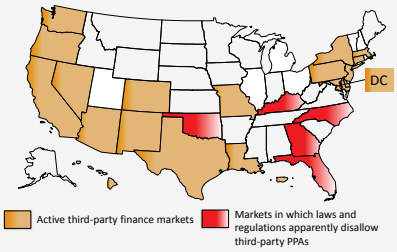
As of 2014, third-party ownership (TPO) accounted for some 66% of the residential market and a nontrivial portion of the commercial market. However, after year-over-year gains since 2008, third-party finance market penetration may crest in 2014, and gradually cede share to loan options. This includes the numerous solar-specific programs that are only now just emerging, but also specialty products such as property assessed clean energy (PACE).

How do solar loans perform relative to TPO? What are the range of loan-based financing options available to U.S. consumers, and what are the regional/jurisdictional limitations on that availability. And what kind of challenges—besides competition with the successful TPO model—that could affect the growth of solar loans as a viable form of financing distributed (namely residential and small commercial) installations?

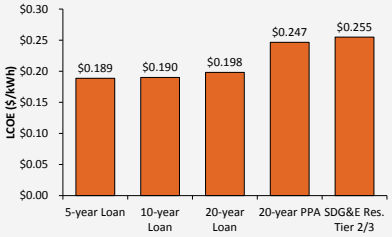
The National Renewable Energy Laboratory's Banking on Solar effort aims to answer these questions and build a knowledge framework to investigate and facilitate the emergence of this nascent asset class.

A Diversity of Financing Options

Third-Party Finance Availability in the United States



Modeled Cost of Energy for Solar Loans (5-, 10-, and 20-year) vs. Solar PPA and SDG&E Blended Residential Rate



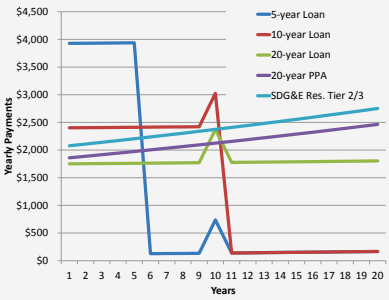
Growth in the U.S. distributed solar market—particularly the residential sector—has been facilitated in large part by the TPO model: going solar via a lease or power purchase agreement (PPA). The TPO model of allowing solar customers to finance systems for no money down, and to pay a simple monthly fee that is often below the local utility rate has proven to be a winning economic proposition for hundreds of thousands of Americans.

However, a diversity of financing options—leases, loans, and other forms of financing—is important for any consumer market (think automobiles or real estate). Despite its strengths, TPO has limitations that could be complemented by the benefits of loans. For example, TPO is only available in a handful of states. In some states, laws and regulations either explicitly or implicitly prohibit the sale of electricity through third-party power purchase agreements (PPAs). Leases may be legal in these markets, but the business risk of unclear laws may be unacceptable to many TPO companies. In these markets, loans can fill the financing gap for potential solar customers. Moreover, TPO does not allow solar customers to take advantage of the benefits of ownership, such as the direct receipt of the 30% investment tax credit, and potential increase in home value.

Loans could also allow for reductions in the overall cost of distributed solar finance. All else being equal, the cost of capital associated with a loan—that is, the interest rate—can undercut the weighted average cost of capital (WACC) associated with the tax equity financing structures. This WACC is passed through to lease and PPA customers, which can put upward pressure on prices and the ultimate cost of solar energy.

A forthcoming NREL analysis models a hypothetical 5 kW residential solar system in California. This analysis finds that when financed through a loan, the cost of solar energy is below that of a system financed through a third-party PPA, regardless of loan maturity (see Modeled Comparison of Residential Solar Loans figure, right). This analysis also finds greater lifetime savings—i.e., the differential between the utility rate and the total monthly payments over the term of the loan (including O&M costs)—in loan financings.

Modeled Comparison of Residential Solar Loans (5-, 10-, and 20-year) vs. Solar PPA and SDG&E Blended Residential Rate



BANKING ON SOLAR

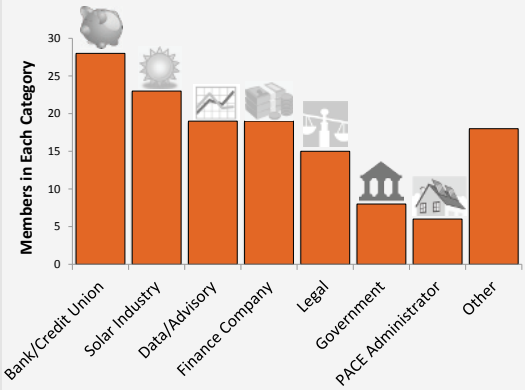
The Flavors of Solar Loans

Homeowners (and businesses to a lesser extent) in certain solar markets can access a growing menu of options when choosing a loan product with which to finance a rooftop installation. These options range from solar-specific loans to general energy-related loans (Title I, PACE), to general loans (home equity, commercial loans), each with its own particular programmatic structure. In some solar specific loans, for example, the lender will issue a 12 -18 month loan at 0% interest against the anticipated sum of the homeowner's return from the 30% investment tax credit. This loan is usually due as a bullet payment (i.e., all at once) at the maturity date. Another example, on-bill financing, which is essentially a loan to a homeowner that is amortized through that homeowner's utility bill, does not offer this "same-as-cash" type loan, though it does consolidate the collection of payment with the utility. This reduces the likelihood of borrower default (because utility bills are typically one of the obligations that people will default on in times of economic hardship).

	Loan Type	Description	Lender	Term (yrs)	Interest Rate	Examples	Availability	Govt. Support?
Residential	Solar-Specific	A loan made to a borrower by a private or public lender exclusively for the purchase of a solar system	Bank, Credit Union (CU), finance company (finco)	5 – 20	2.99% – 8% +	• EnerBank • GreenSky • Mosaic • Sungage Financial	Can be limited to certain jurisdictions or available nationwide	Typically no
Residential	Title I (HUD)	90% government-guaranteed loan secured by second lien on home	Program-approved Lenders (Bank, CU, finco)	10-20	3 - 9%	• Power-Saver • Admirals Bank's Solar Step-down	Nationwide	Yes
Residential	On-Bill	Loan amortized through electric bill	Bank, CU, Utility, State	≤15	3% +	NYSERDA	Service territories of participating utilities	Sometimes
Residential	Home Equity	A loan or line of credit against the value of a homeowner's equity. Also called a 2nd mortgage	Bank, CU, finco	≤30	4.5% +	NA	Nationwide	No
Both	PACE	A loan made via an increase in property tax assessment and amortized through property tax bill	Bank, finco, Municipality	≤20	5 - 8%	• Hero Program • Renewable Funding	States with PACE-enabling legislation	Yes
Comm-ercial	Commercial Loan	A loan made to businesses to finance operations, capital expenditures, etc.	Bank, CU, finco	5 - 30	3.25%– 6.85%	NA	Nationwide	No

Banking on Solar

In January of 2014, the National Renewable Energy Laboratory, under the auspices of the Department of Energy's SunShot program, convened the Banking on Solar working group. The working group brings together stakeholders in the emerging solar loan market to discuss the challenges to growth, explore solutions, and build the knowledge framework that would enable wider market participation and therefore liquidity. The group's membership totals over 135 organizations representing the most active industries in the solar finance arena. Half of the group is comprised of the solar and lending communities, while the other half includes top law firms, governmental entities (e.g., green banks and development authorities), PACE administrators, and other industries.



Many lenders in the United States are hesitant to extend credit to solar borrowers because they lack an understanding of the technology and loan performance risks. Banking on Solar works with its membership to educate banks, credit unions, and other lenders about these risks as well as the potential rewards in gaining exposure to this new asset class.

Banking on Solar also provides a forum for lawyers to explore the legal uncertainties surrounding solar lending. Such issues include the characterization of solar assets as personal property or fixtures of the real estate, the rights of the solar lender in the event of a foreclosure, holder in due course exceptions, and others.

Additionally, no effort to engage the banking sector and other lenders could succeed without addressing the regulatory component. Banks are among the most heavily regulated entities in the world, and they will be hesitant to invest in a new opportunity without clarification of how their regulators will treat it in the examination process. Banking on Solar is facilitating dialogue with regulators, educating them on solar's risk profile, and clarifying their positions will encourage more banks to consider lending to the asset class.

All in all, Banking on Solar aims to build consensus around industry standards and best practices, while also engaging a broad range of capital providers to inform them of and educate them about the solar asset class. The U.S. solar industry is fast-growing and hungry for capital—unlocking the low-cost capital in the banking sector, as well as facilitating the solar industry's access to a financing tool that could reduce installation costs, could enable deployment at levels not possible under strictly higher cost financing regimes.

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