COMMENT

SOLAR-BACKED SECURITIES: OPPORTUNITIES, RISKS, AND THE SPECTER OF THE SUBPRIME MORTGAGE CRISIS

Samantha Jacoby†

† Senior Editor, Volume 162, *University of Pennsylvania Law Review*. J.D. Candidate, 2014, University of Pennsylvania Law School; B.A., 2007, University of the Incarnate Word. I would like to thank Kenneth Kulak, for his advice and guidance throughout the writing of this Comment; Luke Eldridge and Roger Dixon, for their patience and thoughtful edits; and my family, for all their support.

INTRODUCTION

Existing project financing structures utilizing the Investment Tax Credit (ITC) and depreciation benefits have helped spur growth in the solar industry but are insufficient on their own to enable the residential solar sector to scale up and become a mainstream energy source. In the span of only a few years, the solar market has grown from a fledgling niche industry to an important global player. Solar installations in the United States grew at an annual rate of 70% between 2005 and 2012.[1] Federal tax incentives and state-level subsidies have largely driven this growth. However, for reasons I explore in this Comment, these tax incentives and subsidies will be unable to sustain such rapid growth in the coming years, especially in the residential sector. If the solar industry is to continue to grow and become competitive with other energy sources, innovative private financing mechanisms are needed to allow residential solar developers to tap into capital markets and access new classes of investors (e.g., mutual funds, pension funds, and other institutional investors).

The securitization of solar leases presents a promising solution to this problem, but a variety of barriers currently prevent solar companies from securitizing these assets successfully. This Comment identifies and assesses these barriers and recommends strategies to promote low-cost securitization of residential solar leases while minimizing the potential risks that such securitization poses.

In Part I, I introduce the solar market, emphasizing in particular the current mechanisms to finance solar systems, the existing policies promoting solar energy, and the residential solar leasing model. In Part II, I present an overview of the asset-backed securitization process, outline how it might apply to solar leasing, and assess the risks and benefits of solar lease securitization. Finally, in Part III, I recommend strategies to reduce the risks posed by solar lease securitization and offer some predictions for the sector going forward. This Comment focuses primarily on residential solar

---

1 According to the Solar Energy Industries Association, annual installations of solar photovoltaic systems totaled 79 megawatts (MW) in 2005. SOLAR ENERGY INDUS. ASS'N & GTM RESEARCH, U.S. SOLAR MARKET INSIGHT: 2ND QUARTER 2010: EXECUTIVE SUMMARY 3 fig.2-1 (2010) [hereinafter SOLAR MARKET INSIGHT 2010], *available at* http://www.seia.org/sites/default/files/us-solar-market-insight-report-q2-2010-120627095752-phpapp02.pdf. In 2012, annual installations of solar photovoltaic systems totaled 3313 MW. SOLAR ENERGY INDUS. ASS'N & GTM RESEARCH, U.S. SOLAR MARKET INSIGHT REPORT: 2012 YEAR IN REVIEW: EXECUTIVE SUMMARY 3 (2013) [hereinafter SOLAR MARKET INSIGHT 2012], *available at* http://www.seia.org/sites/default/files/resources/ZDgLD2dxPGYIR-2012-ES.pdf. These figures yield a compound annual growth rate (CAGR) of 70.5%.

systems but will also address some concepts common to commercial and utility-scale solar systems. Ultimately, I argue that while securitization is not a quick fix, it is a valid option for increasing liquidity and attracting new sources of capital to the solar leasing market.

I. SOLAR FINANCING AND THE LEASE/POWER PURCHASE AGREEMENT MODEL

A. *Solar Market Background and Trends*

Although the solar market consists of multiple technologies that harness the sun's energy in different ways, this Comment focuses specifically on solar photovoltaic (PV) technology. PV technology is used in three distinct market segments that generate power for different classes of customers: residential, commercial, and utility-scale end users.[2] Solar PV has traditionally accounted for a very small percentage of the total amount of electricity generated, but the PV industry has experienced rapid growth in the last few years and is expected to continue this trajectory through 2016.[3]

In 2005, only 79 megawatts (MW) of solar PV were installed in the United States.[4] That number grew to 848 MW installed in 2010 and 3313 MW installed in 2012.[5] Annual installations for 2013 are expected to grow to 4300 MW (approximately 29% more than in 2012) and to more than 5000 MW in 2014.[6] The PV industry is projected to continue to grow rapidly through 2016—reaching nearly 9000 MW of installations in 2016—which indicates that the domestic solar market will expand by roughly 28% in each

2 *See generally* NAT'L RENEWABLE ENERGY LAB., 2010 SOLAR TECHNOLOGIES MARKET REPORT 6-8 & figs.1.6-1.7 (2011), *available at* http://www.nrel.gov/docs/fy12osti/51847.pdf (discussing and depicting both the number of installations and capacity installed by year for each market segment).

3 *See* SOLAR MARKET INSIGHT 2012, *supra* note 1, at 13 fig.2.8 (projecting that PV installations in 2016 will total nearly 9000 megawatts (MW), up from fewer than 2000 MW in 2011).

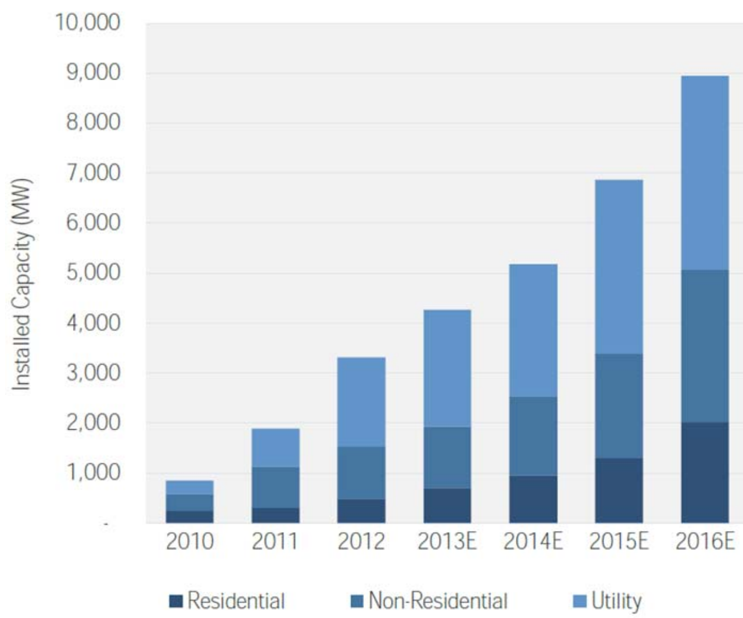
4 SOLAR MARKET INSIGHT 2010, *supra* note 1, at 3 fig.2-1. For reference, one MW of installed solar PV produces the equivalent of the annual energy needs of approximately 164 average American homes. *What's in a Megawatt?*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/solar-technology/photovoltaic-solar-electric/whats-megawatt (last visited Oct. 25, 2013). In general, a MW-rated solar system produces less electricity in the aggregate than a MW-rated conventional system, such as a coal-fired power plant, because a solar system produces power only when the sun is shining. For more information on average power output of different energy technologies, see *Energy Technology Cost and Performance Data*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/analysis/tech_cap_factor.html (last visited Oct. 25, 2013).

5 SOLAR MARKET INSIGHT 2012, *supra* note 1, at 5 fig.2.1.

6 *Id.* at 13 & fig.2.8.

of the next three years.[7] By 2016, the United States will account for nearly 15% of global PV market share, up from about 7% in 2011.[8] Of the three market segments, the residential sector has shown the most consistent growth patterns—increasing by a steady but modest pace each quarter—and is expected to more than triple in size by 2016.[9] The following graph shows actual and projected annual installations by market segment from 2010 through 2016.

Figure 1: Projected U.S. Solar PV Installations, 2010–2016[10]



[7] *Id.*; *cf.* STEFAN LINDER & MICHEL DI CAPUA, BLOOMBERG NEW ENERGY FIN., US SOLAR—WHITE PAPER: RE-IMAGINING US SOLAR FINANCING 4 fig.4 (2012), *available at* http://www.bnef.com/WhitePapers/download/84 (forecasting smaller growth rates, with 4300 MW expected in 2014 under an "optimistic" scenario).

[8] SOLAR ENERGY INDUS. ASS'N & GTM RESEARCH, U.S. SOLAR MARKET INSIGHT REPORT: 2011 YEAR-IN-REVIEW: EXECUTIVE SUMMARY 6 & fig.1-4 (2012) [hereinafter SOLAR MARKET INSIGHT 2011], *available at* http://www.seia.org/sites/default/files/resources/2011%20Q4%20SMI%20ES.pdf.

[9] *See* SOLAR MARKET INSIGHT 2012, *supra* note 1, at 13 fig.2.8 (forecasting U.S. PV installations from 2010 to 2016); *cf.* LINDER & DI CAPUA, *supra* note 7, at 4 fig.4 (projecting that, even in a "conservative scenario," the residential sector will nearly double between 2011 and 2014).

[10] SOLAR MARKET INSIGHT 2012, *supra* note 1, at 13 fig.2.8.

However, it should be noted that the national data masks important state-level trends. Perhaps most important, states vary significantly in their levels of solar adoption. For instance, California has been the consistent market leader in the solar industry, with Arizona, New Jersey, Nevada, and Massachusetts rounding out the top five states for solar installations in 2012.[11] California also has the largest residential market, yielding a residential solar market more than three times the size of the residential market in the next largest state, Arizona.[12] Figure 2 depicts installed capacity in the top ten leading state markets.

Figure 2: Top Ten States by Grid-Connected PV Capacity Installed in 2012[13]

2012 Rank by State	2012 (MW_{DC})	2011 (MW_{DC})	2011–2012 Percent Change	2012 Market Share	2011 Rank
1. California	983	547	80%	29%	1
2. Arizona	709	288	146%	21%	3
3. New Jersey	391	305	28%	12%	2
4. Nevada	226	19	1062%	7%	15
5. Massachusetts	123	42	190%	4%	10
6. North Carolina	122	45	169%	4%	9
7. Hawaii	114	40	182%	3%	11
8. Colorado	103	76	36%	3%	6
9. Maryland	80	24	227%	2%	12
10. New York	56	68	(18%)	2%	7
All Other States	434	402	8%	13%	–
Total	3341	1856	80%	–	–

11 LARRY SHERWOOD, INTERSTATE RENEWABLE ENERGY COUNCIL, U.S. SOLAR MARKET TRENDS: 2012, at 12 tbl.3 (2013), *available at* http://www.irecusa.org/wp-content/uploads/2013/07/Solar-Report-Final-July-2013-1.pdf; *cf.* SOLAR MARKET INSIGHT 2012, *supra* note 1, at 6 fig.2.2 (ranking North Carolina, rather than Massachusetts, as the fifth-largest solar market in 2012).

12 SOLAR MARKET INSIGHT 2012, *supra* note 1, at 8 fig.2.4.

13 SHERWOOD, *supra* note 11, at 12 tbl.3.

B. *Solar Finance and Policy*

A number of federal tax incentives support the financing of renewable energy systems, which are still, in general, more expensive than traditional energy sources.[14] The primary driver of growth in the solar industry has been the Investment Tax Credit (ITC), which is a federal income tax credit worth 30% of the cost of solar energy systems.[15] To take advantage of the credit, however, solar developers must have some tax liability, but most solar developers lack sufficient tax liability to fully utilize the credit.[16] Unless modified, the 30% ITC will remain in effect until the end of 2016, when it will revert to a permanent 10% credit.[17] There is a similar 30% credit available for residential consumers who install on-site solar systems.[18]

Businesses investing in renewable energy projects may also claim accelerated depreciation deductions. Under the Modified Accelerated Cost Recovery System (MACRS), businesses may recover investments in solar energy property through depreciation deductions on an advanced five-year

---

[14] *See* LAZARD, LEVELIZED COST OF ENERGY ANALYSIS—VERSION 6.0, at 2 (2012), *available at* https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20121221/20121221%20PAC%20Supplemental%20Levelized%20Cost%20of%20Energy%20Analysis.pdf (depicting the levelized cost of various types of energy sources and showing that rooftop solar photovoltaics cost between $149 and $204 per megawatt-hour (MWh), while the cost of coal, for example, ranges from $62 to $141 per MWh). It should be noted that these figures do not include federal tax incentives, which lower the cost of renewable energy significantly. *See id.* at 3.

[15] *See* I.R.C. § 48(a) (2006 & Supp. V 2012) (granting a tax credit worth 30% of the cost of "equipment which uses solar energy to generate electricity" placed in service before January 1, 2017), *amended by* American Taxpayer Relief Act of 2012, Pub. L. No. 112-240, § 407, 126 Stat. 2313, 2341-42 (2013); *see also* MARK BOLINGER, ERNEST ORLANDO LAWRENCE BERKELEY NAT'L LAB., FINANCING NON-RESIDENTIAL PHOTOVOLTAIC PROJECTS: OPTIONS AND IMPLICATIONS 5 (2009), *available at* http://eetd.lbl.gov/sites/all/files/publications/report-lbnl-1410e.pdf (tracing the development of the solar ITC since its enactment).

[16] *See* MICHAEL MENDELSOHN ET AL., NAT'L RENEWABLE ENERGY LAB., THE IMPACT OF FINANCIAL STRUCTURE ON THE COST OF SOLAR ENERGY 1 (2012), *available at* http://www.nrel.gov/docs/fy12osti/53086.pdf ("[R]enewable energy project developers typically do not have sufficient taxable income to take full advantage of the tax incentives directly.").

[17] I.R.C. § 48(a)(2)(A)(i)(II); *see also* LINDER & DI CAPUA, *supra* note 7, at 5 & fig.7 (projecting a sudden and substantial decline in tax equity investment in 2017 due to the reduced credit amount).

[18] I.R.C. § 25D (2006 & Supp. V 2012), *amended by* Pub. L. No. 112-240, § 104, 126 Stat. 2313, 2322 (2013). Before 2009, the residential credit was capped at $2000, which severely limited homeowners' ability to take advantage of the credit, but the cap was removed in 2008. Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, § 106, 122 Stat. 3807, 3814-15 (codified as amended at 26 U.S.C. § 25D (Supp. V 2012)); *see also* BOLINGER, *supra* note 15, at 2-3 (explaining how the ITC has historically provided fewer benefits to residential consumers than to commercial users).

schedule.[19] Solar systems are also eligible for 50% bonus depreciation until the end of 2013.[20] Bonus depreciation allows businesses to recover 50% of the project cost in the first year of service, with the remaining 50% deducted over the ordinary MACRS schedule.[21] These federal tax incentives—including both the ITC and MACRS—can provide a tax benefit that amounts to more than half of the upfront installed cost of a solar system.[22]

Furthermore, a variety of state-level incentives exist to assist homeowners with upfront installation costs.[23] With few exceptions,[24] the states with significant solar markets are the ones that offer meaningful solar policies such as renewable portfolio standards, cash or tax incentives, and favorable regulatory environments.[25]

---

19 I.R.C. § 168(a)–(c),(e)(3)(B)(vi) (2006 & Supp. V 2012), *amended by* Pub. L. No. 112-240, §§ 311–313, 331, 410, 126 Stat. 2313, 2330, 2335-37 (2013).

20 *See* I.R.C. § 168(k)(1)(A) (allowing a 50% depreciation deduction for "qualified property"). The 50% bonus depreciation for "qualified property" was first included in the Economic Stimulus Act of 2008, Pub. L. No. 110-185, § 103(b), 122 Stat. 613, 618 (codified as amended at 26 U.S.C. § 168(k)(1)(A) (Supp. V 2012)). This allowance has since been amended and extended by several pieces of legislation. For example, under the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, eligible property placed in service after September 8, 2010, and before January 1, 2012, qualified for a 100% first-year bonus depreciation. Pub. L. No. 111-312, § 401, 124 Stat. 3296, 3304 (codified as amended at 26 U.S.C. § 168(k) (Supp. V 2012)). After 2011, bonus depreciation reverted back to 50%. Bonus depreciation was scheduled to expire at the end of 2012, but it was extended for an additional year by the American Taxpayer Relief Act, passed in December 2012. Pub. L. No. 112-240, § 331, 126 Stat. 2313, 2335-37 (codified as amended at 26 U.S.C. § 168(k) (West, Westlaw through P.L. 113-31)). Residential system owners cannot take advantage of depreciation benefits. *See* I.R.C. § 167(a) (2006) (allowing depreciation deductions only for property used in a "trade or business" or for the "production of income").

21 I.R.C. § 168(k)(1).

22 *See* BOLINGER, *supra* note 15, at 6 ("Taken together, then, the 30% ITC and accelerated depreciation provide a combined Tax Benefit equal to about 56% of the installed cost of a commercial PV system."). Bolinger notes, however, that the net tax benefit of these incentives is only about 30% because system owners must pay income taxes on utility bill savings. *Id.* at 6 n.12.

23 *See generally* N.C. State Univ., *Database of State Incentives for Renewables and Efficiency*, DSIRE, http://www.dsireusa.org/ (last visited Oct. 25, 2013) (providing information on state and local incentives that promote solar energy); *see also* BOLINGER, *supra* note 15, at 8-11 (providing an overview of state-level incentives).

24 Texas is the most notable example of a state with a meaningful solar market despite a lack of supportive statewide legislation. *See, e.g.*, N.C. State Univ., *Texas: Incentives/Policies for Renewables and Efficiency*, DSIRE, http://www.dsireusa.org/incentives/allsummaries.cfm?State=TX&&re=0&ee=0 (last visited Oct. 25, 2013) (summarizing state-level incentives for solar energy in Texas). However, a small number of electric utilities are responsible for most of the solar installations in Texas, through incentive programs in concentrated areas. *See* Stephen Lacey, Herman Trabish & Eric Wesoff, *Portraits of a Maturing Solar Market: How Key States Are Faring*, GREENTECH MEDIA (Apr. 23, 2013), http://www.greentechmedia.com/articles/read/portraits-of-a-maturing-solar-market-how-states-are-advancing (listing "utilities such as Oncor, Austin Energy and CPS Energy" as "driving Texas solar").

25 *See* BOLINGER, *supra* note 15, at 8-11 (providing an overview of the different types of supportive state policies for solar energy).

Because most developers cannot utilize the tax credits and depreciation benefits themselves, they must incorporate third-party investors into the deals.[26] This type of equity financing (known as "tax equity financing") is primarily provided by banks, insurance companies, and a few large corporations, which provide upfront capital in exchange for the tax credits and depreciation deductions associated with the development of solar energy projects.[27] The tax equity financing model has given rise to a number of creative but complex structures that allow tax equity investors to achieve their desired returns and then return ownership to the developer, usually after five to seven years.[28]

After the 2008 financial crisis, however, the number of institutions providing tax equity for renewable energy projects plummeted—from fourteen major providers to only five—as few companies retained the high tax liabilities necessary to make the tax credits attractive.[29] As a result, the renewable energy industry faced a liquidity crisis and entered an environment characterized by few tax equity investors and constrained global debt markets.[30] The tax equity funding available for renewable energy projects

---

26 *See* MENDELSOHN ET AL., *supra* note 16, at 1 (describing the financing structures developers with insufficient tax liability use to take full advantage of tax incentives). It should also be noted that small or newly created developers are not the only ones lacking sufficient tax liability to take advantage of the ITC and depreciation benefits. Large developers, such as utilities, with net operating losses (NOLs) also require tax equity investors, because they lack sufficient taxable income to utilize the tax credits. *See, e.g.*, *The Role of Tax Equity Partnership Financing in Facilitating the Development of Wind Farms*, TAXAND (Jan. 18, 2012), http://www.taxand.com/taxands-take/news/role-tax-equity-partnership-financing-facilitating-development-wind-farms (noting "the current taxable margins of utility companies and independent power producers are relatively small," meaning that "tax credits have generally limited use to these taxpayers").

27 *See* LINDER & DI CAPUA, *supra* note 7, at 3 & fig.3 (identifying financiers, most of which are large banks and insurance companies, that offer "upfront equity, in exchange for tax credits and other benefits").

28 *See* MENDELSOHN ET AL., *supra* note 16, at 4-10 (describing common solar financing structures for commercial projects, including single owner, all-equity partnership flip, leveraged partnership flip, and sale leaseback structures).

29 LINDER & DI CAPUA, *supra* note 7, at 3 fig.3; *see also* MICHAEL MENDELSOHN & JOHN HARPER, NAT'L RENEWABLE ENERGY LAB., § 1603 TREASURY GRANT EXPIRATION: INDUSTRY INSIGHT ON FINANCING AND MARKET IMPLICATIONS 10 (2012), *available at* http://www.nrel.gov/docs/fy12osti/53720.pdf ("[M]any 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.").

30 *See* PAUL SCHWABE, KARLYNN CORY & JAMES NEWCOMB, NAT'L RENEWABLE ENERGY LAB., RENEWABLE ENERGY PROJECT FINANCING: IMPACTS OF THE FINANCIAL CRISIS AND FEDERAL LEGISLATION 3-4, 6 (2009), *available at* http://www.nrel.gov/docs/fy09osti/44930.pdf (forecasting a "sharp contraction in the pool of active tax equity investors in 2009," which hindered renewable energy project development, and noting that the "tightening of credit worldwide" also contributed to this slowdown); *see also* U.S. P'SHIP FOR RENEWABLE ENERGY FIN., ITC CASH GRANT MARKET OBSERVATIONS 4 (2011) [hereinafter ITC CASH GRANT

dropped from $6.1 billion before the financial crisis to $1.2 billion in 2009, severely limiting the ability of developers to finance new projects.[31]

The American Recovery and Reinvestment Act (ARRA) attempted to ameliorate the effects of the financial crisis on the energy sector by creating the 1603 Treasury Program, designed to help renewable energy developers obtain financing without having to rely on scarce third-party tax equity financing.[32] This program, which was administered by the Treasury Department, allowed eligible renewable energy system owners to take a 30% upfront grant, rather than a tax credit.[33] The effect of this program was that any business that developed a renewable energy system could receive the grant—regardless of the business's tax liability. To date, the Treasury Department has allocated more than $19.3 billion in grant awards, including $4.7 billion for solar electric projects.[34]

In general, financing has improved since the years immediately following the financial crisis. As noted above, the 1603 Treasury Program helped fill the gap left by the post–financial crisis tax equity shortage.[35] Additionally, the

MARKET OBSERVATIONS], *available at* http://uspref.org/wp-content/uploads/2011/07/US-PREF-ITC-Grant-Market-Observations-12.1.2011-v2.pdf (depicting the shortfall in tax equity financing from 2008 to 2009).

31 U.S. P'SHIP FOR RENEWABLE ENERGY FIN., PROSPECTIVE 2011–2012 TAX EQUITY MARKET OBSERVATIONS 2 (2011), *available at* http://uspref.org/wp-content/uploads/2011/07/US-PREF-Tax-Equity-Market-Observations-v2.2.pdf.

32 *See* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 1603, 123 Stat. 115, 364-66 (providing "grants for specified energy property in lieu of tax credits").

33 *Id.* at 364; *see also 1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits*, U.S. DEP'T OF THE TREASURY, http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx (last updated July 18, 2013, 9:48 AM) (specifying application requirements and providing a list of grant awards). Though the program formally expired at the end of 2011, some deals are still going forward under the safe harbor provision, which allows applicants to take the grant if at least 5% of the project costs were incurred by the end of 2011. *See generally Payments for Specified Energy Property in Lieu of Tax Credits Under the American Recovery and Reinvestment Act of 2009: Frequently Asked Questions and Answers: Begun Construction*, U.S. DEP'T OF THE TREASURY, http://www.treasury.gov/initiatives/recovery/Documents/FAQs%20for%20Begun%20Construction%20web4.pdf (last visited on Oct. 25, 2013) (providing guidance on the two ways to fulfill the section 1603 "begun construction" requirement). Despite a number of attempts by renewable energy industry lobbyists to convince Congress to renew the program, the effort has thus far been unsuccessful. *See* Zack Colman, *Solar Lobby Wants Grant Program Extended*, THE HILL (July 11, 2012, 1:45 PM), http://thehill.com/blogs/e2-wire/e2-wire/237293-solar-lobby-renews-push-to-extend-grant-program (detailing the efforts to extend the program).

34 U.S. DEP'T OF THE TREASURY, SECTION 1603—PAYMENTS FOR SPECIFIC RENEWABLE ENERGY PROPERTY IN LIEU OF TAX CREDITS: AWARDEES AS OF JULY 30, 2013, http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx (last updated July 18, 2013, 9:48 AM) (click "List of Awards"). Note that the $4.7 billion also includes concentrating solar power projects, in addition to PV projects. Wind projects have received $12.9 billion in grants, biomass projects have received $631 million, and all other technologies combined have received $1 billion. *Id.*

35 ITC CASH GRANT MARKET OBSERVATIONS, *supra* note 30, at 4.

Department of Energy (DOE) Loan Guarantee Program (LGP), also an ARRA provision, was implemented to mitigate the effect of tightening credit markets.[36] The LGP provides loan guarantees for two distinct classes of clean energy projects: commercialized energy generation projects and innovative, precommercial manufacturing and generation facilities.[37] To date, $34.4 billion in loan guarantees have been issued to clean energy projects under the LGP, including $1.28 billion for four solar manufacturing facilities and $11.97 billion for solar generation projects.[38]

With the expiration of the 1603 Program at the end of 2011, many industry analysts feared another slowdown in solar installations, but the ITC remains an "adequate, albeit more costly replacement for the grant," at least for experienced developers of large projects.[39] Industry surveys suggest that most tax equity providers—other than those who went bankrupt in 2008—have returned to the marketplace.[40] However, while there may be little reason to believe the broader industry will face crippling financing shortages in the near term, developers of small solar projects, especially customer-owned residential systems, will face continued difficulty obtaining financing. In large part, this is because small projects are unlikely to attract tax equity investors, "which tend to want to deploy at least $15-30m at a time."[41] The residential solar leasing model, discussed in the following Section, has emerged in recent years to provide homeowners with an alternative financing

36 Section 1703 of the Energy Policy Act of 2005 authorized the DOE to issue loan guarantees for innovative energy generation and manufacturing facilities that reduce emissions compared to commercial technologies. Pub. L. No. 109-58, § 1703, 119 Stat. 594, 1120-22 (codified as amended at 42 U.S.C. § 16513 (2006)). In 2009, the ARRA reauthorized the program and added § 1705 to the Energy Policy Act, which authorizes loan guarantees for already-commercialized renewable energy generation and manufacturing technologies, like wind and solar photovoltaics. § 406, 123 Stat. at 145 (codified as amended at 42 U.S.C. § 16516 (Supp. V 2012)). The section 1705 Program expired in 2011, 42 U.S.C. § 16516(e) (Supp. V 2012), but the DOE still has authority to issue loan guarantees under section 1703, 42 U.S.C. § 16513 (2006 & Supp. V 2012).

37 42 U.S.C. § 16513; *see also* 10 C.F.R. §§ 609.1–.18 (2013) (containing DOE regulations related to the LGP).

38 *Our Projects*, U.S. DEP'T OF ENERGY LOAN PROGRAMS OFFICE, http://lpo.energy.gov/our-projects (last visited Oct. 25, 2013).

39 LINDER & DI CAPUA, *supra* note 7, at 4; *see also* MENDELSOHN ET AL., *supra* note 16, at iv (predicting that the termination of the 1603 Program would increase the cost of tax equity financing by 2%-4%).

40 LINDER & DI CAPUA, *supra* note 7, at 3 fig.3.

41 *Id.* at 6. It is important to note that residential customers could not obtain the 1603 grants. *See Payments for Specified Energy Property in Lieu of Tax Credits Under the American Recovery and Reinvestment Act of 2009: Frequently Asked Questions and Answers*, U.S. DEP'T OF THE TREASURY 5-6, http://www.treasury.gov/initiatives/recovery/Documents/A%20FAQs0411%20-%20general.pdf (last visited Oct. 25, 2013) (noting that eligible property "must be used in a trade or business or for the production of income").

method for installing solar PV systems. This model has eased financing constraints for residential customers and has contributed to significant growth in the residential sector.

C. *Solar Leasing Model*

Because many residential and commercial electricity users cannot afford the upfront cost of solar systems,[42] the solar lease/power purchase agreement (PPA) model has emerged to allow liquidity-constrained homeowners and commercial building owners to install solar systems on their roofs.[43] In a typical solar lease, a host (the homeowner) enters into a long-term contract with a third-party financier whereby the host agrees to provide the third-party financier with a series of payments (usually a certain amount of money per month) while consuming the electricity generated by the solar system.[44] In effect, the lease operates like a loan agreement between the customer and the third-party financier.

Leases are typically used in the residential sector, while a PPA model is often used in the commercial sector.[45] The PPA model is similar to the lease model, except payments are made based on system performance (dollars per kilowatt-hour of electricity produced) rather than a pre-fixed per-month payment schedule.[46] In this Comment, the terms "lease" and "PPA" are used interchangeably. In each case, the third-party financier handles the installation as well as the operation and maintenance of the system, either on its

---

42 *See, e.g.*, SOLAR ENERGY INDUS. ASS'N & GTM RESEARCH, U.S. SOLAR MARKET INSIGHT REPORT: Q2 2012: EXECUTIVE SUMMARY 6 (2012) [hereinafter SOLAR MARKET INSIGHT Q2 2012], *available at* http://www.seia.org/research-resources/solar-market-insight-report-2012-q2 (click "Download the Solar Market Insight 2012 Q2 Report") ("In Q2 2012, the average price of a residential system was $32,453 . . . . Even with costs coming down, purchasing a system outright is not a financially viable or appealing option for many homeowners.").

43 *See* LINDER & DI CAPUA, *supra* note 7, at 7 (describing the development of residential third-party financing models, "which offer customers the benefits of a solar system without the upfront cost").

44 *See id.* at 7-9 (describing various solar leasing models); NAT'L RENEWABLE ENERGY LAB., SOLAR LEASING FOR RESIDENTIAL PHOTOVOLTAIC SYSTEMS 1 (2009) [hereinafter NREL SOLAR LEASING], *available at* http://www.nrel.gov/docs/fy09osti/43572.pdf ("Instead of purchasing a PV system, a homeowner enters into a contract with a lessor (the owner) of a PV system and agrees to make monthly lease payments over a set period of time while consuming the electricity generated.").

45 *See, e.g.*, *Solar Power Purchase Agreement (PPA)*, SOLARCITY, http://www.solarcity.com/commercial/power-purchase-agreement.aspx (last visited Oct. 25, 2013) (marketing its solar PPAs to businesses).

46 *See* LINDER & DI CAPUA, *supra* note 7, at 7 ("A host pays to the third-party financier either a series of payments via a lease ($/month) or PPA payments linked to the system's performance ($/kWh), usually based on a 10-25 year contract.").

own or by outsourcing to local companies.[47] The lease/PPA model also allows the third-party financiers to "pool multiple leases and PPAs from multiple systems into investment portfolios to attract larger outside project finance lenders and tax equity providers."[48] In other words, the pooling of multiple leases and PPAs opens up the residential market to large investors who would not otherwise be interested in such small projects on a one-off basis.[49]

Despite the advantages of the PPA model, it is not available in every state. Currently, twenty-two states have explicitly authorized the use of third-party financing, while six states have actively disallowed its use by deeming third-party financiers "utilities" under state law.[50] The remaining twenty-two states have not taken action, and the legality of third-party leases and PPAs in these jurisdictions is uncertain.[51] The states that have authorized the use of third-party financing, not surprisingly, are also the states with very active residential solar markets—including California, Arizona, New Jersey, Colorado, and Pennsylvania.[52]

1. Solar Leasing Market

Solar leasing provides a number of benefits to homeowners. First, the leasing model enables those who cannot afford the upfront cost of a system or utilize the ITC to benefit from having a solar-powered home.[53] Without

---

47 *See id.* at 7-9 (describing the "vertical" solar leasing model, in which the leasing company handles all aspects of the system, from financing to installation and maintenance, as well as the "semi-vertical" model, in which the leasing company outsources installation and maintenance to third parties).

48 *Id.* at 7.

49 *See supra* note 41 and accompanying text.

50 *See* N.C. State Univ., *3rd-Party Solar PV Power Purchase Agreements (PPAs)*, DSIRE (Feb. 2013), http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf [hereinafter DSIRE] (discussing state-level legislation regarding third-party leases and PPAs). In the states where PPAs are disallowed, public utilities are granted monopoly power to provide electricity, to the exclusion of independent power producers. *See, e.g.*, *In re* SZ Enters., LLC, No. 2012-0001, IOWA UTIL. BD. 17 (Apr. 12, 2012), https://efs.iowa.gov/cs/groups/external/documents/docket/mdaw/mtmy/~edisp/101261.pdf (declaring a PPA provider a "public utility" under Iowa state law and prohibiting it from providing PPAs).

51 *See* DSIRE, *supra* note 50.

52 *See id.*; *Solar Market Insight 2011*, *supra* note 8, at 8 (depicting installed solar capacity by state and market segment in 2011).

53 Under most solar leasing arrangements, the residential site host does not collect the tax incentives—those generally go to the third-party leasing company, which owns the system. *See, e.g.*, *Federal Energy Tax Credits*, SUNRUN, http://www.sunrun.com/solar-lease/cost-of-solar/federal-solar-incentives (last visited Oct. 25, 2013) (explaining that Sunrun will "file for the energy tax credit for [the homeowner] and immediately pass on the savings"). If the system is installed in

solar leasing, those who cannot pay for a system in cash would have to rely on home-equity loans, which can be problematic or undesirable.[54] Second, homeowners who elect to enroll in a solar lease do not have to worry about operating or maintaining the system, because lease providers are responsible for maintenance—providing it either in a vertical model or by outsourcing to a third-party installer–partner.[55] Finally, long-term lease contracts generally include a provision ensuring payments will remain lower than the cost of the homeowner's current utility bills,[56] thus saving homeowners money with little or no upfront cost.

A number of companies have emerged to provide third-party financing. Perhaps the best-known provider is SolarCity, which is a vertically integrated company that handles the financing, installation, and maintenance of its leased solar systems in-house.[57] In late 2012, SolarCity filed a Form S-1 initial public offering (IPO) registration statement with the Securities and Exchange Commission (SEC) and, on December 13, began selling shares.[58]

---

a state with a Renewable Portfolio Standard (RPS), the leasing company also collects the environmental attributes, known as Renewable Energy Certificates (RECs), associated with generation of renewable energy. *See* Jim Motavalli, *Home Solar Lease: Pro and Con*, THE DAILY GREEN, http://www.thedailygreen.com/green-homes/latest/home-solar-lease-0811 (last visited Oct. 25, 2013) (explaining that the leasing company, as the system owner, will also own the RECs generated by a leased solar system). These credits are tradable commodities (each credit usually represents the generation of one MW of renewable electricity) and can be sold to utilities or other entities subject to the RPS. *See id.* Thus, under a solar leasing arrangement, the lessee does not get the monetary benefit of these RECs. Rather, the benefits that accrue include, in most cases, lower electricity costs, higher property values, and any intangible benefits associated with being a "first-mover" or a "green" homeowner. These benefits may also spill over into the broader neighborhood or community. For more information on REC trading, see FED. ENERGY MGMT. PROGRAM, U.S. DEP'T OF ENERGY, QUICK GUIDE: RENEWABLE ENERGY CERTIFICATES (RECS) 1 (2011), *available at* http://www1.eere.energy.gov/femp/pdfs/rec_guide.pdf.

54 *See* NREL SOLAR LEASING, *supra* note 44, at 2 ("The challenge is that credit availability under the home-equity loan model has been severely curtailed as a result of the ongoing financial crisis. Banks have tightened credit requirements, and declining home values have eliminated a substantial portion of equity accrued during the past three to five years.").

55 *See supra* note 47 and accompanying text; *see also infra* Figure 3.

56 Most contracts set lease rates below current electricity prices, subject to price escalators reflecting assumptions about inflation and expected energy price increases. *See* Diane Cardwell, *Assessing Whether Solar Panels Make Sense for You*, N.Y. TIMES (May 9, 2012, 6:45 PM), http://green.blogs.nytimes.com/2012/05/09/how-to-assess-whether-solar-panels-make-sense-for-you (discussing common payment arrangements for solar leases).

57 *See* LINDER & DI CAPUA, *supra* note 7, at 8 (describing SolarCity's model as an "inverted lease," under which the company "leases the project portfolio . . . and 'passes through' the ITC to the tax equity investor," and the "investor pays the lease payments to [SolarCity]," which gives the company a stable cash flow compared to other potential structures, such as the "partnership flip").

58 *See* Jay Yarow, *Elon Musk's SolarCity Goes Public, and the Stock Is Up 30%*, BUSINESS INSIDER (Dec. 23, 2012, 11:11 AM), http://www.businessinsider.com/elon-musks-solarcity-ipo-2012-12 (discussing SolarCity's IPO). *See generally* SolarCity Corp., Registration Statement (Form S-1) (Oct. 5, 2012).

The company is currently operating in fourteen states, with further expansions planned.[59] SolarCity's growth mirrors the overall growth in the solar industry, with the number of installed systems doubling every year since 2009.[60] Other solar lease providers include SunRun and Sungevity, which outsource the installation and maintenance work rather than using SolarCity's vertical model.[61] Under that approach, the third-party financier pays the installer a fee, and the host's lease payments go to the financier.[62] These two business models—the vertical model used by SolarCity and the semi-vertical model used by SunRun and Sungevity—are depicted in Figure 3 below.

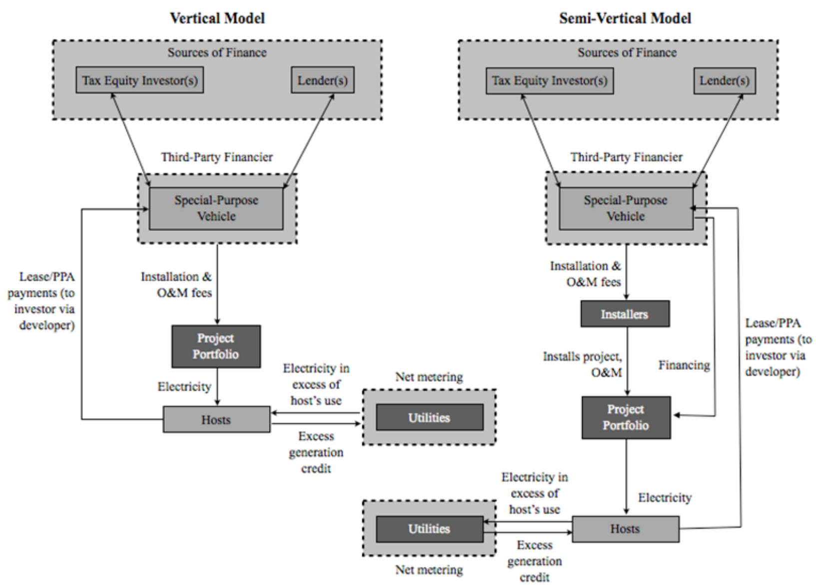
59 *See* Andrew Krulewitz, *The Numbers Behind SolarCity's Success*, GREENTECH MEDIA (Mar. 18, 2013), http://www.greentechmedia.com/articles/read/The-Numbers-Behind-SolarCitys-Success (describing the extent of SolarCity's current operations, including its "expanding East Coast presence").

60 *See* SolarCity Corp., Registration Statement, Amendment No. 1 (Form S-1) 1 (Nov. 27, 2012) (noting that the "aggregate contractual cash payments that [SolarCity's] customers are obligated to pay . . . have grown at a compounded annual rate of 117% since 2009"). SolarCity's combined residential and commercial installations totaled 156 MW in 2012, accounting for 10.2% of all new distributed solar installations, up from 6.4% in 2011. Krulewitz, *supra* note 59.

61 *See* LINDER & DI CAPUA, *supra* note 7, at 9 (analyzing SunRun's and Sungevity's "semi-vertical" models).

62 *See id.*

Figure 3: Vertical and Semi-Vertical Solar Leasing Models[63]



A third leasing model has emerged, established by a company called Clean Power Finance.[64] Under this model, known as the financial market model, various investors compete with each other through a bidding process—similar to a lending exchange—and an intermediary (here Clean Power Finance) matches lenders with small installer–borrowers.[65] The intermediary establishes the bidding interface, administers billing and other operational tasks, and collects a fee for each transaction.[66]

Because the solar leasing model is only a few years old, there is limited data available on the number of solar installations utilizing solar leases and PPAs. However, it is clear that the use of solar leasing is growing rapidly in a number of states. For instance, in California, new residential solar leases now greatly exceed the number of new customer-owned residential systems.[67] Similarly, nearly 80% of new residential solar systems in Colorado

---

63 Adapted from *id.* at 8 figs.10 & 11.

64 *See Solar Financing*, CLEAN POWER FIN., http://www.cleanpowerfinance.com/products/financing (last visited Oct. 25, 2013) (describing the financing provided by Clean Power Finance).

65 *See* LINDER & DI CAPUA, *supra* note 7, at 9 (explaining the mechanics of the financial market model).

66 *See id.*

67 *See* SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 7 fig.2-3 (charting the percentage of third party–owned residential installations in various states); *see also* ANDREW HOBBS ET AL.,

are acquired and installed under solar leases.[68] In short, it appears that homeowners who want to install solar are increasingly taking advantage of "the option to avoid upfront payment and have a contract with a company to monitor and repair the array."[69]

This growing demand for third-party residential leases has attracted a great deal of interest from the investment community. For instance, SunRun is backed by $85 million in venture capital and has raised $750 million in financing from U.S. Bancorp and PG&E—enough to install 20,000 residential systems—while Sungevity has raised over $175 million for residential solar projects.[70] As noted above, SolarCity recently moved ahead with its long-anticipated IPO, which initially valued the company at $585 million.[71] This increasing attention to the residential leasing sector "signifies the growing acceptance of solar leases as a secure investment . . . . It is expected that third-party installations will quickly claim even more market share in the coming quarters."[72]

2. Potential Limitations of the Solar Leasing Model

Current financing mechanisms are inadequate to help the solar industry—and the residential leasing market in particular—achieve the growth many industry analysts predict. Though residential demand has grown more slowly than the commercial or utility-scale sectors, the third-party lease model has the potential to expand the market dramatically—if adequate capital is available. Bloomberg predicts that "PV capital requirements for 2012–20 total $62bn, of which $12bn is required third-party tax equity."[73] Even though this figure represents capital requirements for all solar market segments, it is significantly more than the amount of capital currently

---

CLIMATE POLICY INITIATIVE, IMPROVING SOLAR POLICY: LESSONS FROM THE SOLAR LEASING BOOM IN CALIFORNIA 18 (2013), http://climatepolicyinitiative.org/wp-content/uploads/2013/07/Improving-Solar-Policy-Lessons-from-the-solar-leasing-boom-in-California.pdf ("Over the last five years, California has seen sustained growth in new residential solar installations—and a marked shift to solar leasing—from 7% leased in 2007 to 75% leased in 2012.").

68 SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 7 fig.2-3.

69 *Id.* at 6.

70 Bloomberg Businessweek, *Solar Firms that Lease Panels See Business Grow,* S.F. CHRON. (Sept. 24, 2012, 4:57 PM), http://www.sfgate.com/business/article/Solar-firms-that-lease-panels-see-business-grow-3263082.php.

71 Katie Fehrenbacher, *SolarCity IPO Still Moving, Now Plans to Sell More Shares at $8 per Share*, GIGAOM (Dec. 12, 2012, 5:41 AM), http://gigaom.com/2012/12/12/solarcity-ipo-still-moving-now-plans-to-sell-more-shares-at-8-per-share.

72 SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 7.

73 LINDER & DI CAPUA, *supra* note 7, at 5.

available.[74] More specifically, baseline industry projections expect residential installations to grow from 297 MW in 2011[75] to approximately 2000 MW in 2016.[76] At current market prices, installing 2000 MW of residential solar would require more than $10 billion in upfront capital.[77] Even though prices are expected to decline by 2016,[78] there is not adequate capital to scale the residential sector up without accessing new financing sources.

With the expiration of the 1603 Program at the end of 2011, lease providers like SolarCity and SunRun were forced to revert to the tax equity model and partner with large third-party investors who could fully utilize available tax credits.[79] At the same time, however, the U.S. Partnership for Renewable Energy Finance, a coalition of renewable energy financiers, projected that only $3.6 billion of tax equity would be available for the entire renewable energy industry in 2012, while demand would reach up to $10 billion.[80] In short, the supply of tax equity is relatively limited and insufficient to meet the capital requirements of the renewable energy industry. As a result, the solar leasing sector must compete with utility-scale solar and other renewables, including wind (a more mature technology with lower costs), for a limited pool of tax equity.[81] Because of this supply and demand

---

74 *See, e.g.*, ITC CASH GRANT MARKET OBSERVATIONS, *supra* note 30, at 4 (projecting only $3.6 billion in available tax equity for 2012).

75 SOLAR MARKET INSIGHT 2011, *supra* note 8, at 9.

76 SOLAR MARKET INSIGHT 2012, *supra* note 1, at 13 fig.2.8.

77 *See id.* at 10-11 & fig.2.6 (noting that residential installed prices were $5.04/watt (W) at the end of 2012). At $5.04/W, the installation of 2000 MW would require $10.08 billion in upfront capital. This figure does not take into account tax incentives or the rapid declines in cost that are expected to occur by 2016. *See* Nicholas Rinaldi, *Solar PV Module Costs to Fall to 36 Cents per Watt by 2017*, GREENTECH MEDIA (June 18, 2013), http://www.greentechmedia.com/articles/read/solar-pv-module-costs-to-fall-to-36-cents-per-watt (reporting that the price of PV modules, the key hardware in solar systems, is projected to fall by 28% between 2012 and 2017)

78 Rinaldi, *supra* note 77.

79 *See, e.g.*, Chris Meehan, *SolarCity, Goldman Sachs Launch Record-Breaking, $500M Fund for Rooftop Solar*, RENEWABLEENERGYWORLD.COM (May 21, 2013), http://www.renewableenergyworld.com/rea/blog/post/2013/05/solarcity-goldman-sachs-launch-record-breaking-500m-fund-for-rooftop-solar (detailing a $500 million tax equity investment to finance 110 MW of solar lease projects). For a discussion of tax credit utilization, see *supra* notes 26-28 and accompanying text.

80 *See* ITC CASH GRANT MARKET OBSERVATIONS, *supra* note 30, at 4 (suggesting that demand for tax equity in 2012 will total between $7 billion and $10 billion, leaving a gap of $3 billion to $6 billion).

81 Wind producers receive a Production Tax Credit (PTC) of 1.5 cents/kWh in 1993 dollars. I.R.C. § 45 (2006 & Supp. V 2012). Adjusted for inflation, this is approximately 2.3 cents/kWh. I.R.S. Notice 2013-33, 2013-22 I.R.B. 1140, 1142 (May 28, 2013). The PTC was set to expire at the end of 2012, but it was extended for another year by the American Taxpayer Relief Act of 2012. Pub. L. No. 112-240, § 407(a)(1), 126 Stat. 2313, 2340 (2013) (codified as amended at 26 U.S.C. § 45(d) (West, Westlaw through P.L. 113-31)). Now, wind developers may receive the credit if projects begin construction before January 1, 2014. *Id.* The PTC extension will further increase the competitiveness of obtaining tax equity in the renewable energy industry.

imbalance, tax equity providers often have the upper hand in negotiating deals, which can lead to unsatisfactory terms for lease providers and raises costs for both developers and consumers.[82] Some have predicted that tax equity investors will start to demand returns that are approximately 2%-4% greater, largely because of the highly competitive market for tax equity and the expiration of the 1603 Program.[83]

The tax equity shortage negatively affects the residential sector as well. Even with recent price decreases, owning a solar system still requires a large upfront investment. The average residential system costs $32,000, which only the wealthiest homeowners can afford, even if the net present value of the system is positive.[84] Homeowners can only utilize tax credits (including the ITC) if they have sufficient tax liability, and home equity loans may be difficult to obtain or unattractive for those looking to reduce debt.

Tax equity is not the only factor that raises the cost of financing. The perceived—and actual—riskiness of investing in solar companies also increases the cost of financing, even though the completed solar projects themselves have very low risk. For instance, a number of high-profile solar bankruptcies—including the bankruptcies of solar manufacturers Solyndra and Abound Solar, both of which received DOE Loan Guarantees[85]—raised questions about the solvency of solar manufacturers and, more generally, the solar industry itself.[86] Another common concern is what might happen to the long-term warranties on solar panels if manufacturers cease to exist.[87]

Furthermore, banks and other investors might be unwilling to invest in solar companies when the industry heavily relies on temporary tax credits and other subsidies. If investors are going to provide tens or hundreds of

---

[82] *See* MENDELSOHN ET AL., *supra* note 16, at 11 (noting that "because tax equity is in such high demand by a wide array of projects both inside and outside the renewable energy industry, the tax equity investor generally dictates many of the terms of the agreement including the financial structure," a circumstance which can significantly raise costs for the developer).

[83] *Id.* at 23.

[84] *See supra* note 42 and accompanying text; *see also* HOBBS ET AL., *supra* note 67, at 10-11 & fig.5 (finding that, as a residential solar consumer's discount rate increases, the consumer begins to prefer leasing over ownership).

[85] *See Our Projects*, *supra* note 38 (noting that Solyndra and Abound Solar received a combined $935 million in DOE Loan Guarantees).

[86] *See, e.g.*, Matthew L. Wald, *Market Risks Are Seen in Energy Innovations*, N.Y. TIMES, Sept. 16, 2011, at A14 (noting that "[t]he same market forces that doomed Solyndra, the solar cell manufacturer that received $528 million in government loans and then went bankrupt, could imperil other [clean energy] manufacturing ventures").

[87] *See, e.g.*, Ucilia Wang, *The Rise of Solar Warranty Management Plans for Homeowners?*, RENEWABLEENERGYWORLD.COM (Jul. 25, 2013), http://www.renewableenergyworld.com/rea/news/article/2013/07/the-rise-of-solar-warranty-management-plans-for-homeowners (describing solar PV warranty management plans, that, among other things, honor warranties of bankrupt manufacturers).

millions in equity or nonrecourse loans, they need adequate assurance of a return on their investment. But if the ITC is terminated before 2016—which could happen under a comprehensive tax reform package[88]—the solar industry will almost certainly face slowdowns or even a complete halt, much as the wind industry did when the PTC was allowed to expire on three separate occasions.[89] Though the American solar industry has not yet faced the termination of important subsidies, some European governments have decreased or eliminated subsidies to solar companies, causing significant growth contractions in those countries.[90]

The solar market is experiencing global volatility as well. Chinese manufacturers have faced financial difficulty due to rapid manufacturing expansions that have outpaced demand growth,[91] and international trade disputes over solar pricing have led to tariffs, which could increase prices in the future.[92] These risks could impede the ability of solar lease providers to obtain financing using traditional methods.

II. SOLAR-BACKED SECURITIES: OPPORTUNITIES AND RISKS

In this Part, I explain how asset-backed securitization (ABS)—the process of aggregating monetary obligations and creating securities backed by the collateral in the pool—of residential solar leases could provide a solution to the deficiencies addressed in Part I above.

---

88 *See* Christopher Mansour, *Solar Makes Strong Case in Senate Tax Debate*, SOLAR ENERGY INDUS. ASS'N (Aug. 7, 2013), http://www.seia.org/blog/solar-makes-strong-case-senate-tax-debate (discussing Senate tax reform efforts and identifying the risk that "Congress will try to eliminate all renewable energy tax credits in order to reduce corporate tax rates").

89 *See Wind Energy Tax Credit Set To Expire at the End of 2012*, U.S. ENERGY INFO. ADMIN. (Nov. 21, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=8870 (depicting wind energy installations since 1992, and highlighting the industry's declines in each of the three instances when the Production Tax Credit expired). Though the solar industry has not yet faced such an expiration, it is reasonable to conclude that a similar result would occur if the ITC was terminated prematurely.

90 *See, e.g.*, Alex Morales & Ben Sills, *Spain Ejects Clean-Power Industry with Europe Precedent: Energy*, BLOOMBERG (May 30, 2012, 10:07 AM), http://www.bloomberg.com/news/2012-05-29/spain-ejects-clean-power-industry-with-europe-precedent-energy.html (describing the abrupt drop in Spain's renewable energy demand after subsidies were removed).

91 *See, e.g.*, Keith Bradsher, *Strategy of Solar Dominance Now Poses a Threat to China*, N.Y. TIMES, Oct. 5, 2012, at B1 ("China's biggest solar panel makers are suffering losses of up to $1 for every $3 of sales this year, as panel prices have fallen by three-fourths since 2008.").

92 *See id.* at B2 (describing the decision of the United States to impose antidumping and antisubsidy tariffs on Chinese solar manufacturers and the European Union's ongoing antidumping investigation of Chinese solar panel imports).

A. *Background on Securitization*

Securitization is a "structured finance process in which assets, receivables or financial instruments are acquired, classified into pools, and offered as collateral for third-party investment."[93] In an asset-backed securitization transaction, assets are pooled and restructured into a package or multiple packages and offered to investors as securities, either in public markets or through private placements.[94] One of securitization's primary benefits is the ability to diversify risk by pooling assets in different geographic areas and selling pieces of each asset, enabling investors to limit the default risk of a single asset or a group of similar assets.[95] Securitization also allows originators to tailor securities groupings (or "tranches") to specific investor risk preferences.[96] For instance, a single pool of assets may be split into three or more tranches, with a senior class receiving high credit ratings, followed by riskier subordinated securities.[97] The result is a more efficient method of matching investors with assets that line up with their particular needs and risk tolerances, allowing investors to tailor their portfolios as they wish.

Securitization can also be beneficial because it reduces an investor's (the purchaser of the asset-backed security) dependence on the originating company for payment, since the originator will typically transfer the assets to a bankruptcy-remote special purpose entity (SPE).[98] Thus, it is the SPE

---

[93] Eamonn K. Moran, *Wall Street Meets Main Street: Understanding the Financial Crisis*, 13 N.C. BANKING INST. 5, 32-33 (2009).

[94] *See id.* at 33-34 (describing the basic mechanics of securitization in the context of the mortgage industry).

[95] *See* BD. OF GOVERNORS OF THE FED. RESERVE SYS., REPORT TO THE CONGRESS ON RISK RETENTION 8-9 (2010) [hereinafter FED. RESERVE REPORT], *available at* http://federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf ("[S]ecuritization that involves the transfer of credit risk allows financial institutions that primarily originate loans to particular classes of borrowers, or in particular geographic areas, to limit concentrated exposure to these idiosyncratic risks on their balance sheets.").

[96] *See* Moran, *supra* note 93, at 33-34 (noting that securitization allows "investment bankers [to] break the [asset] pool into a number of different parts, referred to as 'tranches' . . . [that] can be structured in virtually any way the bankers structuring the securitization see fit, allowing for the tailoring of a single asset pool for a variety of risk tolerances").

[97] *See id.* at 34 ("In the event that the underlying asset pool becomes insufficient to make payments on the securities . . . the loss is absorbed first by the subordinated tranches. The upper-level tranches remain unaffected until the losses exceed the entire amount of the subordinated tranches.").

[98] This is similar to the process for financing a large commercial project. In a typical project finance structure, an SPE, not the developer corporation itself, constructs the project, and investors may only reach the project assets as collateral. *See, e.g.*, CHRIS GROOBEY ET AL., WILSON SONSINI GOODRICH & ROSATI, P.C., PROJECT FINANCE PRIMER FOR RENEWABLE ENERGY AND CLEAN TECH PROJECTS 2 (2010), *available at* http://www.wsgr.com/PDFSearch/

that actually issues the securities, not the originating company; the investor need only account for the riskiness of cash flows from the investment itself, not for the credit risk of the originating company.[99] This is a significant advantage over issuing corporate bonds, under which credit ratings are directly tied to both the company's performance and the quality of the assets financed by the bond.[100] As long as an originator can accurately quantify the aggregate rate of default for a given receivable, "it can securitize even those receivables that present some risk of uncollectibility. Therefore, a statistically large pool of receivables due from many obligors, for which payment is reasonably predictable, is generally preferable to a pool of a smaller number of receivables due from a few obligors."[101]

B. *Potential Benefits of Solar Securitization for Lease Providers*

In broad terms, securitization offers an advantage over current financing mechanisms because it would help the solar industry scale up, allow developers to obtain financing at lower cost than tax equity or corporate debt, and bring in new classes of investors who have historically been hesitant to invest in renewable energy. Securitization would be especially attractive, from the industry's perspective, because, unlike other proposals to improve financing, it does not require new legislation or regulation.[102]

Commentators frequently cite two other mechanisms for attracting new investment to the solar industry—master limited partnerships (MLPs) and real estate investment trusts (REITs)—but neither is as viable an option as securitization.[103] An MLP is a "type of business structure that is taxed as a

---

ctp_guide.pdf (defining project finance as a "method of financing in which the lenders to a project have either no recourse or only limited recourse to the parent company that develops or 'sponsors' the project").

99 *See* STEVEN L. SCHWARCZ, BRUCE A. MARKELL & LISSA LAMKIN BROOME, SECURITIZATION, STRUCTURED FINANCE AND CAPITAL MARKETS 7 (2004) ("A potential buyer of the securities therefore looks to the cash flow from the purchased receivables, and not to the credit of the originator, for repayment.").

100 *See* STANDARD & POOR'S, GUIDE TO CREDIT RATING ESSENTIALS: WHAT ARE CREDIT RATINGS AND HOW DO THEY WORK? 12 (2011), *available at* http://img.en25.com/Web/StandardandPoors/SP_CreditRatingsGuide.pdf (explaining that in rating corporate bonds, Standard & Poor's assesses both the creditworthiness of the issuer and the quality of the bond itself).

101 SCHWARCZ ET AL., *supra* note 99, at 7.

102 *See infra* text accompanying notes 108-109.

103 *See, e.g.*, PAUL SCHWABE, MICHAEL MENDELSOHN, FELIX MORMANN & DOUGLAS J. ARENT, NAT'L RENEWABLE ENERGY LAB., MOBILIZING PUBLIC MARKETS TO FINANCE RENEWABLE ENERGY PROJECTS: INSIGHTS FROM EXPERT STAKEHOLDERS 2 (2012), *available at* http://www.nrel.gov/docs/fy12osti/55021.pdf ("Opening alternative financial mechanisms such as

partnership, but whose ownership interests are traded on financial markets like corporate stock,"[104] which allows it to avoid "double taxation" while raising capital.[105] Similarly, REITs are "pass-through" entities not subject to corporate tax.[106] To qualify for such treatment, however, at least 75% of the REIT's assets must be qualifying assets (such as real estate), at least 75% of its income must derive from mortgages or rent, and at least 90% of its taxable income must be distributed to shareholders.[107] MLPs and REITs would provide many of the same benefits as securitization—in particular, access to new investors and additional capital. However, solar MLPs and REITs cannot currently be utilized without federal government action: MLPs would require a tax code amendment qualifying renewables as MLPs, and REITs would require an IRS ruling classifying power purchases as "rents."[108] Because securitization of solar leases would not require new legislation or regulatory action, it is perceived as a superior, or at least a more practical, alternative by many industry commentators.[109]

Asset-backed securitization benefits the originators of financial assets for a number of reasons. Five common motivating factors for creating a new asset class include: "(1) removal of the assets and related liabilities from the originator's balance sheet; (2) obtaining a lower cost of funds; (3) obtaining regulatory capital relief; (4) obtaining a varied investor base; and (5) obtaining financing when unable to do so in any other practicable manner."[110] Most of these potential benefits would apply to solar lease providers. As detailed above, obtaining financing for solar lease providers can be

---

master limited partnerships (MLPs) or real estate investment trusts (REITs) could enable investment through more liquid and transparent investment vehicles.").

104 MOLLY F. SHERLOCK & MARK P. KEIGHTLEY, CONG. RESEARCH SERV., MASTER LIMITED PARTNERSHIPS: A POLICY OPTION FOR THE RENEWABLE ENERGY INDUSTRY 1 (2011), *available at* http://www.ieeeusa.org/policy/eyeonwashington/2011/documents/masterlmtdpartnerships.pdf.

105 *Id.* at 2; *see also* LINDER & DI CAPUA, *supra* note 7, at 18 ("Benefits associated with MLPs would lift the economics of renewable projects, as they would drive down the cost of capital and reduce tax obligations.").

106 *See* LINDER & DI CAPUA, *supra* note 7, at 18 (discussing REITs' tax structure).

107 *Id.*

108 *Id.* at 18-19.

109 *See, e.g.*, SCHWABE ET AL., *supra* note 103, at 5 (noting that while MLPs, REITs, and asset-backed securities are "fairly liquid . . . and may match the long-term return requirements of pension funds and other institutional investors . . . significant regulatory . . . barriers remain" for MLPs and REITs).

110 Stuart M. Litwin & William A. Levy, *Securitization of Equipment and Auto Leases*, § 30:2.1, *in* 3 EQUIPMENT LEASING—LEVERAGED LEASING 30-1, 30-4 to -6 (Ian Shrank & Arnold G. Gough, Jr. eds., 4th ed. 2004).

expensive, in part due to tax equity constraints and the inherent risks in the solar industry.[111]

In addition, the industry would benefit greatly from bringing in new classes of investors, such as pension funds and other institutional investors. To date, most investment has come from large banks, some insurance companies, and a few nontraditional investors, like Google.[112] Tax equity, the dominant mode of financing, is highly specialized because it requires investors who have significant tax liability, the sophistication to perform due diligence on a complex project financing structure, and the ability to hold illiquid investments for at least the duration of the five-year recapture period.[113] Researchers at the National Renewable Energy Laboratory (NREL) have noted that these requirements "constrain[] the supply of tax equity, increase[] the required yield, and, in effect, negate[] some of the value of the tax benefits[,] . . . . [which] essentially caps the number of [renewable energy] projects that are deployed."[114] Bringing new investors into the space would ease the financing constraints associated with the tax equity market and allow solar developers to bargain for lower rates, thus lowering costs for consumers.

Institutional investors and hedge funds have expressed some interest in making renewable energy investments but have largely remained on the sidelines.[115] This is because most institutional investors do not have the characteristics required for tax equity investment, as discussed above.[116] First, many institutional investors, such as pension funds, are tax-exempt, and would not be able to use the tax benefits associated with renewable energy projects.[117] Additionally, most institutional investors lack the sophistication or

---

111 *See supra* notes 79-92 and accompanying text.

112 *See* LINDER & DI CAPUA, *supra* note 7, at 3 fig.3 (listing current tax equity providers for U.S. renewable energy projects).

113 *See* MICHAEL MENDELSOHN & DAVID FELDMAN, NAT'L RENEWABLE ENERGY LAB., FINANCING U.S. RENEWABLE ENERGY PROJECTS THROUGH PUBLIC CAPITAL VEHICLES: QUALITATIVE AND QUANTITATIVE BENEFITS 2-3 (2013), *available at* http://www.nrel.gov/docs/fy13osti/58315.pdf (outlining the necessary characteristics of tax equity investors, and noting that these requirements effectively limit the pool of available investors to fewer than twenty institutions).

114 *Id.* at 3.

115 *See* SCHWABE ET AL., *supra* note 103, at 3 ("[I]nstitutional investors are increasingly indicating their desire to invest in long-dated, climate-related investments but have been slow to invest in projects outside of their traditional risk and return comfort zone.").

116 *See supra* note 113 and accompanying text.

117 *See* DAVID NELSON & BRENDAN PIERPONT, CLIMATE POLICY INITIATIVE, THE CHALLENGE OF INSTITUTIONAL INVESTMENT IN RENEWABLE ENERGY 48 tbl.7.1 (2013), *available at* http://climatepolicyinitiative.org/wp-content/uploads/2013/03/The-Challenge-of-Institutional-Investment-in-Renewable-Energy.pdf (recognizing that many institutional investors are tax-exempt and suggesting that the federal government should offer cash incentives instead).

specialization required to perform complex due diligence for large construction projects.[118] Furthermore, because many institutional investors require a highly liquid investment portfolio, they tend to avoid investing in construction projects like renewable energy generation facilities, which cannot be sold quickly or easily.[119]

Securities offerings backed by cash flows from residential solar leases might attract these institutional investors, who prefer to invest in highly liquid assets.[120] It is particularly important to attract new investors because traditional investors who have been historically active in the renewable energy market, including European banks and the U.S. government, are expected to decrease their participation in the coming years.[121] Institutional investors are generally ill-equipped or unwilling to finance large construction projects, but they are experienced players in both bond and equity markets.[122] Thus, rearranging solar assets into securities that more closely resemble these types of investments would make them more attractive to institutional investors.[123] The Climate Policy Institute has estimated that institutional investors have the potential to invest up to $290 billion in pooled debt investments tied to renewable energy assets.[124] Investors have already begun to show interest in the few renewable energy bond issuances

118 *See id.* at 34 (noting that direct investment in construction projects is expensive and the investor has to perform all the due diligence, which only the largest institutional investors have the capacity to do).

119 *See id.* at 31-33 (commenting that "institutional investors must have access to at least a minimum level of cash in their investment portfolio," which means that "the share that any institutional investor can dedicate to illiquid renewable energy project debt or equity assets will be limited").

120 *See id.* at 6-12 & tbl.2.2 (identifying the major categories of institutional investors, their respective characteristics, and the factors that drive their investment decisions).

121 *See* LINDER & DI CAPUA, *supra* note 7, at 14-15 (citing the European credit crisis, Basel III financial regulations, and the expiration of the DOE Loan Guarantee Program as the principal reasons for traditional investors reducing their presence in the renewable energy industry).

122 *See id.* at 15 (noting that while institutional investors may come to play "significant roles on the equity side," they "prefer not to take construction risk").

123 *See id.* (noting that institutional investors tend to "prefer investments that are more liquid and more closely resemble . . . bonds" and suggesting that hedge funds and mutual funds might also invest in high-liquidity solar assets); *see also* Raffaele Della Croce, Christopher Kaminker & Fiona Stewart, *The Role of Pension Funds in Financing Green Growth Initiatives* 44-45 (OECD Working Papers on Fin., Ins. & Private Pensions, Paper No. 10, 2011), *available at* http://dx.doi.org/10.1787/5kg58j1lwdjd-en (click "PDF") (predicting similar investments in the European wind market).

124 *See* NELSON & PIERPONT, *supra* note 117, at 18-19 & tbl.3.1 (estimating the total potential global investment in renewable projects by asset class).

that have been made thus far,[125] suggesting that solar-backed securities would also generate significant interest.

Relatedly, securitization could alleviate the burden of the constrained financing environment. The solar industry is widely expected to face capital shortages in the coming years as the installed cost of solar continues to decline and demand grows.[126] Furthermore, for solar lease providers in particular, "[w]hile PPAs and solar lease payments provide developers with steady revenue streams, they may also result in near-term funding issues that could hinder future growth."[127] Specifically, lease providers finance construction by creating a "fund" of leases, which investors can buy into.[128] The fund finances construction and, as more projects are built, the fund diminishes.[129] Customer lease payments replenish the fund,[130] but because lease terms last up to twenty years, the fund does not replenish quickly enough to allow the third-party lease provider to build new projects without leveraging existing assets.[131] Thus, securitization of solar leases could offer cheaper and more liquid financing for third-party lease providers like SolarCity and Sunrun. Selling securitized leases would help fuel growth by allowing leasing companies to sell the rights to receivables from their current leases while using the resulting cash to initiate more leases. According to Bloomberg New Energy Finance, residential leases in the United States "could demand up to $5.2bn in financing in 2014. If all of 2011's installed residential capacity were securitised, the proceeds from the securitised assets would contribute 32-47% of capital requirements for residential solar build in 2012 and 31-42% of commercial build."[132] This would allow lease providers to use currently available financing mechanisms

---

125 *See, e.g.*, Justin Doom & Noah Buhayar, *Buffett Plans More Solar Bonds After Oversubscribed Deal*, BLOOMBERG (Mar. 1, 2012, 11:12 AM), http://www.bloomberg.com/news/2012-02-29/buffett-plans-more-solar-bonds-after-oversubscribed-topaz-deal.html (reporting that the first round of bonds to finance a $2.4 billion solar energy facility was oversubscribed and that the company is planning to issue a second round of bonds).

126 *See supra* notes 73-78 and accompanying text.

127 STANDARD & POOR'S, WILL SECURITIZATION HELP FUEL THE U.S. SOLAR POWER INDUSTRY? 3 (2012), *available at* http://www.cleanenergyfinancecenter.org/library (click article title under "Solar Financing").

128 *See* LINDER & DI CAPUA, *supra* note 7, at 7-9 (discussing common mechanisms for financing solar projects).

129 *Id.*

130 *Id.*

131 *See* STANDARD & POOR'S, *supra* note 127, at 3 (explaining that solar leases provide developers with "steady revenue streams," but also "result in near-term funding issues"); *see also* LINDER & DI CAPUA, *supra* note 7, at 18 ("Sale proceeds from the securitised assets can be reinvested to build more solar systems.").

132 *Id.* at 18.

(e.g., tax equity and debt) to finance a smaller portion of new leases while bringing in new classes of investors to buy lease-backed securities. As a result, the solar industry would grow faster than it could without securitization.

In addition to easing financing constraints, securitization helps to lower financing costs by separating relatively low-risk assets from higher-risk issuers.[133] Separating the assets from the originator is a benefit because "the securities issued by the [special purpose entity] . . . may have a higher investment rating than securities issued directly by the originator and, therefore, would bear a lower interest rate than the originator might be able to obtain on its own securities."[134] This is valuable in the case of solar leases, because third-party lease providers tend to be young companies with relatively few assets, little or no profits, and a limited borrowing history.[135] Larger, more established companies, such as utility affiliates, are moving into the solar leasing space, but most leases continue to be provided by traditional solar leasing companies like SolarCity, at least for now.[136] By carving out cash-generating assets from their books, "[s]ecuritization offers marginally investment-grade companies access to the AAA-rated debt markets."[137] Even large, established companies with significant assets can benefit from securitization in this way. Thus, solar leasing companies stand to benefit greatly by separating assets such as residential leases from their balance sheets, which are almost certainly higher-risk than the assets themselves.

C. *Potential Risks of Securitization*

Although asset-backed securitization has become ingrained in the American economy—reaching everything from credit card receivables to auto lease payments—the mortgage-related practices that contributed to the financial crisis of 2008 raise questions about the wisdom of securitization

133 *See supra* text accompanying notes 98-99.

134 SCHWARCZ ET AL., *supra* note 99, at 8.

135 *See, e.g.*, STANDARD & POOR'S, *supra* note 127, at 7 (noting that the credit quality of most solar lease providers is in the "speculative-grade category").

136 *See, e.g.*, Shayle Kann, *Can You Name All the Residential Solar Lease Providers?*, GREENTECH MEDIA (Mar. 26, 2013), http://www.greentechmedia.com/articles/read/can-you-name-all-the-residential-solar-lease-providers (identifying new entrants to the solar leasing market).

137 CHARLES AUSTIN STONE & ANNE ZISSU, THE SECURITIZATION MARKETS HANDBOOK: STRUCTURES AND DYNAMICS OF MORTGAGE- AND ASSET-BACKED SECURITIES 126 (2005).

going forward.[138] The financial crisis followed a remarkable increase in the securitization of consumer debt, especially subprime mortgage debt.[139] By 2006, subprime mortgage assets accounted for about half of all asset-backed securities issuances.[140] These mortgage loans were granted to borrowers who had little ability to repay them, and were then quickly packaged, securitized, and often re-securitized.[141] Under this "originate-to-distribute" model, brokers had an incentive to increase the number of loans they sold by lowering credit standards, and banks had an incentive to take on more subprime assets because these paid higher interest rates.[142] Scant attention was paid to risk, in part because of the perceived strength of the residential real estate market, which nearly everyone expected to continue increasing in value.[143]

In the wake of the crisis, while regulators are still trying to figure out exactly what went wrong and how to prevent it from happening again, it is important to assess the risks of a new solar asset class. This is especially so because, during the crisis, ratings agencies and investors were inadequately

---

138 *See, e.g.*, Moran, *supra* note 93, at 44-45 (discussing securitization's role in the 2008 financial crisis and noting that "[t]he absence of significant regulatory controls on how mortgages were repackaged into larger and more complex securities served as a central cause of the current financial crisis"); *see also* Ronald S. Borod, *Belling the Cat: Taming the Securitization Beast Without Killing It*, 31 REV. BANKING & FIN. L. 643, 657-58 (2012) (explaining that mortgage-based derivatives became too complex and far-removed from the underlying assets for even the ratings agencies to fully understand); David J. Harris, Jr., Comment, *Asset-Backed Securities Regulation Under the Dodd–Frank Act*, 30 REV. BANKING & FIN. L. 43, 44 (2010) ("The moral hazards inherent in securitization likely increased the frequency of mortgage defaults and simultaneously exacerbated market sensitivity to those increases.").

139 FED. RESERVE REPORT, *supra* note 95, at 29 tbl.1 (documenting the increase in subprime mortgage securitizations, which increased in amount by 174% between 2002 and 2007).

140 KAREN WEAVER, DEUTSCHE BANK, US ASSET-BACKED SECURITIES MARKET REVIEW AND OUTLOOK, *in* GLOBAL SECURITISATION AND STRUCTURED FINANCE 2008, at 18, 19 fig.2 (2008), *available at* http://www.globalsecuritisation.com (click "Special Focus"; then article title).

141 *See* Borod, *supra* note 138, at 654-55 (noting the loosening of underwriting standards on subprime mortgage loans and the incentive problem created when "origination machines around the country sold the loans almost as quickly as they were originated to the banks, which just as quickly securitized them").

142 *See* Moran, *supra* note 93, at 45 ("Wall Street firms became enamored of the profitability and supposed safety of their securitized credit derivative instruments, not only originating many products but also stocking their balance sheets with them as they had represented a huge market with relatively high yields.").

143 *See* Borod, *supra* note 138, at 657 (noting that "the fact that the homeowners would be incapable of paying the debt service after the teaser rates converted to higher rates was deemed immaterial" because everyone assumed that "the residential real estate market was not only secure against national devaluation but was more likely to continue to *increase* in value over the foreseeable future").

apprised of the risks subprime mortgage assets posed.[144] In this Section, I assess whether residential solar leases present the same types of systemic risks that subprime mortgage assets did, and whether they require regulation under the Dodd–Frank Act, the financial reform bill passed in 2010.[145]

1. Solar-Specific Risks

There are a number of risks that are specifically related to solar leases, which must be addressed before a successful, low-cost securitization can occur. First, to have a successful securitization that will attract investors, a potential buyer must be able to rely on the originator to "reasonably predict the aggregate rate of default."[146] This will enable credit rating agencies to accurately assign ratings to each security and allow potential investors—who rely heavily on credit ratings in their due diligence efforts[147]—to make more informed decisions.

In the solar lease context, potential investors would need data showing the likelihood of customer default over the life of the assets, which typically last for more than twenty years.[148] The problem, however, is that existing solar leases have been operating for only a few years. Indeed, before 2009, when the $2000 cap on the residential ITC was removed, annual residential solar installations totaled only 82 MW, compared to 488 MW in 2012.[149] This is hardly enough data upon which to draw conclusions about aggregate default rates going forward for twenty years or more—a necessary procedure for ratings agencies and potential investors. Up until now, solar leasing companies have been careful to contract only with lessees having very high

144 *See id.* at 658 ("The ratings agencies were staring into murky pools when they were asked to rate [collateralized debt obligations], since the actual assets supposedly generating the cash flows were several layers beneath the instruments held by the [collateralized debt obligation] issuers, and these instruments were themselves composed largely of subordinated tranches rated below investment grade.").

145 Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (2010) (codified as amended in scattered sections of 7, 12, and 15 U.S.C.).

146 SCHWARCZ ET AL., *supra* note 99, at 7.

147 *Credit Rating Agencies and the Financial Crisis: Hearing Before the H. Comm. on Oversight & Gov't Reform*, 110th Cong. 4 (2008) (opening statement of Rep. Henry Waxman, Chairman, H. Comm. on Oversight & Gov't Reform) ("The credit rating agencies occupy a special place in our financial markets. Millions of investors rely on them for independent objective assessments.").

148 STANDARD & POOR'S, *supra* note 127, at 3 (noting that the length of solar leases "may run up to 20 years"); *see also* SCHWABE ET AL., *supra* note 103, at 4 ("[H]istorical data on default rates by the energy purchaser was noted as critical to assess creditor risks and develop solutions through financial innovation.").

149 SOLAR MARKET INSIGHT 2012, *supra* note 1, at 5 fig.2.1.

FICO scores,[150] but as competition for new business increases, lease providers may be pressured to loosen their credit standards, potentially increasing the risk of default.

An additional risk is the ongoing need for PV system maintenance and, sometimes, system repair. As discussed above, one of the primary benefits of securitization is the separation of the assets and their cash flows from the issuer, allowing investors to make investment decisions based solely on the quality of the underlying assets, rather than speculating about the creditworthiness of the issuer.[151] However, in the solar context, the availability of operations and maintenance (O&M) providers must also factor into investor risk models.[152] In a state with a small solar industry, there may be few companies that can provide such services. Investors who depend on steady cash flow from solar projects could be dissuaded from investing if cash flows decline in response to inadequate system maintenance.[153] Though this is definitely a risk, most states with active solar leasing markets also have a high concentration of installation and maintenance companies,[154] and as the market grows, so should the number of service providers. The biggest risk in this context may be that supportive state and federal policies will decline or be removed completely before the industry achieves necessary cost reductions,[155] which would lead to an overall contraction and a corresponding decline in the number of O&M providers.

---

150 *See* Robert Freedman & Patricia Hammes, Shearman & Sterling, *US Solar: Of PPA Securitisations, Horizons & Hurdles*, INFRASTRUCTURE J., Nov. 11, 2011, *available at* http://www.shearman.com/us-solar-of-ppa-securitisations-horizons—hurdles-11-14-2011 (click "View full memo") ("[S]olar providers are currently minimising this credit risk by generally requiring that homeowners have excellent credit (e.g. FICO scores of 700 or above) to qualify for a lease or PPA.").

151 *See supra* text accompanying notes 133-137.

152 *See, e.g.*, TRAVIS LOWDER ET AL., NAT'L RENEWABLE ENERGY LAB., CONTINUING DEVELOPMENTS IN PV RISK MANAGEMENT: STRATEGIES, SOLUTIONS, AND IMPLICATIONS 7-8 & tbl.2 (2013), *available at* http://www.nrel.gov/docs/fy13osti/57143.pdf (identifying "operation contingencies" that can cause solar energy production shortfalls, ultimately reducing project revenue).

153 *See* STANDARD & POOR'S, *supra* note 127, at 4 ("The performance of a securitization may also be hurt if the O&M rate required by a new provider is higher than the previous rate. Rising expenses would most likely reduce future cash flows, which in turn, increase the transaction's credit risk profile.").

154 *See* THE SOLAR FOUNDATION, NATIONAL SOLAR JOBS CENSUS 2012: A REVIEW OF THE U.S. SOLAR WORKFORCE 62 & tbl. (2012), *available at* http://thesolarfoundation.org/sites/thesolarfoundation.org/files/TSF%20Solar%20Jobs%20Census%202012%20Final.pdf (showing the strong correlation between a state's PV capacity and its number of solar employers, of which installers make up the vast majority).

155 *See* LOWDER ET AL., *supra* note 152, at 8-9 & tbl.3 (discussing policy and regulatory risks associated with solar PV projects).

Furthermore, although the rapid decline in the installed cost of solar systems benefits consumers and helps ensure the long-term viability of the solar industry, it could simultaneously produce risks for investors in solar-backed securities. In 2012, the average installed cost of a solar project dropped by 26.6%,[156] and prices are expected to continue declining for at least the next four to five years.[157] Although price declines increase demand and make the industry more competitive with traditional energy technologies, rapid price declines also create risk for long-term solar lease contracts. A homeowner who signs a twenty-year solar lease at today's costs might try to renegotiate the contract in five or ten years if the market price is much lower, or even default on the contract.[158] According to Standard & Poor's, "this risk is particularly high in situations where panels change hands, either in the event of a property sale or an insolvency of the owner (i.e., foreclosure)."[159] If a customer defaults, the solar system would be liquidated and investors paid from the proceeds.[160] Massive renegotiations or defaults could "materially affect the securitization's future cash flows,"[161] because the liquidation proceeds will most likely not make investors whole.[162] Though this is a potentially serious risk, many lease contracts are tied to customers' current utility rates, not directly to the market price of solar energy.[163] Setting the contract price at a certain percentage below current utility rates ensures the relationship to the market price of solar is more tenuous and unlikely to cause widespread customer renegotiations or defaults. The greater risk, perhaps, is that utility electric rates will drop because of technological advancements in energy production, which would make solar leases more expensive than energy from traditional sources. This outcome seems unlikely, however, as electricity rates have increased consistently for

---

156 SOLAR MARKET INSIGHT 2012, *supra* note 1, at 10.

157 SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 10 ("As the U.S. solar industry progresses toward 2016, it is becoming increasingly clear that system prices will fall significantly.").

158 *See* STANDARD & POOR'S, *supra* note 127, at 5 (explaining that price declines increase the risk that homeowners will default on or try to renegotiate payments).

159 *Id.*

160 *See generally* STEVEN L. HARRIS & CHARLES W. MOONEY, JR., SECURITY INTERESTS IN PERSONAL PROPERTY 576-79 (5th ed. 2011) (providing an overview of the process for enforcing security interests after a default).

161 STANDARD & POOR'S, *supra* note 127, at 5.

162 *See id.* (noting the "extremely low recovery rates" in such circumstances).

163 *See* Todd Woody, *SolarCity: Ditch Your Big Utility and Get a Free Rooftop Solar System*, FORBES (May 16, 2012, 1:18 PM), http://www.forbes.com/sites/toddwoody/2012/05/16/ditch-your-big-utility-and-get-a-free-rooftop-solar-system (noting that SolarCity lease customers in Maryland and Washington, D.C., are signing lease contracts at prices about 10% below current electricity rates).

decades.[164] On the other hand, recent advances in hydrofracking technology have dramatically reduced the cost of producing natural gas, and it is not unreasonable to predict future price declines, at least in the medium term.[165]

Because solar energy is an intermittent resource, there is some risk that expected system output will exceed actual output, which, in turn, would reduce expected cash flows and negatively affect investor returns. Indeed, as Standard & Poor's has noted, "The amount of sunlight also varies by location and time of year, which may result in the securitization having a volatile cash flow profile."[166] However, this risk can be at least partially mitigated by geographic diversification.[167] For instance, lease providers could pool leases from different geographic areas to ensure that investors are not too heavily exposed to the vagaries of one particular area's weather. For currently active lease providers that are developing leases in a number of states, this is both a prudent and viable strategy for risk diversification.

2. Broader Market and Regulatory Risks

In addition to solar-specific risks, broader market and regulatory risks have arisen as a result of the 2008 financial crisis. Unfortunately, these risks are more difficult to predict and address. A crucial first question is whether residential solar leases, which are physically attached to homes, might be subject to broader housing market risk in the event of another housing bubble. In this way, solar leases may resemble mortgage-backed securities, with default rates on both types of instruments tied closely to foreclosure rates. Further, solar lease contract timelines—usually twenty years[168]—are roughly similar to mortgage terms, which often run to thirty years.[169] Assets with long payback periods may be riskier because of the inherent uncertainty in a decades-long horizon. Moreover, if the lease inhibits mortgage liquidity,

164 *See* U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2011, at 254-55 fig.8.10 & tbl.8.10 (2012), *available at* http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf (depicting the steadily increasing average retail price, in nominal terms, of electricity by sector from 1960 through 2011).

165 *See id.* at 192 fig.6.8 (showing the recent sharp drop in natural gas prices).

166 STANDARD & POOR'S, *supra* note 127, at 6.

167 *See id.* ("[Geographic diversification] reduces the transaction's operating risk profile because the securitization doesn't depend on one area for most of its future cash flows. For example, the transaction's performance is less likely to suffer if one region has, say, a long string of cloudy days.").

168 *See* Rebecca Smith, *Rays for Rent*, WALL ST. J., Sept. 13, 2010, http://online.wsj.com/article/SB10001424052748704271804575404863359949420.html ("Currently, leases run 15 to 20 years, and the lease agreement transfers to the new owner if the property is sold.").

169 *See* Bob Tedeschi, *How Rates Are Set*, N.Y. TIMES, Nov. 16, 2008, at RE10 (noting that a thirty-year fixed-rate loan is the most commonly held type of mortgage).

solar leases may pose even more risk than mortgage-backed securities. Some lease contracts contain terms requiring homeowners to transfer their leases to the new owners in the event of a sale.[170] In an already-constrained environment for home sales, liquidity (or its absence) is an important issue to address. If homes with leased solar systems are more difficult to sell than homes without solar, potential investors could be even more hesitant to enter the solar market. Although no studies have addressed this question, one study did examine the sale prices of California homes with solar systems versus those without.[171] The results show that homes in California with solar PV installed sold for a premium over comparable homes without solar.[172] This premium ranged on average from $3.90/W to $6.40/W of installed solar, which roughly corresponds to the installed system cost.[173] This study did not differentiate between customer-owned systems and homes with solar leases,[174] but the results suggest that the solar system itself adds value to the home. The lessee will most likely have lower electric bills than her neighbors, and there could be a boost in the price associated with "going green."

Despite some similarities to mortgage-backed securities, solar leases also resemble securitizations of other, historically less risky, assets. For example, like equipment and automobile leases, solar lease securitizations would require an estimate of the residual value of the system after the lease period ends.[175] The underlying asset follows a predictable timetable for devaluation, unlike homes, which are usually expected to increase in value, often causing unpredictability and speculation.[176] In addition, the value of a solar system

---

170 *See id.* at 5 ("Depending on the agreement, the outgoing [homeowner] may be required to find a replacement who will assume the existing agreement or otherwise purchase the system at a fixed price.").

171 *See generally* BEN HOEN, RYAN WISER, PETER CAPPERS & MARK THAYER, ERNEST ORLANDO LAWRENCE BERKELEY NAT'L LAB., AN ANALYSIS OF THE EFFECTS OF RESIDENTIAL PHOTOVOLTAIC ENERGY SYSTEMS ON HOME SALES PRICES IN CALIFORNIA (2011), *available at* http://eetd.lbl.gov/sites/all/files/publications/lbnl-4476e.pdf.

172 *Id.* at 34.

173 *Id.*

174 The study examined historical data on solar home sales through mid-2009, *id.* at 8, when solar leases were rare, *see* SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 7 fig.2-3 (showing the percent of residential solar PV installations subject to a lease from 2009 through the beginning of 2012). Therefore, it is likely that the vast majority of the homes considered in the Lawrence Berkeley study were customer-owned.

175 *See* Litwin and Levy, *supra* note 110, § 30:2.3[D], at 30-12 to -14 (describing the process of securitizing the residual value of leased assets).

176 *See* Borod, *supra* note 138, at 657 (noting that one of the factors contributing to the financial crisis was the assumption that "the residential real estate market was not only secure against

is roughly comparable to the value of a new automobile.[177] Securitizations of auto leases, loans, and other consumer financial products did not face the same difficulties during the financial crisis as mortgage-backed securities did.[178] While over 66% of subprime mortgage-backed securities were deemed likely to default in 2010, as well as 28% of prime mortgage-backed securities, no significant portion of auto loans and leases faced such downgrades.[179] According to the Federal Reserve, the relatively strong performance of these assets throughout the crisis is "partly a function of the auto ABS structure," which is "designed to withstand this level of stress."[180] Auto lease and loan securitizations contain a number of protections and credit enhancements, including excess spread, overcollateralization, and originator retention of a portion of the subordinate tranches, none of which featured in mortgage-backed securities.[181]

Also, though the consumer ABS market—which consists of credit cards, auto leases and loans, student loans, and similar assets—suffered a precipitous drop in the number of new issuances in 2008 as a result of the financial crisis, it has recovered since then.[182] Auto leases, in particular, rebounded quickly to their pre-crisis levels.[183] Therefore, because of the many similarities to auto leases and the relatively strong performance of these assets despite the stresses of the financial crisis, potential issuers of solar lease-backed securities should model the securities on auto ABSs.

Another area of uncertainty is which provisions of the Dodd–Frank Act,[184] if any, might apply to solar-backed securities. Dodd–Frank was enacted in July 2010 in response to the financial crisis. In an effort to protect

---

national devaluation but was more likely to continue to *increase* in value over the foreseeable future").

177 *See* SOLAR MARKET INSIGHT Q2 2012, *supra* note 42, at 6 (noting that, "[i]n Q2 2012, the average price of a residential system was $32,453").

178 *See* FED. RESERVE REPORT, *supra* note 95, at 57 ("Delinquency rates on auto loans increased considerably during the financial crisis but remained near the high end of their historical range."); *see also* Borod, *supra* note 138, at 650 ("[T]he historical performance on auto loan and credit card securitization pools has been, with some exceptions, relatively stable.").

179 FED. RESERVE REPORT, *supra* note 95, at 49-50 & tbl.4.

180 *Id.* at 57.

181 *See id.* at 46 (discussing these and other investor-protecting features of auto loan and lease securitizations).

182 *See id.* at 31 ("[I]ssuance in the consumer ABS market, which includes credit cards, auto loans and leases, and student loans, declined dramatically in both number of deals and dollar value after 2007. Unlike the real estate sector, however, consumer ABS has rebounded somewhat since the 2008 market trough.").

183 *See id.* at 58 & fig.12 (discussing the strong performance of auto leases in the years following the financial crisis).

184 Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (codified as amended in scattered sections of 7, 12, and 15 U.S.C.).

consumers from "abusive financial services practices,"[185] Dodd–Frank contains various financial protections, authorizes federal agencies to issue new regulations, and creates a new agency, the Consumer Financial Protection Bureau.[186] Dodd–Frank also contains a number of provisions aimed at ratings agencies and issuers of asset-backed securities.[187] While many of the relevant Dodd–Frank regulations have been drafted, they have not all been finalized or clarified, and it is not clear whether they would apply to new asset classes like solar leases.[188]

Perhaps the most significant Dodd–Frank asset-backed securitization reform is the risk retention requirement in § 941(b) of the Act.[189] This provision requires the SEC and other relevant agencies to establish rules requiring ABS issuers to retain a certain percentage of the credit risk associated with the assets collateralizing the security.[190] In April 2011, the agencies released proposed risk retention rules and solicited comments.[191] After receiving comments, the agencies released revised proposed rules in September 2013.[192] Under the proposed rules, "a sponsor [must] retain an economic interest equal to at least 5 percent of the aggregate credit risk of the assets collateralizing an issuance of ABS."[193] The requirement seeks to better align issuer and investor incentives and, thus, in theory, to alleviate the "moral hazard" problem inherent in the originate-to-distribute securitization model.[194] However, the proposed risk retention rules would apply not

185 *Id.* at pmbl.

186 *See generally id.* at tit. VI, IX & X.

187 *See generally id.* §§ 621, 932, 936, 938, 939A, 939C, 941 & 942.

188 *See Implementing Dodd–Frank Wall Street Reform and Consumer Protection Act—Pending Action*, SEC, http://www.sec.gov/spotlight/dodd-frank/dfactivity-upcoming.shtml (last updated Sept. 18, 2013) (listing the Dodd–Frank mandates that are still pending).

189 Dodd–Frank Act § 941(b) (codified as amended at 15 U.S.C. § 78o-11 (Supp. V 2012)).

190 *Id.* (mandating that, within 270 days of enactment, "the Federal banking agencies and the Commission shall jointly prescribe regulations to require any securitizer to retain an economic interest in a portion of the credit risk for any asset that the securitizer, through the issuance of an asset-backed security, transfers, sells, or conveys to a third party.").

191 *See* Credit Risk Retention, 76 Fed. Reg. 24,090 (proposed Apr. 29, 2011) (to be codified at 12 C.F.R. pts. 43, 244, 373 & 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267).

192 *See* Credit Risk Retention, 78 Fed. Reg. 57,928 (proposed Sept. 20, 2013) (to be codified at 12 C.F.R. pts. 43, 244, 373 & 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267). As of the time of publication, the final rules have not been issued.

193 *Id.* at 57,936.

194 *See id.* ("[T]his exposure should provide a sponsor with an incentive to monitor and control the underwriting of assets being securitized and help align the interests of the sponsor with those of investors in the ABS."); *see also* Borod, *supra* note 138, at 662 ("[The risk retention] provision was intended to address the deficiency that was clearly at the core of the subprime [residential mortgage-backed securities] and [collateralized debt obligation] phenomenon—lack of skin in the game.").

only to the problematic subprime mortgage ABSs, but also to auto leases, credit cards, equipment finance, and student loans, which were "functioning well before and during the meltdown" and have protections "embedded in [their] capital structure[s]."[195] As a result, it seems that solar lease securitizations would also be subject to the proposed risk retention rules, unless the final rules create an exemption. As third-party lease providers consider whether to securitize lease pools, they should consider the implications of Dodd–Frank's risk retention rules, which could raise costs[196] or limit what types of securities can be created. On the other hand, risk retention would help mitigate the risk that third-party financiers will try to expand too quickly by lowering credit requirements for new lessees, as mortgage originators did with subprime mortgages.

III. RECOMMENDATIONS AND FUTURE OUTLOOK

Although the two broad categories of challenges to creating residential solar lease securitizations—solar-specific and the broader market risks—do present serious barriers that must be overcome before successful solar-backed securitization can take place, they are not insurmountable in the medium term.

With time, the market will address (or perhaps is already addressing) the solar-specific risks identified above. For instance, NREL, Sandia Laboratories, and other organizations are creating a database of both technological PV performance data and customer default history.[197] This publicly available database will help ratings agencies and investors assess the risks of securitized solar leases.[198] NREL notes that the database "is an important step to tapping the public capital markets and offers the potential

[195] Borod, *supra* note 138, at 662-63. The revised proposed rules provide that certain "qualifying" auto loan securitizations can be subject to reduced risk retention requirements. 78 Fed. Reg. at 57,983.

[196] *See* FIN. STABILITY OVERSIGHT COUNCIL, MACROECONOMIC EFFECTS OF RISK RETENTION REQUIREMENTS 27 (2011), *available at* http://www.treasury.gov/initiatives/wsr/Documents/Section%20946%20Risk%20Retention%20Study%20%20(FINAL).pdf ("An excessive [risk retention] requirement could unduly limit credit availability and economic output to the point that these costs could outweigh the benefits of improved stability.").

[197] *See* Press Release, Nat'l Renewable Energy Lab., NREL Launches Initiative to Build Solar Performance Database (Apr. 9, 2013), http://www.nrel.gov/news/press/2013/2166.html [hereinafter NREL Press Release] (detailing the effort to build a database of real-world solar performance data to assist investors and ratings agencies).

[198] *Id.*; *see also* SCHWABE ET AL., *supra* note 103, at 7 (discussing the importance of "[i]mprov[ing] availability of data so that the risks of renewable energy investment can be better understood and mitigated").

to significantly lower the cost of solar energy."[199] However, it will take time before the database is robust enough to satisfy ratings agencies. In the interim, investors and ratings agencies might rely on existing data that tracks utility default rates, which would likely be a close proxy for solar default data. While utility default data would not perfectly correlate to solar lease default rates (since homeowners would possibly choose to default on their solar leases before failing to pay their utility bills),[200] using utility data would facilitate some informed decisionmaking by ratings agencies and investors.

Additionally, as noted above, the risk posed by intermittent solar resources can be mitigated by including geographically dispersed assets in each security. This is not a novel idea and can be done fairly easily, especially as the national solar market continues to grow. Furthermore, O&M providers are becoming more widely available in large state markets, thus lowering the risk of substantial disruption in system performance and cash flows due to unavailable maintenance providers.

Unfortunately, however, there is no easy solution for the problem of price uncertainty as PV technologies mature and their costs decline. Such uncertainty could lead to an influx of contract renegotiations or even defaults, particularly when homes change hands. A wait-and-see approach would force the industry to wait a few years for prices to stabilize. Another option might be to go forward with securitizations and take advantage of credit enhancement mechanisms that would help protect investors if defaults are greater than expected.[201] In particular, overcollateralization, historically used by auto lease originators, helps protect investors by including "extra" assets in the pool.[202] The originator or securitizer "backs a deal with collateral that has a par value greater than the value of the liabilities sold to investors."[203] If more defaults occur than expected, the extra

---

199 NREL Press Release, *supra* note 197 (quoting NREL Senior Financial Analyst Michael Mendelsohn).

200 *See* STANDARD & POOR'S, *supra* note 127, at 4 ("It is possible . . . that [solar lease customers] would be more likely to default on their solar bills than their utility bills.").

201 *See* LITWIN & LEVY, *supra* note 110, § 30:2.3[B], at 30-10 to -11 (providing a detailed discussion of typical credit enhancement mechanisms used in auto lease securitizations); *see also* FED. RESERVE REPORT, *supra* note 95, at 46 (listing various credit enhancement mechanisms—including excess spread, subordinate tranche retention, overcollateralization, and monoline insurance—that protect auto lease investors).

202 LITWIN & LEVY, *supra* note 110, § 30:2.3[B], at 30-10 to -11.

203 FED. RESERVE REPORT, *supra* note 95, at 41.

collateral ensures sufficient funding to pay investors; if the assets perform as predicted, the extra collateral returns to the securitizer.[204]

Until ratings agencies and investors become familiar with solar lease securities and their underlying assets, due diligence will be time-consuming and expensive. Contract standardization could help keep securitization and due diligence costs low. As NREL has noted, the "due diligence process on a one-off project basis [is] cumbersome and inconsistent with a more liquid, open investment environment. Standardization is perceived as a fundamental element to reducing the due diligence workload, as it may allow for consistent project documentation, evaluation processes, and risk assessment elements."[205] At the state level, public utility commissions could facilitate contract standardization, which would enable lower-cost due diligence and lead to lower costs overall. As the national market expands, an interstate entity—perhaps a trade association like the National Association of Regulatory Utility Commissioners—could facilitate standardization across markets. The solar industry could thus follow the example set by other trade groups to promote lower costs.[206]

In addition to these solar-specific risks, the broader market and related policy environment present risks that may impede growth in solar lease-backed securities. First of all, despite some surface similarities to mortgage-backed securities, solar leases should function more like other consumer finance securitizations. Like automobile and equipment loans, residential solar systems steadily depreciate, leaving a residual asset value when the lease term ends. As a result, residential solar leases are less likely to experience the bubble pricing and asset devaluation that occurred in the mortgage market from 2007 to 2009. Because of these similarities, solar lease providers looking to issue solar-backed securities should model them after automobile and equipment leases, which include embedded protections and have been largely successful despite the financial crisis. Solar lease securitizations do pose unique risks, however, that would make them materially different from auto leases and other nonmortgage securitizations. In particular, because solar systems are physically tied to houses for twenty-year terms, the high likelihood of home turnovers within the lease periods could present a risk of widespread default if new homeowners choose not to inherit the leases. Because of these added risks, it may be necessary to include a greater

204 *Id.*

205 SCHWABE ET AL., *supra* note 103, at 7.

206 *See id.* at 8 (citing processes used by the U.S. Department of Housing and Urban Development to "standardize[] the evaluation of prospective residential homeowners with a consistent set of income and other criteria" as well as the International Swaps and Derivatives Association, which has developed a "master agreement" for over-the-counter derivatives).

number of credit enhancements—like overcollateralization—than auto lease securitizers have historically used.

Furthermore, as stipulated above, some Dodd–Frank rules—in particular, the risk retention rules—may apply to solar securities, although their applicability remains uncertain until the final rules are issued. Despite the added costs these risk retention rules would impose, securitization is a viable strategy for residential solar leases and will help ease financing constraints for solar assets generally. Though there is some risk, these risks are fairly manageable in the medium term and will not require government intervention. Regulators should not hinder solar-backed securitizations by imposing costly requirements, and state agencies should attempt to foster standardization to enable lower-cost due diligence.

Solar lease securitization will happen, but it will not happen overnight. First, we will see pass-through securities, similar to bonds, with relatively high interest rates. As these mature and credit rating agencies become familiar with solar leases, more complex structures resembling those in the auto lease securitization market will materialize. It is important to recall that the 30% solar ITC is currently set to expire at the end of 2016, at which point it will revert to a 10% credit. The solar industry should begin preparing for that now by establishing alternative financing frameworks, such as solar lease securitizations, that are less dependent on tax equity investment.