STARING AT THE SUN: HOW PROPERTY TAX INCENTIVES AND THIRD PARTY OWNERSHIP CAN STIMULATE THE RESIDENTIAL SOLAR ENERGY MARKET

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I. INTRODUCTION

Scientists have documented that, as of May 2013, carbon dioxide levels surpassed the 400 parts-per-million level,[1] which is ten percent greater than what some believe is environmentally sustainable over the long-term.[2] Many of those emissions come from the continued reliance on electricity generated from coal-fired power plants, and from fossil fuels in general.[3] Meanwhile, business interests[4] and cynical government officials[5] who dispute anthropogenic climate change, have systematically eroded[6] the nearly unanimous conclusion by many in the scientific community of humankind's role in climate change.[7] As a result, the climate change debate has been distorted and politicized to such an extent that our policymakers have failed to work together in developing an energy policy that can effectively curb climate change.[8] Fortunately, there are multiple avenues through which other shareholders can influence energy innovation even

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[1] Justin Gillis, *Heat-Trapping Gas Passes Milestone, Raising Fears*, N.Y. TIMES (May 11, 2013), http://www.nytimes.com/2013/05/11/science/earth/carbon-dioxide-level-passes-long-feared-milestone.html?pagewanted=all&_r=0.

[2] *See* James Hansen et al., *Target Atmospheric CO2: Where Should Humanity Aim?*, 2 OPEN ATMOSPHERIC SCI. J. 217, 226 (2008), *available at* http://www.benthamscience.com/open/toascj/articles/V002/217TOASCJ.pdf.

[3] *See How Much of U.S. Carbon Dioxide Emissions Are Associated with Electricity Generation?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/faqs/faq.cfm?id=77&t=11 (last updated Aug. 23, 2013).

[4] *See* GREENPEACE USA, KOCH INDUSTRIES SECRETLY FUNDING THE CLIMATE DENIAL MACHINE 6 (2010), *available at* http://www.greenpeace.org/usa/Global/usa/report/2010/3/koch-industries-secretly-fund.pdf.

[5] *See* Jeff Spross, *The Anti-Science Climate Denier Caucus*, THINKPROGRESS (June 26, 2013), http://www.thinkprogress.org/climate-denier-caucus/.

[6] *See A New Gallup Poll on Climate Change*, NAT'L CENTER FOR SCI. EDUC. (Apr. 9, 2013), http://ncse.com/news/2013/04/new-gallup-poll-climate-change-0014799.

[7] *See* John Cook et al., *Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature*, ENVTL. RES. LETTER 8 (2013), http://iopscience.iop.org/1748-9326/8/2/024024/pdf/1748-9326_8_2_024024.pdf.

[8] *See The End of Energy: The Unmaking of America's Environment, Security, and Independence*, THE MIT PRESS , http://mitpress.mit.edu/books/end-energy (last visited Mar. 30, 2014).

more effectively than the government, specifically within the solar power industry.

Rooftop solar photovoltaic ("PV") panels hold great potential for distributed energy[9] production across the country. One study estimated that rooftop PV alone could produce up to twenty-two percent of the energy supply in the United States.[10] Another study concluded that solar energy could provide a third of the energy supply for the western United States by 2040.[11] Unlocking that renewable energy potential is vital, given how much energy residential buildings currently consume. In 2011, for example, residential energy consumption accounted for roughly twenty-two percent of total energy consumed in the United States, even more energy than commercial buildings.[12] Despite its vast potential, solar energy accounted for roughly 0.3% of total energy generation in the United States in 2013.[13]

In broad strokes, this Note aims to demystify the solar power industry and to propose a new program that will increase residential solar energy production. Part II analyzes the current state of the solar industry. Part III discusses the disparate state and federal incentives and regulatory schemes that govern the solar industry and examine the growing importance of, and potential legal complications with, third party solar financing. Finally, Part IV proffers an innovative new solution that will dramatically expand onsite solar energy installation and production. That solution combines the emerging industry of third-party solar financing with a property-tax-moratorium-incentive program that seeks to correct abnormal consumer behavior as it relates to energy efficiency investments. The lower transaction costs and economies of scale derived from industrializing residential, onsite PV energy production through third-party ownership, plus the direct economic benefits that homeowners would theoretically receive, make this solar-energy-for-reduced-property-tax scheme a highly attractive method to spur residential PV installations.

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[9] Distributed energy is a system where energy is produced closer to where it is consumed, rather than produced from large, isolated power plants. A distributed system works well with renewable energy like solar and wind because those systems can be built on various sites around the country and provide energy locally.

[10] PAUL DENHOLM & ROBERT MARGOLIS, NAT'L RENEWABLE ENERGY LAB., SUPPLY CURVES FOR ROOFTOP SOLAR PV-GENERATED ELECTRICITY FOR THE UNITED STATES 9 (2008), *available at* http://www.nrel.gov/docs/fy09osti/44073.pdf.

[11] *See* Ana Mileva et al., *SunShot Solar Power Reduces Costs and Uncertainty in Future Low-Carbon Electricity Systems*, ENVTL. SCI. & TECH. 9053 (July 19, 2013), http://pubs.acs.org/doi/abs/10.1021/es401898f.

[12] U.S. ENERGY INFO. ADMIN. ANNUAL ENERGY REVIEW 2011 38 (2012), *available at* http://www.eia.gov/totalenergy/data/annual/archive/038411.pdf.

[13] U.S. ENERGY INFO. ADMIN., PRIMARY ENERGY CONSUMPTION BY SOURCE (2014), *available at* http://www.eia.gov/totalenergy/data/monthly/pdf/sec1_7.pdf.

II. OVERVIEW OF SOLAR ENERGY, FINANCING, AND THE ELECTRICITY GRID

A. Recent Growth, And Declining Costs In The Solar Energy Industry

The solar panel industry has been growing steadily in recent years. According to the Solar Energy Industry Association, solar energy has become the fastest growing energy source in recent years.[14] Analysts expect that 4.4 gigawatts of PV energy will be installed in 2013, an increase of over thirty percent from the previous year.[15] The U.S. global market share of PV production will reach thirteen percent, up from just five percent in 2008.[16] And collectively, PV energy capacity will be more than ten gigawatts.[17] Industry growth is occurring despite dramatic decreases in the cost of solar energy production.[18] The cost for residential PV production also continues to fall. Over the past year, residential system installed prices have fallen from $5.22 per kilowatt to $4.72 per kilowatt,[19] and the final installed prices for some residential systems were less than $3.00 per watt.[20]

While those figures are encouraging, solar energy production still finds itself competing with traditional fossil fuel production and other renewable energy sources that are cheaper for the end-user. A 2011 Department of Energy study found that the levelized cost of energy ("LCOE")[21] for residential PV energy ranged from $0.17 to $0.27 per kilowatt,[22] compared to the LCOE for coal energy, which one study found to be between $0.06 to $0.15 per kilowatt hour.[23] That study also estimated that the LCOE for geothermal energy, ranging from $0.09 to $0.14 per

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[14] *U.S. Solar Market Grows 76% in 2012; Now an Increasingly-Competitive Energy Source for Millions of Americans Today,* SOLAR ENERGY INDUSTRIES ASS'N (Mar. 14, 2013), http://www.seia.org/news/us-solar-market-grows-76-2012-now-increasingly-competitive-energy-source-millions-americans.

[15] SOLAR ENERGY INDUSTRIES ASS'N, U.S. SOLAR MARKET INSIGHT REPORT Q2 2013 EXECUTIVE SUMMARY 2 (2013), *available at* http://www.seia.org/research-resources/solar-market-insight-report-2013-q2.

[16] *Id*. at 4.

[17] *Id.*

[18] *U.S. Solar Market Grows 76% in 2012; Now an Increasingly-Competitive Energy Source for Millions of Americans Today*, *supra* note 14.

[19] SOLAR ENERGY INDUSTRIES ASSOCIATION, *supra* note 15, at 14.

[20] *Id.*

[21] *See* U.S. DEP'T OF ENERGY, 2010 SOLAR TECHNOLOGIES MARKET REPORT 51 (2011), *available at* http://www.nrel.gov/docs/fy12osti/51847.pdf ("LCOE is the ratio of an electricity-generation system's amortized lifetime costs (installed cost plus lifetime O&M and replacement costs minus any incentives, adjusted for taxes) to the system's lifetime electricity generation. The calculation of LCOE is highly sensitive to installed system cost, O&M costs, location, orientation, financing, and policy.").

[22] *Id*. at 52.

[23] LAZARD, LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS 4 (2013), *available at* http://gallery.mailchimp.com/ce17780900c3d223633ecfa59/files/Lazard_Levelized_Cost_of_Energy_v7.0.1.pdf.

kilowatt-hour, and for wind energy, ranging from $0.05 to $0.10, were both cheaper than that of residential solar energy.[24]

Government initiatives have historically been important drivers of solar PV development, but those government programs are declining as the price of solar energy production also declines.[25] In 2012, for example, "median cash incentives ranged from $0.5/W to $1.0/W across the three system size categories shown, having fallen by more than $4.0/W (roughly 85% to 90%) from their historical peak in 2001/2002."[26] That decline is driven, in part, by policymaker's strategic calculation that reduced government incentivizing can spur further cost reductions.[27] The thinking is that "regular and scheduled incentive reductions can provide a long-term signal to the industry to reduce costs and improve installation efficiencies."[28] In other words, weaning the industry off of government support encourages a more efficient PV product, in the hopes that PV could successfully compete in the broader energy market. Those reductions also apply downward pressure on PV project installers (i.e., contractors) to reduce their costs in order for homeowners to maintain their expected returns on investment, without which the PV market might decline.

While the U.S. solar market has seen impressive cost reductions in recent years, it is still more expensive than in other countries. While that sounds troubling, it ironically provides an opportunity for the solar industry in the United States, given the distinct downward trend in PV costs. Because "the installed price of small residential PV in the United States remains relatively high compared to many other major markets," additional cost reductions are possible in the near future within the U.S. market.[29] The U.S. solar industry imports many of its hardware and software components from other countries in which the products are cheaper due to the relative maturity of those markets.[30] Larger markets could realize "price reductions through learning-by-doing and economies of scale."[31] With thirty-two

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[24] *Id*.

[25] GALEN BARBOSE ET AL., LAWRENCE BERKELEY NAT'L LAB., TRACKING THE SUN VI: AN HISTORICAL SUMMARY OF THE INSTALLED PRICE OF PHOTOVOLTAICS IN THE UNITED STATES FROM 1998 TO 2012 16-17 (2013), *available at* http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf.

[26] *Id*. at 17.

[27] *Id*. ("PV incentive program administrators have also reduced incentives over time both in response to installed price declines and to encourage further declines. The premise behind the latter is that regular and scheduled incentive reductions can provide a long-term signal to the industry to reduce costs and improve installation efficiencies.").

[28] *Id*.

[29] *Id*. at 19.

[30] *Id*. at 20 ("Given that modules and other hardware items are effectively global commodities with only marginal price differences across countries, much of the pricing variation across countries can be attributed to differences in 'soft costs.'").

[31] *Id*.

gigawatts of cumulative solar energy capacity,[32] Germany currently has over four times more solar capacity than the United States.[33] Installed prices are also between fifty-three percent to fifty-eight percent cheaper in Germany than in the U.S.[34] That suggests that, as the U.S. market continues to grow, installed prices will continue to decline.

Installed prices, however, differ significantly across states and regions within the United States. For example, although it did not reflect more recent price reductions, one 2010 study found that "[a]verage [installed] costs within individual states range from a low of $6.30/W in New Hampshire to a high of $8.40/W in Utah."[35] While one would expect market maturity, and thus cost reductions via economies of scale, other factors seem to be more important. The two largest markets, California and New Jersey, were not the cheapest states, and the three cheapest states, New Hampshire, Texas, Nevada, and Arkansas, have relatively immature markets.[36] Therefore, a space exists for creative policymaking to reduce costs in order to spur the PV market.

B. Residential Solar Energy Project Financing: Limitations and Opportunities

As with any major home investment decision, the question, and thus the primary obstacle in installing PV, becomes how to finance the project. Traditionally, homeowners could take advantage of the equity they had accrued in their real property to finance home upgrades and improvements, or use that equity to finance other major personal needs such as paying off medical bills or student loans.[37] Financial institutions are realizing that the financing of residential renewable energy projects is a potential untapped market, and they are beginning to partner with solar energy producing entities. For example, New Resource Bank in California has partnered with SunPower, a principal producer and installer of PV energy products, to offer solar-specific home equity loans to finance a PV project.[38] Other financial institutions, such as Wainwright Bank & Trust, a

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[32] *See* PHILLIP BROWN, CONGRESSIONAL RESEARCH SERVICE, EUROPEAN UNION WIND AND SOLAR ELECTRICITY POLICIES: OVERVIEW AND CONSIDERATIONS 6 (2013), *available at* http://www.fas.org/sgp/crs/row/R43176.pdf.

[33] *See* Zachary Shahan, *Top Solar Power Countries Per Capita & Per GDP*, CLEANTECHNICA, http://cleantechnica.com/2013/06/26/solar-power-by-country-solar-rankings-by-country/#6u5yUxHHIFqjJqFo.99 (last visited Mar. 30, 2014).

[34] BARBOSE ET AL., *supra* note 25, at 20.

[35] UNITED STATES DEPARTMENT OF ENERGY, *supra* note 21, at 64.

[36] *See id.*

[37] *See* Jason R. Wiener & Christian Alexander, *On-Site Renewable Energy and Public Finance*, 26 SANTA CLARA COMPUTER & HIGH TECH. L.J. 559, 563 (2010).

[38] *See* JASON COUGHLIN & KARLYNN CORY, NAT'L RENEWABLE ENERGY LAB., SOLAR PHOTOVOLTAIC FINANCING: RESIDENTIAL SECTOR DEPLOYMENT 26 (2009), *available at* http://www.nrel.gov/docs/fy09osti/44853.pdf.

Boston firm, and Pennsylvania-based AFC First Financial Corp., have both entered the "green loan" market.[39]

Home equity financing, however, does have potential drawbacks. For homeowners, it adds debt to their financial portfolios, a liability they may choose to forgo. Moreover, it consumes a portion of their home equity, which homeowners may prefer to use to finance other major expenses, such as unexpected medical bills.[40] And from the lender's perspective, the financing institution risks losing on the investment if the homeowner defaults.[41] Bankruptcy courts allow consumers to strip home equity loans, which are generally considered junior to home mortgages because the latter are secured by the property,[42] though courts might treat a PV project financed by a home equity loan differently since there is a tangible asset.

Thus, the market needs new, creative financing mechanisms to support the growing installation of PV systems. Third-party solar financing, this Note argues, is one mechanism that will help dramatically expand access to renewable energy. Instead of personally fronting the cost to finance their systems, homeowners would instead contract with commercial companies who fund (and own) the solar energy systems. Homeowners would then pay to lease the system in order to consume the energy generated. This arrangement results in lower residential electricity bills owed to the public utility company, which likely has a monopoly over energy production.

Although a relatively new product, third-party solar financing is already dominating the market. Indeed, one study found that "[t]hird party ownership . . . through power purchase agreements and leases has become increasingly common for PV systems of all sizes, representing roughly 60% of all systems installed in 2012."[43] The percentage of third-party financed projects, however, differs substantially from market to market. For example, during the second quarter of 2013, third party entities in Colorado owned more than eighty-nine percent of new solar energy residential installations, compared to just sixty percent in Massachusetts.[44]

These arrangements are uniquely beneficial because they allow the consumer to take advantage of commercial federal tax rebates for *commercial* owners, which are generally greater than *residential* owners,

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[39] Stephanie I. Cohen, *Banks, Manufacturers Offer New Ways to Finance Solar*, MARKETWATCH (Feb. 8, 2007, 7:56 PM), http://www.marketwatch.com/story/banks-manufacturers-offer-financing-for-residential-solar.

[40] *See* Wiener & Alexander, *supra* note 37, at 563.

[41] *See id.*

[42] *See* Michael Myers, *Dewsnup Strikes Again: Lien-Stripping of Junior Mortgages in Chapter 7 and Chapter 13*, 53 ARIZ. L. REV. 1333, 1333 (2011) ("[O]ne of the issues that may encourage debtors to opt for chapter 13 bankruptcy: lien-stripping of wholly valueless junior home mortgages.").

[43] BARBOSE ET AL., *supra* note 25, at 26.

[44] SOLAR ENERGY INDUSTRIES ASSOCIATION, *supra* note 15, at 10.

thereby making the system less expensive.[45] Homeowners take advantage of net metering policies and are granted credit for the energy they create; "[i]n an ideal situation, this combination of a monthly lease payment and a lower monthly utility bill will be less than the utility bills the homeowner had been paying prior to installing the system."[46] That truly is a win-win situation for the consumer, for the lending company, and, more importantly, for the environment.

SolarCity is one such financing institution, which has expanded from California, Oregon, and Arizona in 2009,[47] to ten other states and the District of Columbia today.[48] The company began operations in the western part of the country, where electricity rates and robust financial incentives, coupled with optimal solar conditions, maximized consumer savings.[49] The beneficial geography meant that, "[f]or example, a 3.2 kW PV system in northern California may cost the homeowner $83/month and may reduce his utility bill by $125/month, for a net savings of $42/month."[50] The company provides homeowners with a range of options at the end of the lease period. They can buy the system for the fair market price, renew the lease arrangement, or remove the system for no additional cost to the customer.[51]

Third-party financing, however, does present some unique legislative and regulatory issues. The proliferation of home-based solar energy production is challenging the public utility framework that had been established in many states to regulate energy production. Primarily, the third-party financing model conflicts with the current framework because "the regulations do not account for a finance model in which a non-utility entity owns power generation equipment and sells the power generated by this system to a customer."[52] In order to accommodate the proliferation of residential PV energy production, states need to figure out how low generation solar systems fit into their broader public utility regulatory schemes.

In states that grant monopoly rights for utility companies to provide electricity, residential-based solar energy production may conflict with the regulatory monopoly grant. This can be approached through legislation, as in California, or through regulation, as in Colorado. California amended its Public Utilities Code to exempt "a corporation or person employing

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[45] *See* COUGHLIN & CORY, *supra* note 38, at 28.
[46] *Id.*
[47] *Id.* at 28-29.
[48] SOLARCITY, http://solarcity.com (last visited Nov. 27, 2013).
[49] *See* COUGHLIN & CORY, *supra* note 38, at 29.
[50] *Id.*
[51] *Id.*
[52] KATHARINE KOLLINS ET AL., NAT'L RENEWABLE ENERGY LAB., SOLAR PV PROJECT FINANCING: REGULATORY AND LEGISLATIVE CHALLENGES FOR THIRD-PARTY PPA SYSTEM OWNERS 1 (2010), *available at* http://www.nrel.gov/docs/fy10osti/46723.pdf.

cogeneration technology or producing power from other than a conventional power source for the generation of electricity."[53] That exemption allows third parties to sell directly to individual homeowners, multi-family housing complexes (e.g., condominiums), multi-tenant commercial buildings (e.g., apartments), and even industrial buildings.[54] In Colorado, the Colorado Public Utilities Commission issued a decision that defined energy production systems producing less than ten kilowatts of energy as not being utilities; and thus, exempted small PV energy generating systems from its regulatory regime.[55]

As a model for other states, the California public utilities exemption opens the door for much larger PV projects by not limiting the size of non-regulated systems, which could generate substantial solar energy production. By partnering with organizations that have built large physical footprints, solar financing institutions will be able to install major PV generating facilities on buildings such as condominiums and commercial warehouses. Government entities would also be able to participate in the program. For example, the Louisville Metro Government recently initiated a public-private partnership in which a private company would finance substantial energy efficiency upgrades, and in return, Louisville Metro would repay the capital investment through reduced energy costs.[56] A financing institution could similarly partner with government entities to provide the upfront capital in order to install large-scale PV systems.

As it stands, third-party PV installation will likely be the predominate mechanism that homeowners use to finance their solar projects because it is mutually beneficial for the homeowners and the third parties. Homeowners often place unusually high discount rates on renewable energy investments, which leads to underinvestment.[57] That means that the benefits of the investment would need to be substantially higher for the net present value to be positive. In other words, through their consumption decisions, homeowners do not believe that PV energy systems are worth their money, a decidedly shortsighted proposition. Third-party financing mechanisms, however, relieve the burden and the risk of personally financing an expensive investment that will, in the long run, provide a sizeable financial return.[58] Moreover, it will lower costs through economies

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[53] CAL. PUB. UTIL. CODE § 218 (West 2009).

[54] *See* KOLLINS ET AL., *supra* note 52, at 8.

[55] *See id.*

[56] Erica Peterson, *Louisville Metro Announces $27 Million Deal for Energy Efficient Upgrades*, WFPL (Sept. 24, 2013, 2:38 PM), http://wfpl.org/post/louisville-metro-announces-27-million-deal-energy-efficient-upgrades.

[57] *See* Neil Peretz, *Growing the Energy Efficiency Market Though Third-Party Financing*, 30 ENERGY L.J. 377, 381 (2009).

[58] *See generally Solar Return of Investment Is Best In*, COST OF SOLAR, http://costofsolar.com/solar-roi/ (last visited Mar. 30, 2014).

of scale as companies that specialize in solar financing begin building marketing campaigns and networks of solar contractors to be able to accommodate PV projects for numerous consumers at the same time. Additionally, this third-party financing mechanism can further reduce the installed price by taking advantage of the more generous commercial financial incentives for PV projects.

III. ANALYSIS OF CURRENT REGULATORY ENVIRONMENT FOR SOLAR ENERGY

A. Financial Incentives and Metering Issues

The renewable energy industry is subject to a multi-level regulatory regime. Along with the federal government, each state has its own renewable energy incentive program.[59] At the federal level, various pieces of legislation are supporting the solar industry. The Emergency Economic Stabilization Act of 2008 and the American Recovery and Reinvestment Act of 2009, for example, accomplished a number of goals.[60] First they expanded the federal investment tax credits ("ITCs"), including allowing utility companies to claim ITCs.[61] Second they removed the residential ITC cap and increased the manufacturing ITC for solar installations to thirty percent.[62] Finally, they began allowing corporations to use grants instead of tax credits to fund PV investments.[63]

One issue that any residential solar energy policy must resolve is how to calculate the amount of energy one's system produces versus how much energy one consumes. Because the sun is an intermittent source of energy—and thus unable to provide continuous, reliable electricity when there is no sunlight—all PV systems will have to work in conjunction with a fossil or nuclear based electricity backup, at least for the foreseeable future.[64] In order for utility companies to compensate PV system owners for the energy they produce, most states use one of two predominant methods: net energy metering ("NEM") or feed-in tariffs ("FIT").[65]

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[59] *See generally* DSIRE, http://www.dsireusa.org/ (last visited Mar. 30, 2014).

[60] UNITED STATES DEPARTMENT OF ENERGY, *supra* note 21, at 81-87.

[61] *Id.*

[62] *Id.*

[63] *Id.*

[64] Ralph Vartabedian, *Rise in Renewable Energy Will Require More Use of Fossil Fuels*, L.A. TIMES (Dec. 9, 2012), http://articles.latimes.com/2012/dec/09/local/la-me-unreliable-power-20121210.

[65] *See Feed-in Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies*, U.S. ENERGY INFO. ADMIN. (May 30, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=11471; *see also Policies for Compensating Behind-the-Meter Generation Vary by State*, U.S. ENERGY INFO. ADMIN. (May 9, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=6190.

In the United States, the most widely used policy among those options is net metering.[66] In this system, PV system owners pay for the amount of energy they consume after being credited with the amount of energy they produce.[67] So, for example, if a homeowner consumes the national average of 900 kilowatt-hours ("kWh") of energy a month,[68] and his PV system produces, as a monthly aggregate, 300 kWh, he will only pay for 600 kWh of energy. Although the Energy Policy Act of 2005 required all public utilities across the nation to make net metering available to customers who request it, a number of states, like Alabama and Mississippi, are still not in compliance with this law.[69]

Whereas a NEM regime subtracts from the customer's bill the amount of energy he produces, feed-in tariffs differ by actually paying customers directly for the energy they produce.[70] So rather than give PV homeowners credit for the energy they produce, "[a] FIT program typically guarantees that customers who own a FIT-eligible renewable electricity generation facility, such as a roof-top solar photovoltaic system, will receive a set price from their utility for all of the electricity they generate and provide to the grid."[71] The premium established in each FIT system directly corresponds to the policy goal sought. Primarily, FIT regimes are intended to increase renewable energy investments by purchasing renewable energy at rates higher than electric retail costs.[72] The more ambitious the policy objective, the greater the premium will need to be.[73]

The United States has had a different experience with feed-in tariff policies compared to other countries.[74] In Germany, the government developed a FIT model in which government mandates gave solar energy

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[66] *See Net Metering,* DSIRE (July 2013), http://www.dsireusa.org/documents/summarymaps/net_metering_map.pdf.

[67] *See Net Metering*, SOLAR ENERGY INDUSTRIES ASS'N, http://www.seia.org/policy/distributed-solar/net-metering (last visited Feb. 26, 2014).

[68] *How Much Electricity Does An American Home Use?*, U.S. ENERGY INFO. ADMIN. http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3 (last updated Jan. 10, 2014),

[69] Steven Ferrey, *Virtual "Nets" and Law: Power Navigates the Supremacy Clause*, 24 GEO. INT'L ENVTL. L. REV. 267, 270 (2012); *see also Net Metering for Renewable Energy*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/index.cfm?SearchType=Net&&EE=0&RE=1 (last visited May 1, 2014).

[70] *See Feed-in Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies*, U.S. ENERGY INFO. ADMIN. (May 30, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=11471.

[71] *Id.*

[72] *See id.*

[73] *See id.*

[74] *See* Ben Block, *North American Feed-in Tariff Policies Take Off*, WORLDWATCH INST., http://www.worldwatch.org/node/6221 (last updated Mar. 2, 2014) ("The FIT is credited for the rapid deployment of wind and solar power among world renewable energy leaders Denmark, Germany, and Spain this past decade. Similar policies have since been adopted by many other countries, leading the FIT to become the most prevalent tool for promoting renewables. . . . In North America, its adoption has been relatively slow.").

producers long-term signals by guaranteeing premiums "typically well above the retail price of electricity," which encouraged solar energy investment.[75] Electric utilities in the United States are also beginning to experiment with the FIT model. For example, Dominion Virginia Power provides $0.15 per kilowatt-hour of renewable energy produced, which is about fifty percent higher than the average retail price of residential energy in that region.[76]

Arizona's recent fight to repeal its NEM regime underscores the difficult choices facing policymakers seeking to balance the promotion of solar energy with the need to maintain the integrity of our existing energy system. Public utilities claim that incentives to increase PV energy production, such as NEM or FIT models, ultimately place greater burdens on non-PV customers.[77] Because utilities recoup their capital expenses through the rates charged to customers, they assert that a greater share of infrastructure investment and maintenance costs (*i.e.*, for the grid) will be borne by customers unable to produce their own electricity.[78] The Arizona Public Service compromised and allowed utilities to place a surcharge on PV systems of a $0.70 per kWh rated capacity (which is roughly $5.00 per month for the average system).[79] As PV installations continue their upward momentum, other state utilities, and possibly interests representing the fossil fuels industries, are likely to lodge similar challenges. The issue of grid maintenance is also playing out in other countries. At a recent energy event in Qatar, Ignacio Galán, chairman and chief executive of Spain's Iberdrola, a large multinational energy company, similarly cautioned that distributed energy producers (such as residential solar systems) must also foot some of the bill required to maintain the grid.[80]

B. Permitting Requirements, and Other Legal Issues

Solar energy systems implicate energy production, and they also amount to relatively large infrastructure investments. As such, installation requires obtaining proper permits and satisfying appropriate regulations,

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[75] *Feed-in Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies*, *supra* note 70.

[76] *Id.*

[77] Diane Cardwell, *Compromise in Arizona Defers a Solar Power Fight*, N.Y. TIMES, Nov. 15, 2013, http://www.nytimes.com/2013/11/16/business/energy-environment/compromise-in-arizona-defers-a-solar-power-fight.html?_r=1&.

[78] *See id.*

[79] *Id.*

[80] *See* Pilita Clark, *Iberdrola Chief Sees Coal Losing Out to Gas and Renewable Energy*, FIN. TIMES (Oct. 9, 2013), http://www.ft.com/intl/cms/s/0/d76d6f62-3100-11e3-b991-00144feab7de.html#axzz2urMG4aiJ.

which adds additional costs to the PV system.[81] The disparate, and potentially conflicting, local regulatory frameworks thus increase the cost of residential solar installations. According to a study by Sunrun, a solar energy leasing company operating in eleven states,[82] "[l]ocal permitting and inspection add $0.50 per watt, or $2,516 per residential install."[83] Moreover, those added costs amount "to a $1 billion tax on solar over the next five years, and make it hard for installers to achieve any economies of scale."[84] Clearly, then, streamlining regulations could also greatly facilitate solar energy installation.

There are three general methods of solar energy regulation that range from strong state government control to a totally local regulatory approach. For example, the state government in Vermont exercises near complete control over permitting, while other states, such as Oregon, California, and Wisconsin, provide broad oversight, but delegate processing to local authorities.[85] That oversight can come in the form of stringent building codes that govern solar installation.[86] Eight of the top ten solar states have mandatory technical codes based on national or international standards, but often give local authorities leeway to modify those codes as they see fit.[87] Finally, Arizona and Colorado defer almost entirely to local regulatory agencies to craft their own building codes, making it difficult to ensure consistency for building developers and solar contractors.[88]

Reforming and streamlining the permitting process has been difficult to achieve given the enormous influence local authorities wield. Regardless of the merits, "[w]hen states attempt to influence the permitting process via legislation or other mandatory regulations, without local buy-in, they run the risk of encountering opposition during the legislative process and backlash after passage."[89] Therefore, experience has shown that even if state legislatures can pass laudable statewide mandates, it has still been

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[81] *See* ALAN GOODRICH ET AL., NAT'L RENEWABLE ENERGY LAB., RESIDENTIAL, COMMERCIAL, AND UTILITY-SCALE PHOTOVOLTAIC (PV) SYSTEM PRICES IN THE UNITED STATES: CURRENT DRIVERS AND COST-REDUCTION OPPORTUNITIES 5 (2012) ("In addition to module price, many factors contribute to the price of a PV system, including installation labor, power electronics, permitting and other regulatory costs.").

[82] SUNRUN.COM, http://www.sunrun.com/solar-by-state (last visited Mar. 2, 2014).

[83] SUNRUN, THE IMPACT OF LOCAL PERMITTING ON THE COST OF SOLAR POWER 1 (2011), *available at* http://www4.eere.energy.gov/solar/sunshot/resource_center/sites/default/files/59b89d0ed01.pdf.

[84] *Id.*

[85] SKY STANFIELD ET AL., INTERSTATE RENEWABLE ENERGY COUNCIL, INC., SHARING SUCCESSES: EMERGING APPROACHES TO EFFICIENT ROOFTOP SOLAR PERMITTING 7 (2012), *available at* http://www.irecusa.org/wp-content/uploads/Sharing-Success-final-version.pdf.

[86] *Id.*

[87] *Id.*

[88] *Id.* at 8.

[89] *Id.* at 10.

difficult to implement reforms as local authorities continue to find creative ways to undermine those efforts.[90]

Another issue affecting PV systems is access to sunlight, in other words, controlling and maintaining direct line of sight to the sun. Two property rights concepts are important in this context: solar *easement* and solar *rights*. The former "refers to the ability of one property to continue to receive sunlight across property lines without obstruction from another's property," while the latter "refers to the ability to install solar energy systems on residential and commercial property that is subject to private restrictions [*e.g.*, covenants or condominium bylaws]."[91]

The legal roots for controlling access to sunlight date back to the doctrine of "ancient lights" developed under English common law.[92] By imposing a negative easement, the doctrine sought to prevent a property owner from placing anything on his or her land that would obstruct light received by the dominant tenement.[93] Parliament eventually codified the common law doctrine into a statutory right in The Prescription Act of 1832, which required that the dominant property enjoy unobstructed light for a period of twenty years before the easement could attach.[94] The doctrine said that:

> [w]hen the access and use of light to and for any dwelling house, workshop, or other building shall have been actually enjoyed therewith for the full period of twenty years without interruption, the right thereto shall be deemed absolute and indefeasible, any local usage or custom to the contrary notwithstanding, unless it shall appear that the same was enjoyed by some consent or agreement expressly made or given for that purpose by deed or writing.[95]

The easement holder was, therefore, entitled to the amount of light necessary "to illuminate half of a room beyond the 'grumble line' – the point beyond which a normal person might complain about lack of light."[96] As has been the case with other sorts of easements, this negative right was justified because "if persons were so indifferent as to allow their neighbours [sic] to use lights for twenty years without objection, the continuance of the windows could hardly be prejudicial; and . . . it was inconsistent with

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[90] *Id.*

[91] COLLEEN MCCANN KETTLES, FLA. SOLAR ENERGY RESEARCH AND EDUC. FOUND., A COMPREHENSIVE REVIEW OF SOLAR ACCESS LAW IN THE UNITED STATES 1 (2008).

[92] *Id.*

[93] *Id.*

[94] *Id.*

[95] Prescription Act, 1832, 2 & 3 Will. 4, c. 71, § 3 (Eng.).

[96] Sara C. Bronin, *Solar Rights*, 89 B.U. L. REV. 1217, 1258 (2009).

justice to compel people to forego an employment which they had used without hindrance."[97] Thus, English common law granted substantial solar access rights to individuals, the significance of which would not be realized until much later when PV technology developed sufficiently to make use of those rights.

Solar rights in the United States, however, have failed to take root, either because they are nonexistent or they have proved impotent.[98] In the late nineteenth and early twentieth centuries, the United States was just beginning to sprout economically, and courts, as well as legislatures, were concerned that solar rights would impede growth and development.[99] In this context, though, courts have missed the mark. Although any legal regime regulating solar rights "might impede development, government-issued permits [rather than negative property easements] are more likely to impede development on a wide scale than, say, express agreements between [individual] neighbors."[100] While one can debate whether individual solar easements would stifle construction development, some commentators believe that the lack of clarity regarding solar rights has certainly dampened solar energy development.[101]

The leading case on the issue of solar rights is *Fontainebleau Hotel Corp. v. Forty-Five Twenty-Five Inc*.[102] Fontainebleau, the defendant-appellant, proposed to build a fourteen-story hotel on Miami Beach, directly adjacent to Eden Roc Hotel, the plaintiff-appellee, which brought suit seeking to enjoin construction.[103] The plaintiff claimed that, during the winter, the new building would block the sunlight extending over the cabana, the pool, and other sunbathing areas.[104] The trial court ruled for the plaintiff, but the appellate court reversed on appeal and expressly rejected the ancient lights doctrine.[105] The outcome of the case established a number of principles regarding solar rights that still apply: (1) property owners may reasonably use their property, short of injuring the legal rights of other

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[97] *Id.*

[98] *Id.* at 1219.

[99] *See id.* at 1241; *see also Ancient Lights*, N.Y. TIMES, July 7, 1878, at 6 ("[C]ourts have rendered decisions that the law of ancient lights is inappropriate and inapplicable in America . . . . Our sparsely-settled country, they say, has not required such a law; encouragement of building is more needed than restrictions upon it.").

[100] Bronin, *supra* note 96, at 1241.

[101] *See, e.g.*, Dale D. Goble, *Solar Rights: Guaranteeing a Place in the Sun*, 57 OR. L. REV. 94, 134 (1977) (writing that the lack of solar rights amounts to an "impediment to widespread conversion to solar energy"); *see also* Sophia Douglass Pfeiffer, *Ancient Lights: Legal Protection of Access to Solar Energy*, 68 A.B.A. J. 288, 291 (1982) ("[I]t would indeed be regrettable if the demonstrated need for utilization of solar energy − a technological reality today − were to be left unmet because of the modern legal system's inability to devise adequate measures to protect solar access.").

[102] *See* Fontainebleau Hotel Corp. v. Forty-Five Twenty-Five, Inc., 114 So. 2d 357 (Fla. Dist. Ct. App. 1959).

[103] *Id.* at 358.

[104] *Id.*

[105] *See id.* at 359-60.

owners; (2) property owners do not have a legal right to light from neighboring property; (3) and plaintiffs, therefore, do not have a cause of action to compel access to sunlight.[106]

Many states have, however, implemented policies to protect or enhance solar access. As it stands, thirty-four states and some municipalities have some form of solar access protection.[107] The most prevalent legal protection is a voluntary solar easement, which means that, although it does grant some legal rights to sunshine, a property owner cannot compel an unwilling neighbor to grant him access.[108] A different type of easement allows owners to register with the appropriate agency, which serves to place neighboring properties on notice of that owner's solar energy system, essentially a back-ended way of imposing a solar easement on adjoining properties.[109] Still, other states direct the local agencies to require solar access as a component of, for example, residential subdivisions, though that only implicates new construction.[110]

Other jurisdictions give homeowners statutory solar rights that ensure access to sunlight. Such state statutes protect against government and private actions that obstruct access to sunlight. A typical solar rights statute will include language such as, "[t]he adoption of an ordinance by a governing body which prohibits or has the effect of prohibiting the installation of solar collectors is expressly prohibited."[111] Additionally, to protect solar owners against private arrangements that inhibit access to sunlight, such statutes will include language such as "[a]ny covenant, restriction, or condition contained in any deed, contract, security agreement, or other instrument affecting the transfer or sale of or any interest in real property which effectively prohibits the installation or use of a solar energy device is void and unenforceable."[112]

The disparate nature of the various state solar access laws makes reform an effective means to increase PV installations by giving property owners and developers legal clarity. Homeowners associations and architectural review boards often lack awareness of existing solar rights laws leading to expensive lawsuits that hinder solar development. Because the regulations are so complex, homeowners and solar contractors likewise misunderstand the process. And as a result, solar projects are delayed, which in turn increases costs of their projects.[113]

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[106] *See* KETTLES, *supra* note 91, at 2.
[107] *Id.* at 6.
[108] *See id.* at 3.
[109] *See id.* at 6.
[110] *See id.* at 6-7.
[111] *Id.* at 6.
[112] *Id.* at 6-7.
[113] *Id.* at 7.

Certain states and municipalities, however, have implemented solar access regimes that support PV installations. The City of Gainesville, Florida allows for the removal of regulated trees that obstruct solar energy systems.[114] Hawaii has a comprehensive solar rights law that broadly protects property owners' access to sunlight and requires that "[e]very private entity [*e.g.*, condominium association] shall adopt rules . . . that provide for the placement of solar devices."[115] Massachusetts's law provides for solar easements and permits, along with "provisions for compensation of the owner of property benefiting from the easement in the event of impermissible obstruction of the easement."[116] New Jersey's law protects private solar energy projects from community association restrictions and authorizes the Commissioner of Community Affairs to enforce the statue, which, presumably, helps render litigious dispute resolution unnecessary.[117] The City of Ashland, Oregon provides homeowners with a Solar Access Permit, which is intended "to provide protection of a reasonable amount of sunlight from shade from structures and vegetation . . . to preserve the economic value of solar radiation falling on structures, investments in solar energy systems, and the options for future uses of solar energy."[118] Similarly, Wisconsin allows homeowners to apply for solar access permits and prohibits any political subdivision from restricting the installation of solar energy systems.[119] While those states and municipalities have implemented regulations that support and enhance solar rights, the PV industry needs more commitment from around the country.

IV. PROPOSED TAX ABATEMENT PHOTOVOLTAIC PROGRAM

A. Overview and History of Tax Abatement Programs In General

For decades, state and municipal governments have used tax policy as a means to spur economic development and promote social goods. Though there remains debate on whether targeted tax incentives inhibit sound tax policy,[120] "[f]or much of the past three decades, political leaders

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[114] GAINESVILLE, FLA., CODE OF ORDINANCES ch. 30, art. VIII, div. 2, sub div. 1, §§ 30-251, 30-254 (1992), *available at* http://library.municode.com/HTML/10819/level5/COORGAFL_CH30LADECO_ARTVIIIENMA_DIV2LATRMASTMAWAWACOPO_SDILATRMA.html#COORGAFL_CH30LADECO_ARTVIIIENMA_DIV2LATRMASTMAWAWACOPO_SDILATRMA.

[115] HAW. REV. STAT. § 196-7 (2013).

[116] MASS. GEN. LAWS ANN. ch. 187, § 1A (West 2013).

[117] *See* N.J. REV. STAT. §§ 45:22A-48.2 (West 2013).

[118] ASHLAND, OR., MUNICIPAL CODE § 18.70.010 (2014), *available at* http://www.ashland.or.us/CodePrint.asp?Branch=True&CodeID=3338.

[119] *See* WIS. STAT. §§ 66.0401, 03 (2013).

[120] *See, e.g.*, DAVID BRUNORI, STATE TAX POLICY: A POLITICAL PERSPECTIVE 25 (2005) [hereinafter BRUNORI, STATE TAX POLICY]; *see also* David Brunori, *Principles of Tax Policy and Targeted Tax Incentives*, 29 STATE & LOCAL GOV'T REVIEW 50, 50 (1997).

have viewed state tax policy as the key to encouraging economic development."[121] Politicians wield these pecuniary carrots in order "to lure corporations into a state or to convince corporations to stay . . . [and] to encourage in-state companies to expand through investment . . . [and] through additional hiring."[122] Needless to say, state tax policy involves high stakes negotiations with governments and sought-after corporations.

Under political pressure to increase economic development, targeted tax break policies increasingly pit states against each other.[123] This partly reflects an ingrained belief that individuals and businesses respond to government policy when deciding where to live, work, and relocate.[124] As a consequence, state governments want to use policy to drive economic development. Recently, Kentucky offered Toyota $146.5 million in state and local tax incentives to lure the company to invest $531.2 million in a new facility to begin production of the Lexus ES automobile.[125] The deal would result in 570 full-time employees—equating to roughly $257,000 in state tax incentives per job created.[126]

States may, and do, compete against each other because of the structure of our federal government gives states broad latitude to craft creative intrastate tax policy. Within few confines, "[t]he sovereignty of the states also allows them to set policies that will make them more attractive to business and industry than other states. This environment stimulates competition."[127] However, this sovereignty is bound by the Commerce Clause of the United States Constitution, which prevents interstate discrimination.[128] For example, a state may not levy higher sales taxes against goods produced in another state compared to similar goods produced in state.[129] However, states have nearly free reign to craft non-discriminatory tax incentive policies.[130]

Until 2004, no state tax incentive program had been successfully challenged until 2004. In *Cuno v. Daimler Chrysler*, a group of plaintiffs brought suit alleging "that the tax scheme discriminates against interstate commerce by granting preferential treatment to in-state investment and activity, in violation of the Commerce Clause."[131] In exchange for a

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[121] BRUNORI, STATE TAX POLICY, *supra* note 120, at 25.

[122] *Id.*

[123] *Id.* at 26.

[124] *Id.*

[125] *Toyota Offered $146.5 Million to Expand Kentucky Plant to Make Lexus ES*, AUTO. NEWS (Apr. 17, 2013), http://www.autonews.com/article/20130417/OEM01/304179733/toyota-offered-$146.5-million-to-expand-kentucky-plant-to-make-lexus#axzz2qI5ZKCyG.

[126] *Id.*

[127] BRUNORI, STATE TAX POLICY, *supra* note 120, at 27.

[128] *See id.*

[129] *See id.*; *see also* U.S. CONST. art. 1, § 8, cl. 3.

[130] BRUNORI, STATE TAX POLICY, *supra* note 120, at 27.

[131] Cuno v. DaimlerChrysler, Inc., 386 F.3d 738, 741 (6th Cir. 2004), *vacated in part sub nom.* DaimlerChrysler Corp. v. Cuno, 547 U.S. 332 (2006).

commitment to build a new plant near an existing facility (that Daimler Chrysler estimated would equal $1.2 billion in total investment), the City of Toledo offered a ten-year, 100% property tax exemption, along with a 13.5% investment tax credit to offset the state corporate franchise tax; the total incentive package equaled $280 million.[132] The Sixth Circuit held that the tax credits – but, importantly, not the property tax exemption – violated the Commerce Clause.[133] The Supreme Court reversed the ruling largely on standing grounds.[134]

In response to *Cuno*, a bipartisan group in the House of Representatives proposed a bill that sought to protect the tax incentive powers that states had come to enjoy.[135] Specifically, the Economic Development Act of 2005 would have authorized "any State to provide to any person for economic development purposes tax incentives that otherwise would be the cause or source of discrimination against interstate commerce under the Commerce Clause of the United States Constitution."[136] Former Senator George Voinovich, who, as governor, approved the Ohio tax incentive package, remarked that the bill would not "authorize those tax incentives that truly discriminate against interstate commerce."[137] Rather, the legislation sought to "strike[] the right balance between protecting States' tax rights and preserving long-established protections against truly discriminatory State tax practices."[138] The proposal ultimately died in subcommittee after the Supreme Court granted certiorari, but some believed Congress would have approved the bill anyway had the Court upheld the *Cuno* ruling.[139]

Tax incentives are not, however, used solely to lure businesses into a state. For a variety of reasons,[140] governments often use tax policy to promote the preservation of historic buildings. Austin, Texas, for example, has a program that permanently exempts historic building from most local

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[132] *See id.*

[133] *Id.*

[134] *See* DaimlerChrysler Corp. v. Cuno, 547 U.S. 332, 332 (2006) (holding that "[p]laintiffs have not established their standing to challenge the state franchise tax credit. Because they have no standing to challenge that credit, the lower courts erred by considering their claims on the merits.").

[135] *See* Economic Development Act of 2005, H.R. 2471, 109th Cong. (1st Sess. 2005).

[136] *Id.* § 2.

[137] 151 Cong. Rec. S5445 (daily ed. May 18, 2005) (statement of Sen. Voinovich).

[138] *Id.*

[139] Mohsin Reza, *DaimlerChrysler v. Cuno: An Escape From the Dormant Commerce Clause Quagmire*, 40 U. RICH. L. REV. 1229, 1255 (2006).

[140] *See, e.g.*, Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 107-08 (1978) ("Over the past 50 years, all 50 States and over 500 municipalities have enacted laws to encourage or require the preservation of buildings and areas with historic or aesthetic importance. These nationwide legislative efforts have been precipitated by two concerns. The first is recognition that, in recent years, large numbers of historic structures, landmarks, and areas have been destroyed without adequate consideration of either the values represented therein or the possibility of preserving the destroyed properties for use in economically productive ways. The second is a widely shared belief that structures with special historic, cultural, or architectural significance enhance the quality of life for all.").

property laws, equaling $4.2 million in reduced tax revenues.[141] Using property tax moratoriums to encourage historic building preservation is not without controversy. Indeed, such programs are "increasingly seen as a subsidy for wealthy homeowners provided at taxpayer expense."[142] In some cities, there is virtually no oversight on the historic preservation program. For example, San Diego has no inspection process to ensure homeowner compliance, and no spending cap on the program.[143] Opponents claim that the program is inequitable because the beneficiaries, who collect nearly $5,900 per recipient, predominately live in wealthy neighborhoods.[144] Proponents believe the property tax relief encourages purchasing historic buildings and that the money saved is ultimately reinvested in the community, a claim that is difficult to verify.[145]

Municipalities primarily use two types of incentive schemes: property tax abatements or freezes and income credits or reductions.[146] The difference between the two is that "[t]ax freezes exclude the value of rehabilitation work from tax assessments for a period of time, whereas tax abatements reduce a property's assessed value by a set percentage."[147] As it relates to income tax liability on the other hand, "[i]ncome tax credits refund a portion of rehabilitation expenditures to the taxpayer, while deductions reduce taxable income."[148] Although they are not direct spending outlays *per se*, historic preservation programs nonetheless reduce government revenues and are thus considered "tax expenditures," that is, allocations of government resources intended to achieve certain policy goals.[149] These tax expenditures tend to benefit wealthier citizens who can afford houses that are deemed historic, which are usually more expensive. Historic preservations programs, therefore, tend to benefit these wealthier citizens disproportionately.[150]

Proponents of historic preservation programs claim they create positive externalities.[151] For example, "[c]ommon justifications for historic preservation include instilling patriotism, promoting the economy through tourism, educating the public, or preserving a community's aesthetics. The various justifications can be generally categorized as economic, aesthetic,

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[141] *See* David J. Kohtz, *Improving Tax Incentives for Historic Preservation*, 90 TEX. L. REV. 1041, 1041 (2012).

[142] *Id.*

[143] *See* Craig Gustafson, *City Is Generous with Tax Breaks for Old Homes*, SAN DIEGO UNION-TRIB., Jan. 27, 2008, http://www.signonsandiego.com/uniontrib/20080127/news_1n27mills.html.

[144] *See id.*

[145] *See id.*

[146] See Kohtz, *supra* note 141.

[147] *Id.*

[148] *Id.*

[149] *See id.* at 1044-45.

[150] *See id.* at 1045.

[151] *Id.*

or cultural/educational."[152] Additionally, conservation programs have the potential to prevent negative forms of growth (*i.e.*, sprawl) and can support the economic health of neighborhoods.[153] Cities such as Cleveland, Ohio, have used property tax abatement schemes as the backbone of their economic development strategies.[154] As part of their historic preservation programs, some cities in California allow homeowners to reduce their property tax liability if they commit to maintenance and preservation, including seismic retrofitting for homes in earthquake zones.[155]

B. Proposal: Property Tax Abatement For Onsite Solar Energy Production

While there are a plethora of financial incentives to support renewable energy production,[156] this Note proposes a novel approach: property tax reduction in exchange for residential PV energy production. The exact amounts of tax reduction and solar energy required to receive this proposed benefit are, however, beyond the scope of this Note. In general, this Note merely proffers this approach as a new way to stimulate residential solar energy production as a means to reduce the dependence on fossil fuels. Until recently, onsite solar energy production was relatively capital intensive. The recent dramatic reduction in PV system costs has significantly contributed to the increase of solar energy system installation in the United States. But more is possible and, quite frankly, needed, given the contribution to climate change caused in part by carbon emissions.

Such high capital needs and entrenched consumer behavior leads to what is referred to as "the energy conservation paradox."[157] Ultimately, this principle describes the dynamic whereby "consumers apply implicit discount rates of *twenty-five* to *seventy-five* percent to a potential energy efficiency investment, rather than the standard *five* to *eight* percent applied to other types of investments."[158] Discount rates influence consumer

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[152] *Id.*

[153] *See* Josh Eagle, *Notional Generosity: Explaining Charitable Donors' High Willingness to Part with Conservation Easements*, 35 HARV. ENVTL. L. REV. 47, 62-63 (2011).

[154] *See* Mark S. Rosentraub et al., *Residential Property Tax Abatements and Rebuilding in Cleveland, Ohio*, 42 STATE & LOCAL GOV'T REVIEW 104, 104 (2010).

[155] *See* Ronald B. Reiss, *California's S.B. 547: Local Government Balancing of Public Safety and Historic Preservation*, 26 URB. LAW. 347, 360 (1994).

[156] *See generally Financial Incentives for Renewable Energy,* DSIRE, http://www.dsireusa.org/summarytables/finre.cfm (last visited Jan. 15, 2014).

[157] Peretz, *supra* note 57, at 385 (quoting LEE SCHIPPER, WORLD BANK, ENERGY EFFICIENCY: LESSONS FROM THE PAST AND STRATEGIES FOR THE FUTURE 406-07 (1993)).

[158] *Id.* (citing MERRIAN FULLER, ENABLING INVESTMENTS IN ENERGY EFFICIENCY: A STUDY OF PROGRAMS THAT ELIMINATE FIRST COST BARRIERS FOR THE RESIDENTIAL SECTOR 9 (2008) (explaining that consumer's implicit discount rates affect their decision on whether or not to invest their money; abnormally high rates, such as between 25-75%, result in under-investment in efficient products).

behavior when calculating the net present value of potential investments.[159] They are a reflection of a number of market factors, such as expected cash flow and benefits.[160] By applying such high discount rates, consumers implicitly believe that, in order to justify purchasing energy efficient products, the benefits of those products should be greater than current technology is able to produce. That leads consumers to keep their money in their bank accounts rather than invested in, for example, solar energy systems. The high capital costs, therefore, might be a primary obstacle to further residential PV installations because consumers apply abnormally high discount rates to their energy efficiency investment decisions.[161]

The model this Note suggests eliminates this obstacle by allowing third party entities to supply the upfront capital. As previously discussed, third-party financing allows a homeowner to contract with a financial institution to install a PV system on the homeowner's property, at no cost to the homeowner, and pay for the lease through savings from reduced energy bills. Often, the arrangement will provide for an option to re-lease, purchase, or remove the system after a specified amount of time. By leasing rather than owning the system, consumers might not be as influenced by high discount rates, especially if they receive some additional benefit, such as reduced property tax liability.

To incentivize this positive externality further, this Note proposes a program whereby municipalities would provide property tax relief in exchange for producing a certain amount of onsite solar energy. Assuming, *arguendo*, that a particular property could generate forty percent of the net energy it consumes through its PV system, this program would reduce that property's tax liability by forty percent, or by some other appropriate percentage. To encourage increased solar energy, this program would tier tax relief to the net of monthly energy produced versus consumed. The tiers could be, for example, fifteen percent property tax reduction (for twenty percent net solar energy production), twenty-five-percent property tax reduction (for 30% net solar energy production), and forty percent property tax reduction (for forty percent net solar energy production). As previously stated, those amounts could vary depending on the results of additional research that might demonstrate more realistic and appropriate amounts. This tiered structure would also encourage energy conservation behavior because the tax relief is a progressively proportional ratio of energy produced to energy consumed. And, because roof space means that PV

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[159] *See generally* U.S. ENVTL PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 6-2 (2010), *available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-06.pdf/$file/EE-0568-06.pdf.

[160] *See Discount Rate*, INVESTOPEDIA, http://www.investopedia.com/terms/d/discountrate.asp (last visited Feb. 26, 2014).

[161] Peretz, *supra* note 57.

system capacity is likely to be finite, individuals will have to reduce their energy consumption in order to achieve greater tax savings.

Aside from eliminating the need for upfront capital, this proposed model would also directly benefit homeowners by increasing their property values. A hedonic regression (on file with the author) shows how property tax rates impact housing value, while controlling for several other important determinants of housing values, such as population density, commute time, and per capita income, among others.[162] The model has an adjusted R Square of 0.799 and a P-value of less than 0.00, which gives this model highly predictive value.[163] (It is important to note, however, that adjusting for abnormally high real estate values in, for example, California, might slightly reduce the potentially increased property values that this model provides, though not enough to dismiss its conclusion.) The results demonstrate that decreasing property tax rate by 0.1% (for example, from 1.4% to 1.3% of the assessed property value) increases property values by an average of $2,349. Assuming the property tax reductions this Note proposes, homeowners would see increased property values of $3,523, $5,872, and $9,395, respectively.

Many states do provide certain limited property tax exemptions.[164] For example, Alaska allows municipalities to exempt the value of renewable energy systems from property taxation.[165] So if a homeowner invests $30,000 for a PV system, for the purposes of taxation, her property will not increase by that amount. But not every state reassesses properties annually.[166] So this incentive program might not benefit a potential homeowner immediately after installing his system if the state would not reassess the value of his home for another few years.

Other states encourage efficient new construction. Maryland, for example, has an innovative policy that encourages property developers to

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[162] *See generally Property Taxes on Owner-Occupied Housing, by County, Ranked by Taxes as a Percentage of Home Value, 2007-2009*, TAX FOUND. (Mar. 2, 2011), http://taxfoundation.org/article/property-taxes-owner-occupied-housing-county-ranked-taxes-percentage-home-value-2007-2009-three-year (compiling figures for annual property tax as a percentage of home value and median household income from this source); *American FactFinder*, U.S. CENSUS BUREAU, http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml (last visited Mar. 30. 2014) (measuring various metrics gathered in the 2010 U.S. Census); *Local Area Unemployment Statistics*, BUREAU LAB. STAT., data.bls.gov/timeseries/LNS14000000 (last visited May 23, 2014) (calculating the average unemployment rate for February 2012); DAVID MCGRANAHAN, U.S. DEP'T AGRIC. ECON. RESEARCH SERV. NATURAL AMENITIES DRIVE RURAL POPULATION CHANGE (1999), *available at* http://www.ers.usda.gov/publications/aer-agricultural-economic-report/aer781.aspx#.Us1kSrT7TtU (explaining the natural amenities index).

[163] It is important to note, however, that adjusting for abnormally high real estate values in, for example, California, might slightly reduce the potentially increased property values that this model provides, though not enough to dismiss its conclusion.

[164] *See generally Financial Incentives for Renewable Energy*, *supra* note 156.

[165] *See* ALASKA STAT. § 29.45.050 (2013).

[166] *A Homeowner's Guide to Property Taxes and Assessments*, MD. DEP'T ASSESSMENTS & TAX'N, http://www.dat.state.md.us/sdatweb/hog.html (last updated July, 27, 2009).

build for Leadership in Energy and Environmental Design ("LEED") certification. In an effort to verify high performing buildings, the U.S. Green Building Council evaluates properties for LEED certification on five metrics of sustainability and efficiency: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality.[167] Maryland's program provides tiered tax relief – from ten percent to seventy-five percent of property tax liability for five years – for LEED certified homes.[168] The shortcoming, of course, is that that program benefits few property owners. Most buildings are not LEED certified, and the vast majority of homeowners likely do not have the financial resources or desire to retrofit their property to become LEED certified, which is the only way to take advantage of Maryland's tax relief program.

This Note's proposal could prove more successful than other property tax incentive programs in a number of ways. First, it provides relief on taxes paid for the existing home rather than prevent additional taxes on the solar energy system investment. In that way, it would function similarly to historic preservation programs that exist in many jurisdictions around the country. Some historic preservation programs, however, have come under intense criticism as a boon for the wealthy that have the resources and the knowledge to take advantage of those tax benefits.[169] In contrast, this proposed program would be available to any property owner with sufficient roof space and energy conservation behaviors to produce between twenty to forty percent of his energy consumption. This would provide direct, tangible benefits in the form of reduced annual property tax liability and increased property values as well. Moreover, by allowing third party solar financing through purchase power agreements, something not available everywhere,[170] states would also remove the need for large capital investment and the high discount rates that consumers apply to energy efficient products, both of which are large barriers to increased installations.

An interesting initiative called Property Assessed Clean Energy ("PACE") has recently gained traction across the country.[171] Similar to this Note's proposal, PACE removes the need for upfront capital by authorizing local government agencies to provide loans for PV installations to interested homeowners. The loan is paid back over time through a special

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[167] *See FAQ: LEED Green Building Certification System*, U.S. GREEN BUILDING COUNCIL, http://www.usgbc.org/sites/default/files/Docs3330.pdf (last visited May 23, 2014).

[168] *See* HOWARD CNTY, MD., HOWARD CNTY CODE § 20.129B (2007), *available at* http://co.ho.md.us/WorkArea/DownloadAsset.aspx?id=1565.

[169] *See, e.g.*, Gustafson *supra* note 143.

[170] *See 3rd-Party Solar PV Power Purchase Agreements*, DSIRE (2013), http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf; *see also* KY. REV. STAT. ANN. § 278.010(3) (West 2011) (seeming to exclude from the definition of "utility" any consideration of third-party ownership of residential PV systems).

[171] *See PACE Financing*, DSIRE, http://www.dsireusa.org/solar/solarpolicyguide/?id=26 (last visited Mar. 30, 2014).

tax assessment that attaches to the property, rather than the individual homeowner.[172] As of June 2013, thirty states and the District of Columbia have enacted PACE-enabling legislation.[173] But this program still ignores the highly unusual discount rates that influence individual homeowner consumer choices. The upfront capital that the PACE program provides, however, is effectively the same as a home equity loan of the type previously discussed in this Note. Therefore, this approach provides no new innovative solution to residential PV installation. While removing the need for upfront capital is important, the PACE program still assumes that consumers will own the PV system, and thus will apply the abnormally high discount rates to their consumer choices, as discussed above. Moreover, by encumbering the property, rather than the homeowner, with a higher property tax rate, PACE inadvertently reduces the property value, as this Note's regression demonstrates. Those two factors – presumed consumer ownership and increased property tax to repay the government loan – will likely limit the PACE initiative's effectiveness.

In contrast to PACE, this Note's proposal would leverage the benefits of third party ownership and the economic incentives of reduced property taxes to encourage PV installations. Solar financing institutions that rely on power purchase agreements (*i.e.*, where a homeowner pays a third party to build a PV system that supplies energy to the grid) are able to benefit from economies of scale and the generous commercial renewable energy financial incentives,[174] resulting in reduced costs of installation. Moreover, unlike consumers, those financial entities are unlikely to apply unrealistic discount rates, which, when coupled with the homeowner benefits of reduced property taxes, has the potential of accelerating residential solar energy installations. The homeowner would just need to schedule an assessment with a solar company operating in his region to see if his roof could accommodate a system sufficient to qualify for property tax relief.

This proposed program, however, will likely need federal financial support if it is to take root on any appreciable scale. Municipalities rely heavily on property taxes to fund their operations.[175] Revenue from property taxes also supports local school districts, which accounts for almost a third of total education funding.[176] The PACE program could be

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[172] *See id.*

[173] PACE NOW, 2013 ANNUAL REPORT 2 (2013), *available at* http://pacenow.org/wp-content/uploads/2013/06/Annual-report-6.18.13.pdf.

[174] *See* COUGHLIN & CORY, *supra* note 38, at 28.

[175] DAVID BRUNORI, NAT'L EDUC. ASS'N, TAX REVENUE OPTIONS FOR THE STATES 2 (2011), *available at* http://www.nea.org/assets/docs/taxrevenueoptionsforthestates11.pdf.

[176] *See* THE PEW CHARITABLE TRUSTS, THE LOCAL SQUEEZE: FALLING REVENUES AND GROWING DEMAND FOR SERVICES CHALLENGE CITIES, COUNTIES, AND SCHOOL DISTRICTS 8 (2012), *available at*

seen as an investment for local governments. While they would have a short-term liquidity issue to deal with as their resources are invested into PV systems, which might temporarily complicate government expenditures, they would likely make a return on their investment in the long run. This Note's proposal, however, would result in further reductions of local government revenues through lower property taxes. Additionally, while cleaner air – and the related health benefits it would produce – is a laudable goal in and of itself, this Note also acknowledges the financial difficulties that many municipalities are facing.[177] Therefore, for this proposed program to pervade the country, it would likely need the support of the federal government. Fortunately there is an existing model from which to build.

The Energy Efficiency and Conservation Block Grant ("EECBG") Program was first enacted as part of the American Recovery and Reinvestment Act ("Recovery Act") of 2009.[178] As a federal block grant, "the Program empowers local communities to make strategic investments to meet the nation's long-term goals for energy independence and leadership on climate change."[179] Among other priorities, funds are eligible for local governments that provide financial incentives that promote energy efficiency.[180] Should the federal government agree with this Note's proposal, it could use the EECBG precedent to allocate money specifically for this property tax moratorium program. That would offset the costs incurred by local governments implementing this scheme, which would remove financial constraints (and certain political opposition) for municipalities interested in adopting this program.

By placing both a floor and a cap on property tax relief, this proposed program would accomplish two additional goals: promoting substantial increases of renewable energy production and ensuring an equitable allocation of resources. The "Cash For Clunkers" program – which similarly paid consumers to invest in more energy efficient vehicles – was criticized for having too lax mile-per-gallon ("MPG") fuel requirements.[181] Because it only demanded an increase in four miles-per-gallon, "[t]he 2011 Resources for the Future study found that Cash for Clunkers increased average fuel economy in the United States by just 0.65 miles per gallon. But, similarly, that study found that there were far cheaper

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http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/American_Cities/Pew_Cities_Local_Squeeze.pdf.

[177] *See id.*

[178] *See Energy Efficiency and Conservation Block Grant Program*, U.S. DEP'T ENERGY (Sept. 29, 2010), http://www1.eere.energy.gov/wip/eecbg.html.

[179] *Id.*

[180] *See id.*

[181] *See* Janet Hook, *Critics Say 'Cash for Clunkers' Bill is a Lemon*, L.A. TIMES (June 13, 2009), http://articles.latimes.com/2009/jun/13/nation/na-clunkers13; *see also* Sen. Dianne Feinstein & Sen. Susan Collins, *Handout for Hummers*, WALL ST. J. (June 11, 2009, 12:01 AM), http://online.wsj.com/news/articles/SB124467696781404127.

ways to achieve similar savings."[182] This Note's proposal, by contrast, would only benefit homeowners once they meet a threshold of producing twenty percent of their total energy consumption, though additional research is required to determine if that threshold should be increased or decreased. By capping the program at forty percent, this Note recognizes that certain areas of the country provide better conditions to produce solar energy.[183] In other words, it would be inequitable to give a homeowner in Arizona near complete property tax relief because her home sits in the Sun Belt whereas a similarly situated homeowner in Maine is struggling to meet the twenty percent threshold to receive any tax relief.

C. Conclusion: Economic Incentives To Increase Residential Solar Energy Production

The world is facing a climate change crisis[184] driven, in part, by an underestimated sensitivity of our atmosphere to carbon emissions.[185] While the costs of renewable energy have declined markedly over the last decade,[186] our energy mix will likely require some form of fossil fuel energy production to accommodate base level electricity requirements.[187] But public policy should continue to support reductions of renewable energy costs and should facilitate its installation wherever economically feasible. Given entrenched consumer behavior, individual homeowners under-invest in energy efficient products that would reduce their energy consumption or increase their renewable energy production.[188] This Note's proposal – reduced-property-tax-for-solar-energy-production – would help overcome market distortions and facilitate increased residential solar energy

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[182] Brad Plumer, *Almost Anything Would Have Been Better Stimulus Than 'Cash for Clunkers'*, WASH. POST BLOG (Oct. 31, 2013, 11:00 AM), http://www.washingtonpost.com/blogs/wonkblog/wp/2013/10/31/almost-anything-would-have-been-better-stimulus-than-cash-for-clunkers/ ("There are a couple reasons the savings might have been so small. For one thing, the fuel-economy requirements were relatively lax: A person could, in theory, trade in a Hummer that got 14 mpg and get a $3,500 voucher for a new 18-mpg SUV. What's more, the gain in efficiency would be partially offset by the energy costs involved in manufacturing the new car.").

[183] *See generally Solar Maps*, NREL, http://www.nrel.gov/gis/solar.html (last updated Sept. 3, 2010).

[184] *See* Sarah Griffiths, *Global Warming is Happening is '10 Times Faster Than At Any Time in the Earth's History', Climate Experts Claim*, DAILY MAIL (Aug. 2, 2013), http://www.dailymail.co.uk/sciencetech/article-2383472/Global-warming-happening-10-times-faster-time-Earths-history-climate-experts-claim.html.

[185] *See* Lauren Morello, *Climate Change Faster Than Predicte*d, SCI. AM. (Nov. 9, 2012), *available at* http://www.scientificamerican.com/article/climate-change-faster-than-predicted/.

[186] *U.S. Solar Market Grows 76% in 2012; Now an Increasingly-Competitive Energy Source for Millions of Americans Today*, *supra* note 14.

[187] *See Energy Sources Have Changed Throughout the History of the United States*, U.S. ENERGY INFO. ADMIN. (July 3, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=11951.

[188] Peretz, *supra* note 57, at 385.

investments that would dramatically expand our nation's renewable energy portfolio.