Looking in the Side-View Mirror: Assessing the Current and Future State of the Solar Energy Industry as it Reaches the Mainstream

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I. INTRODUCTION

The popularity of solar energy has risen as its cost has rapidly decreased since 2005.[2] A Deutsche Bank projection claims that the cost of solar energy will reach grid parity[3] by 2016, and an Interna-

2. *See* Zachary Shahan, *13 Charts on Solar Panel Cost & Growth Trends*, CLEAN TECHNICA (Sept. 4, 2014), http://cleantechnica.com/2014/09/04/solar-panel-cost-trends-10-charts/ [http://perma.cc/7465-5H8Y] (detailing several charts depicting the growth of solar energy).

3. Grid parity occurs when an alternative source of energy, such as solar energy from photovoltaic panels, costs the same to the retail consumer as energy provided by the utility

tional Energy Agency report asserts that by 2050, solar energy could be a viable source of electricity worldwide.[4] On its face, these projections depict a bright future for solar energy and society. Yet solar energy's presence as an alternative form of energy might be more vulnerable than forecasts depict. With the upcoming expiration of valued government incentives and pushback from energy competitors, solar energy will not run untouched to the end-zone.[5] In other words, solar energy approaches a critical juncture where its deficiencies might come to the forefront. To view these vulnerabilities, a qualitative investigation of solar energy is required. Solar energy is growing at a remarkable rate,[6] yet there are factors intrinsic to the industry that have not yet influenced its growth into adolescence. One must analyze current solar energy issues along with the industry's unique characteristics to properly assess the situation from a complete perspective and to observe its possible exposure to an array of complications. Lawmakers, from all levels of government, must then acknowledge and act on these findings to prudently regulate the solar industry.

Part II of this Note will provide a brief overview of federal and state government policies on solar energy and their implications for the industry. Part III of this Note will summarize three imminent issues that could have significant influence on the continued rollout of solar energy. These issues are: 1) the utility industries' pushback against net metering, a law that incentivizes solar investment and that has been adopted by over forty states; 2) the expira-

company. *See What Is Grid Parity?*, RENEWABLE ENERGY ADVISORS, http://www.renewable-energy-advisors.com/learn-more-2/what-is-grid-parity/ [http://perma.cc/72YY-5RGA] (last visited Sept. 21, 2015); *see e.g.*, Giles Parkinson, *Solar Grid Parity in All 50 US States by 2016, Predicts Deutsche Bank*, CLEAN TECHNICA (Oct. 24, 2014), http://cleantechnica.com/2014/10/29/solar-grid-parity-us-states-2016-says-deutsche-bank/ [http://perma.cc/35EV-8GC3] (describing the new Deutsche Bank report).

4. *See, e.g.*, Sarah McFarlane, *Solar Energy Could Dominate Electricity by 2050: IEA*, REUTERS (Sept. 29, 2014), http://uk.reuters.com/article/2014/09/29/us-solar-iea-electricity-idUKKCN0HO11K20140929 [http://perma.cc/XSF3-2W3V]; Tom Randall, *While You Were Getting Worked up over Oil Prices, This Just Happened to Solar*, BLOOMBERG BUS. (Oct. 29, 2014), http://www.bloomberg.com/news/2014-10-29/while-you-were-getting-worked-up-over-oil-prices-this-just-happened-to-solar.html [http://perma.cc/4KQ3-XTAP] (discussing the current state of solar energy).

5. *See* Brad Plumer, *Rooftop Solar Is Growing So Fast That Electric Utilities Are Now Trying to Slow It Down*, VOX (Sept. 29, 2014), http://www.vox.com/2014/9/29/6849723/solar-power-net-metering-utilities-fight-states [http://perma.cc/JQV6-9UYN] (describing energy companies' push against solar power).

6. *See* Shahan, s*upra* note 2.

tion of the Investment Tax Credit ("ITC"); and 3) the resulting disincentive for commercial investment in solar energy. Following this analysis, Part IV of this Note will step back and pursue a high-level assessment of the features of solar energy and its history that have and continue to influence its current position. How the solar energy industry emerged and what aided its development directly relates to why Part III's issues are so pressing; thus, Part IV will trace solar's path to viability in the United States. This will include an inquiry into whether Congress and the states' rapid pursuit of sustainable renewable energy hindered the maturation of an industry not yet ripe for commercialization. Part IV will compare the environment in which the solar energy industry appeared with other periods of emerging technology within the United States and will clarify why both federal and state law have atypical significance with respect to the solar industry. Finally, Part V concludes that given the issues surrounding solar energy and the inextricable characteristics of the industry, the solar energy industry and its emergence must be evaluated and governed through a different, more cautionary lens that illuminates the industry's eccentricities.

II. SOLAR ENERGY: PAST AND PRESENT

Both federal and state renewable energy policies have supported the commercialization of solar energy.[7] In the late 1970s, the Carter administration successfully pushed the U.S. government to address renewable energy.[8] One example of this is the Public Utilities Regulatory Policies Act ("PURPA"), which was contained within the National Energy Act of 1978.[9] The core of PURPA was a deregulation of the utility system as a response to the energy crisis of the 1970s.[10] Energy had faced turmoil in the decade, and Congress

7. *See, e.g.*, I.R.C. § 25D (2012) (detailing the Solar Installation System Federal Tax Credit); *Net Metering 101*, INST. FOR ENERGY RES. (Jan. 14, 2014), http://instituteforenergyresearch.org/analysis/net-metering-101/ [http://perma.cc/B2FH-X5PM] (introducing and discussing net metering, a state policy that varies from state to state).

8. *See generally* Michael D. Hornstein & J.S. Gebhart Stoermer, *The Energy Policy Act of 2005: PURPA Reform, the Amendments and Their Implications*, 27 ENERGY L.J. 25, 25 (2006) (discussing the major energy bills from Carter's presidency).

9. Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117 (codified as amended in scattered sections of 16 U.S.C.).

10. *See* FERC v. Mississippi, 456 U.S. 742, 745 (1982) ("[PURPA] was part of a package of legislation, approved [on November 9, 1979], designed to combat the nationwide energy crisis."); *see also* Richard F. Hirsch, *Restructuring or Deregulation?*, SMITHSONIAN INSTITUTION, http://americanhistory.si.edu/powering/ (follow "Understanding Deregulation" hyperlink;

had to act.[11] While PURPA ordered deregulation of the utilities[12] to increase competition, it also created a "revolutionary" solar energy incentive.[13] PURPA first compelled utilities to sell electricity to "qualifying" producers;[14] simply put, the statute permitted such producers to connect to the U.S. power grid. Then second, PURPA required utilities to form contracts with those qualifying producers, wherein the utilities would purchase "electricity and capacity from [these producers] at a price equal to the utility's avoided cost."[15] In

then follow "Restructuring or Deregulation?" hyperlink) [http://perma.cc/43VE-AQ6Q] (last visited Sept. 24, 2015) (questioning whether PURPA was an effective deregulation but still noting that it began the process).

11. *See Energy Crisis (1970s)*, HISTORY (2010), http://www.history.com/topics/energy-crisis [http://perma.cc/STB4-JKQ5] (discussing the energy crisis of the 1970s). In 1973, the Organization of Arab Petroleum Exporting Countries placed an embargo on oil shipments to the United States, due to its support of Israel in the Yom Kippur War. The war ended within one month, yet the embargo remained. This caused a dramatic increase in the price of oil per barrel, and thus a corresponding increase in the cost of gasoline in the United States. Gas shortages followed, and the energy crisis was in full force. Even after the embargo was lifted, these high oil prices persisted, causing an increase in environmentalism, and a push for the U.S. government to take action. *See id.*

12. With respect to this Note, a utility is "[a] company that provides necessary services to the public, such as telephone lines and service, electricity, and water. *See Public Utility*, BLACK'S LAW DICTIONARY (10th ed. 2014). In this Note, the utilities I refer to are those that produce and provide electricity to American citizens.

13. *See* Paul Gipe, *Time to Break Free of Net-Metering; We Need a 'FIT' Policy for Renewable Energy to Soar*, NAT'L GEOGRAPHIC: GREAT ENERGY CHALLENGE (Dec. 26, 2013), http://energyblog.nationalgeographic.com/2013/12/26/break-free-net-metering/ [http://perma.cc/3BX4-TP3N] (asserting the idea of the feed-in tariff as PURPA on steroids and how countries adopted similar policies after the United States introduced it).

14. *See* Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, § 1210, 92 Stat. 3117, 3144 (requiring the FERC to prescribe rules that "require electric utilities to offer to sell electric energy to qualifying cogeneration facilities and qualifying small production facilities"); *see also What Is the Electric Power Grid and What Are Some Challenges It Faces?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/power_grid.cfm [http://perma.cc/3LZG-833V] (last updated Sept. 16, 2014) ("The U.S. power grid is the electrical system that connects electricity producers and consumers by transmission and distribution lines and related facilities."). To receive power from utilities, one must be connected to the U.S. power grid. *See id.*

15. SCOTT HEMPLING, CAROLYN ELEFANT, KARLYNN CORY & KEVIN PORTER, NAT'L RENEWABLE ENERGY LAB., RENEWABLE ENERGY PRICES IN STATE-LEVEL FEED-IN TARIFFS: FEDERAL LAW CONSTRAINTS AND POSSIBLE SOLUTIONS 5 (2010), http://www.nrel.gov/docs/fy10osti/47408.pdf [http://perma.cc/LY25-RQ3Z] (noting that avoided costs were the "shorthand of the statutory phrase 'incremental cost of alternative energy' seen in § 210(d) of PURPA"); *see* Public Utility Regulatory Policies Act § 210, 92 Stat. at 3144–45 (requiring the FERC to prescribe rules that "require electric utilities to offer to purchase electric energy from such facilities"); Regulations Under Sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978 with Regard to Small Power Production and Cogeneration, 18 C.F.R. § 292.101(b)(6) (1980) (defining avoided costs as "the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase

short, the utility paid the producer to use the alternative source, thus allowing the producer to recover the initial cost of the alternative energy system. It was an incentive not only to invest in renewable energy, but also to use it to the fullest extent.

Around that time, most other countries did not have a similar renewable energy policy,[16] though countries such as Denmark[17] and Spain[18] were notable exceptions. Thereafter, Germany and much of Europe adopted similar policies and identified the practice as a feed-in tariff ("FIT").[19] These policies, however, contain one major distinction from the Congress-endorsed practice in PURPA. In the United States, PURPA eventually required the utilities to pay a qualifying producer at a rate based on the *utilities'* avoided costs for not having to supply the producer with energy.[20] On the other hand, the German FIT policy maintains that the rate utilities pay the relevant renewable energy user will be based on the cost of the renewable energy system installed by the user rather than on the "avoided costs" of the utility.[21] This difference is significant: the latter situation provides a far greater incentive to produce or purchase solar energy than the initial U. S. policy. The average "avoided cost" of the utility systems in the United States resulted in a lower payment rate than the standard German rate.[22]

from the qualifying facility or qualifying facilities, such utility would generate itself or purchase from another source").

16. *See generally* Gipe, *supra* note 13 (indicating that other countries implemented policies similar to PURPA after the United States enacted PURPA).

17. *See* DANISH ENERGY AGENCY, DANISH ENERGY POLICY: 1970–2010 (2012), https://pire.soe.ucsc.edu/sites/default/files/DK%20Energy%20policy.pdf [https://perma.cc/AU3G-G2HG] ("As a consequence [of the Energy crisis] Denmark launched an active energy policy to ensure the security of supply and enable Denmark to reduce its dependency on imported oil.").

18. *See e.g.*, Geoffrey Jones & Loubna Bouamane, *"Power from Sunshine": A Business History of Solar Energy* 45 (Harvard Bus. Sch., Working Paper No. 12–105, 2012), https://dash.harvard.edu/bitstream/handle/1/9056763/12-105.pdf?sequence=1 [https://perma.cc/5E56-JGVP].

19. *Id.* at 46–47.

20. HEMPLING, ELEFANT, CORY, & PORTER, *supra* note 15, at vi (describing how avoided costs were calculated under PURPA).

21. TOBY D. COUTURE, KARLYNN CORY, CLAIRE KREYCIK & EMILY WILLIAMS, NAT'L RENEWABLE ENERGY LAB., A POLICYMAKER'S GUIDE TO FEED-IN TARIFF POLICY DESIGN 9 (2010), http://www.nrel.gov/docs/fy10osti/44849.pdf [http://perma.cc/M3P6-AGRK] (explaining Germany's approach to feed-in tariffs, while also asserting the United States' role in the first feed-in tariff).

22. Bradley Motl, Comment, *Reconciling German-Style Feed-in Tariffs with PURPA*, 28 WIS. INT'L. L.J. 742, 745 (2011) (asserting that the feed-in tariffs provide a greater rate to consumers than avoided costs).

By 1990, the incentives offered through PURPA had waned even further.[23] The cost of energy through a source such as natural gas had dramatically decreased, and it was continuing to dwindle.[24] Thus, the avoided costs that the utilities were to pay to the qualifying producer similarly decreased, and with that reduction in reimbursement went the incentive to invest in renewable energy.[25] The producer could no longer receive the benefit other qualifying producers had once experienced. Finally, the utilities had little interest in signing long-term contracts with customers because the utilities anticipated the cost of energy to continually abate.[26] In short, PURPA lost most of its power. State governments, however, had identified these issues and the resulting unfavorable rates of the "avoided costs" contracts.[27] Consequently, "net metering"—a prevailing renewable energy policy of the present day—began to appear.

A. An Introduction to Net Metering and Its Role Within the Solar Energy Industry

To begin, unlike PURPA, net metering is a state-made law. No state is required to implement some form of net metering, but to this date, forty-three states and the District of Columbia have a net metering regime in place.[28] Thus, it may be described as the prevalent solar policy within the United States. Naturally, each net metering policy can vary from state to state; yet all net metering policies involve the relationship between a renewable energy user and their utility providing power. Net metering is exactly what its name indicates: the energy-consuming customer pays the cost of the *net* of energy he or she used from the grid and the energy generated from his or her renewable energy system.[29] The utility system

23. ERIC MARTINOT, RYAN WISER & JAN HAMRIN, RENEWABLE ENERGY POLICIES AND MARKETS IN THE UNITED STATES 4 (2005), http://www.martinot.info/Martinot_et_al_CRS.pdf [http://perma.cc/BQS8-4MH3] (explaining PURPA and renewable energy).

24. *Id.*

25. *Id.*

26. *Id.*

27. YIH-HUEI WEN & H. JAMES GREEN, CURRENT EXPERIENCE WITH NET METERING PROGRAMS 2 (1998), http://apps3.eere.energy.gov/greenpower/resources/pdfs/current_nm.pdf [http://perma.cc/8ZM9-ETUG] (claiming net metering exists because of state initiatives that took the intent of PURPA one step further).

28. *See Net Metering 101*, *supra* note 7.

29. *See id.*

"credits" the renewable energy user at *retail* price for every kilowatt hour ("kWh") used.[30] This arrangement represents a far cry from PURPA's avoided costs calculation, which can result in a difference of almost ten cents per kWh as compared to retail price paid.[31] Considering the average monthly amount of kWh households used in 2014 was 911 kWh,[32] ten cents quickly becomes a large number. For owners who spend thousands of dollars on the purchase and installation of renewable energy systems, saving (by credit) $90 per month and almost $1,100 annually presents a very attractive opportunity. When the user generates more power through renewable sources than they use from the grid, the utility company, under all net metering policies, must buy back at least a portion of that excess energy.[33]

The main difference among the large variety of state-enacted net metering statutes is the price at which the utility companies must buy back excess energy.[34] This can vary from requiring the utility to buy back the excess electricity at retail price to requiring the utility to purchase the excess energy at the avoided costs level established by PURPA.[35] While net metering creates massive incentives for people to invest in renewable energy, it is also expensive for utilities. Thus, as this Note will later address, certain utilities do not like it and are fighting net metering policies on several fronts.[36] Net metering, however, is only a state government incentive; a federal incentive also exists for solar owners.

30. *Id.* In other words, the utility system credits the renewable energy user at retail price instead of wholesale price, which is the level at which the utility normally purchases or creates energy. The avoided costs thus were lower than the retail price. *See id.* (describing the difference between wholesale and retail prices).

31. For example, authors Wen and Green found that the difference between a utility's retail rate and avoided cost calculation could be as high as ten cents per kWh. *See* WEN & GREEN, *supra* note 27, at 1.

32. *See How Much Electricity Does an American Home Use?*, U.S. ENERGY INFO. ASS'N (Jan. 10, 2014), http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3 [http://perma.cc/DX59-T2HJ].

33. *See Net Metering 101*, *supra* note 7.

34. *See id.* ("The most important issue with regard to net metering is the rate for the electricity that the utility pays the net metering customer.").

35. *See New Mexico*, FREEING GRID, http://freeingthegrid.org/#state-grades/new-mexico [http://perma.cc/EX86-KYSF] (last visited Sept. 17, 2015) (noting that the net excess generation is credited to the customer's next month bill at an avoided costs rate). *But see Florida*, FREEING GRID, http://freeingthegrid.org/#state-grades/florida [http://perma.cc/N68L-6VSH] (last visited Sept. 17, 2015) (showing that in Florida utilities reimburse customers at the *retail rate* for net excess generation).

36. *See generally* Plumer, *supra* note 5.

B. The Investment Tax Credit

The Investment Tax Credit ("ITC") was first enacted by Congress in 2005, allowing for a thirty percent tax credit on renewable energy systems[37] placed into service in 2006.[38] Initially capped at $2,000, the ITC underwent several extensions that eventually removed the $2,000 credit cap and extended the policy through January 1, 2016.[39] Immediately, this augmented the incentive for Americans to invest in solar energy. Considering the average cost of solar panel systems was and is in the tens of thousands of dollars, any homeowner, as long as he or she installed a solar panel system at his or her residence, appeared to be eligible for a tax credit beginning in the $1,000–$4,000 range.[40] Data displays a massive increase in solar energy investment since the credit's announcement.[41] This suggests that the ITC has in fact induced many people to invest in solar energy.[42] Further, this credit does not only apply to residential installments, but also to businesses that install similar systems.[43] The ITC, however, expires December 31, 2016.[44] For a system to qualify for the credit, it must be placed into service prior

37. This includes renewable energy generated via wind and solar. For the purpose of this Note, the focus is on the ITC's relationship with solar energy development.

38. *See Solar Investment Tax Credit,* SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/finance-tax/solar-investment-tax-credit [http://perma.cc/GBT3-NXXP] (last visited Sept. 18, 2015).

39. *See id.*

40. *See, e.g.*, *Solar Photovoltaic Technology*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/research-resources/solar-photovoltaic-technology [http://perma.cc/DVL2-NRQG] (last visited Sept. 18, 2015) (using the average size of the solar system to calculate an average price for solar installation).

41. *See* SOLAR ENERGY INDUS. ASS'N, THE CASE FOR THE SOLAR INVESTMENT TAX CREDIT 1 (June 9, 2015), http://www.seia.org/sites/default/files/resources/The%20Case%20for%20the%20Solar%20Investment%20Tax%20Credit%2006%2009%202015_0.pdf [http://perma.cc/MC4J-YZ84] ("The market certainty provided by a multiple year extension of the residential and commercial solar ITC has helped annual solar installations grow by over 5,000 percent since the ITC was implemented in 2006—a compound annual growth rate of 65 percent.").

42. The ITC is likely not the only successful example of a renewable energy tax credit playing a role in the development of a renewable energy. There is evidence that the Production Tax Credit has played a similar role in the growth of wind-based renewable energy. *See Production Tax Credit for Renewable Energy*, UNION CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/smart-energy-solutions/increase-renewables/production-tax-credit-for.html#.VaqSnflVg3E [http://perma.cc/G765-7GAX] (last visited Sept. 18, 2015).

43. *See Solar Investment Tax Credit*, *supra* note 38.

44. *Id.*

to that expiration date.[45] Thus, the expiration date also prevents new solar projects from beginning in the latter half of 2016.[46] If the ITC stimulates growth to the extent the data has indicated, the expiration of the credit could become a major problem for the emerging solar industry.[47]

The upcoming expiration of the ITC dulls the solar energy industry's presupposed, clear path to becoming the main source of energy in the United States, though a projection predicts a rapid solar energy invasion of the utilities' empire.[48] By attempting to enter this deeply entrenched industry, the solar industry challenges the conventional forms of energy. Even when supported by an environmental and moral rhetoric, this remains a massive undertaking that has required the help of government on both the state and federal levels.[49] Yes, a renewable source of energy might be needed due to a dependence on a finite supply of fossil fuels[50] and the negative environmental impact caused by use of such fossil fuels. Yet, one should consider the demanding steps that must be taken for the solar energy industry to reach its desired potential. The industry would have to undergo a fundamental change for true grid parity to be achieved. In theory, upon the arrival of grid parity, the utilities would lose customers to solar, yet some of those solar owners might need to remain connected to the grid. Why would homeowners in an attractive solar area choose not to go solar to save money, and how would this not impact the utilities? There must be some form of residual effect on the industry. Many factors, such as the ITC and net metering, though, caused the rapid rate of growth and those factors may soon change. Moreover, the industry is just beginning to capture a cognizable percentage of energy

45. *Id.* For example, a business that wants to invest in a massive solar panel installation will not be eligible for the credit even if work began in November 2014, if the work will not be completed until January 2017. The same logic applies to residential projects.

46. *Id.*

47. *Id.*

48. Randall, *supra* note 4 ("Grid Parity to Reach 36 States in 2016.").

49. *See What Is Grid Parity*, *supra* note 3.

50. *See generally* BHARAT RAJ SINGH & ONKAR SINGH, GLOBAL TRENDS OF FOSSIL FUEL RESERVES AND CLIMATE CHANGE IN THE 21ST CENTURY IN FOSSIL FUEL AND THE ENVIRONMENT 168–92 (2012), http://cdn.intechopen.com/pdfs-wm/32334.pdf [http://perma.cc/TMY8-C5E7] (discussing a new formula, while acting under the assumption that fossil fuels are a limited source of energy, to determine when fossil fuel reserves will become exhausted).

market share.[51] Since it has only recently grown into a legitimate competitor of the utilities, the utilities are just beginning to actively oppose pro-solar policy at the state level.[52] For solar *business* to be as sustainable as solar energy, it cannot overly rely on government assistance, and it must withstand the current pushback from the utilities.[53] The solar energy industry's success might then depend on its resistance against the utilities. Solar, however, is in its adolescence and is still undergoing beneficial transformation.

C. The Solar Energy Industry Continues to Evolve as Exemplified by Third Party Financing, but Remains Dependent on Government

A prime example of evolution within the solar industry is the arrival and growth of third party financing. A decade ago, the consumer had to purchase his or her solar system with his or her own capital since the option of third party financing was very limited.[54] Ten years later, third party financing has grown to become the primary method of funding a solar installation.[55] Two factors that are important for third party financing are the ITC and the need for state legislatures to remain open to third party financing.[56] In fact, the reliance that third party financing places on the ITC and state legislatures is crucial to the technique's effectiveness.

51. *See* PHOTOVOLTAIC POWER SYSTEMS PROGRAMME, INT'L ENERGY AGENCY, 2014 SNAPSHOT OF GLOBAL PV MARKETS 13 (2015), http://www.iea-pvps.org/fileadmin/dam/public/report/technical/PVPS_report_-_A_Snapshot_of_Global_PV_-_1992-2014.pdf [http://perma.cc/2AYA-76R7].

52. *See What Is Grid Parity*, *supra* note 3.

53. *See* Plumer, *supra* note 5 ("The potential disruptions caused by solar power have triggered a number of fierce policy disputes at the state level.").

54. *Cf.* Gabe Davis & Ben Peters, *The Evolution of Residential Solar Leasing*, SOLARPRO (Feb. 2013), http://solarprofessional.com/articles/finance-economics/the-evolution-of-residential-solar-leasing [http://perma.cc/5YZ8-CDFW] (indicating that the first solar third party financing plan emerged in 2007).

55. *See* Samuel Farkas, Comment, *Third Party PPAs: Unleashing America's Solar Potential*, 28 J. LAND USE & ENVTL. L. 91, 100 (2012) (providing an overview of certain issues surrounding third party financing, and discussing the importance of the ITC to developers and why states should not reject third party financing); *see also* KATHARINE KOLLINS ET AL., U.S. DEP'T OF ENERGY, SOLAR PV PROJECT FINANCE: REGULATORY AND LEGISLATIVE CHALLENGES FOR THIRD-PARTY PPA SYSTEM OWNERS 2 (2010), http://www.nrel.gov/docs/fy10osti/46723.pdf [https://perma.cc/B3GG-D3P2].

56. *See generally* Farkas, *supra* note 55 (providing an overview of certain issues surrounding third party financing, and discussing the importance of the ITC to developers and why states should not reject third party financing).

The cost to install solar panel systems is fundamentally high.[57] Third party financing addresses this issue by having the homeowner either: 1) lease the solar panel system from a third party, or 2) permit a third party to install the system on the homeowner's property at no cost and directly purchase electricity from the third party.[58] This results in the homeowner avoiding high installation costs and needing only to pay the new, and ideally cheaper, monthly electricity bill.[59] Meanwhile, the net metering policy, the ITC, and many other solar incentives in theory then become available to the third party who has paid for installation of the solar energy system.[60] In short, the consumer avoids high up-front costs while forfeiting numerous solar incentives of which the third party can then take advantage.[61] Thus, in certain situations, the numerous government pro-solar policies have an identical impact on third party financiers as they would on residential consumers. Given that third party financing emerged within a legal framework not designed to address such methods of solar panel funding, many regulatory obstacles that hinder third party financing still exist.[62]

III. IMMINENT PROBLEMS FACING SOLAR ENERGY

Over the next five years, three separate situations can deeply affect the solar energy industry. The first is the utility pushback against state net metering policies.[63] Currently, net metering policies provide a great incentive to homeowners who would like to invest in solar energy.[64] A battle is brewing that will play itself out in front of the Public Service Commissions of the fifty states.[65] The second issue is whether Congress should extend the ITC, let it ex-

57. *See* KOLLINS, *supra* note 55, at 3.

58. *Id.* at vi–viii.

59. *Id.*

60. *See* Farkas, *supra* note 55, at 95 (arguing that the ITC and incentives are important to third party financiers).

61. *Id.*

62. *Id.* at 94 ("[T]here are other barriers, such as burdensome interconnection standards; utility fees and fines; state, municipality, and neighborhood land use regulations; and inadequate net metering compensation policies that impede distributed solar PV.").

63. *See generally* Plumer, *supra* note 5.

64. *See, e.g.*, *Net Metering*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/distributed-solar/net-metering [http://perma.cc/LQG8-266F] (last visited Sept. 23, 2015) (summarizing net metering and its benefits); *see also* Farkas, *supra* note 55, at 97 (discussing net metering as another valuable incentive for consumers).

65. *See* Plumer, *supra* note 5.

pire at the end of 2016, or pursue an alternative route. The ITC has driven an immense increase of private investment in solar energy.[66] This Part will attempt to decipher whether solar energy has reached a level where its financial and environmental benefits are sufficient, from the perspective of the consumer, to invest regardless of the ITC. Finally, I will complete this short analysis by illustrating the impact general tax reform can have on the solar energy industry, specifically non-residential businesses.[67]

A. The Challenges to Net Metering

Net metering is a prevalent solar energy policy throughout the United States.[68] Enacted in over forty states, net metering allows all persons who are connected to the grid and have renewable energy systems to participate in the program and sell their excess energy back to the utilities in return for credits to their electric bill from grid electricity usage.[69] Utilities, however, rarely promote net metering policies, particularly because they are more expensive for the utilities than the cheaper "avoided costs" policy rates.[70] Further, the utilities represent the fossil fuel industry,[71] the industry that both dominates the energy industry and competes with the solar energy industry.[72] Fueled by the opposition and the growing num-

66. *See* SOLAR ENERGY INDUS. ASS'N, *supra* note 41, at 2 (arguing for continuance of the Solar Investment Tax Credit).

67. *See generally* JAMES MUELLER & AMIT RONEN, GW SOLAR INST., TAX REFORM, A LOOMING THREAT TO A BOOMING SOLAR INDUSTRY (2014), http://solar.gwu.edu/file/753/download [https://perma.cc/C85J-R2K7].

68. Prevalent in the sense that, as noted earlier, forty-three states and the District of Columbia have enacted net metering laws. *See supra* text accompanying note 28.

69. *See Net Metering 101*, *supra* note 7 (illustrating the forty-three states that have enacted net metering policies).

70. ROBERTO VERZOLA, NET METERING OPENS THE FLOODGATES TO SOLAR ROOFTOPS AND OTHER RENEWABLES 5 (2015), http://c1cleantechnicacom.wpengine.netdna-cdn.com/files/2015/09/net-metering-thefullstory.pdf [http://perma.cc/3FW8-KDDK] (indicating that by the end of the 1980s "utilities had turned hostile" towards net metering policies, viewing "net metering as a threat to their business model").

71. *See* Joby Warrick, *Utilities Wage Campaign Against Rooftop Solar*, WASH. POST (Mar. 7, 2015), http://www.washingtonpost.com/national/health-science/utilities-sensing-threat-put-squeeze-on-booming-solar-roof-industry/2015/03/07/2d916f88-c1c9-11e4-ad5c-3b8ce89f1b89_story.html [http://perma.cc/MPT2-L62D] ("Three years later, the [utility] industry and its fossil-fuel supporters are waging a determined campaign to stop a home-solar insurgency that is rattling the boardrooms of the country's government-regulated electric monopolies.").

72. Utilities are concerned about the growth of solar energy because it might lead to users moving off the grid, and the utilities, as a result, losing their business. *See generally id.*

ber of solar energy users, utilities are beginning to bring challenges against state net metering policies[73] to several Public Service Commissions,[74] such as the Arizona Corporation Commission and the Utah Public Service Commission.[75]

The utilities' challenges center around two basic hypotheses. The first theory is that if a customer is using the grid—which the utilities own—for energy, or benefitting from it in any way, he or she has an obligation to pay his or her share to the utilities.[76] Further, the utilities' business model covers fixed costs of maintaining the grid by including a fixed cost per unit of energy consumed from the grid in each bill.[77] In other words, utilities charge fixed costs within an "energy" charge rather than a base level price per customer.[78] Thus, when a customer is credited for excess energy and that credit amount is greater than the energy used by the household over the year, then according to the utilities, that customer is not covering the fixed costs of maintaining the grid.[79] In the aggregate, and with the increased usage of solar energy, the utilities believe that they will not make enough money to profit in their current business model and will therefore have to place the burden of maintaining the grid on people who do not have solar

(noting the utilities' concern that increased residential solar could lead to declining sales, loss of customers, and even potential obsolescence).

73. *See* Plumer, *supra* note 5 (outlining the landscape of net metering challenges).

74. In general, each U.S. state has a utilities commission that is responsible for regulating that state's public utilities. This regulation includes the monitoring of rates charged by the utility. Utility-provided electricity falls under this scope and is subject to regulation by these commissions. *See, e.g.*, *Utilities Division*, ARIZONA CORP. COMM., http://www.azcc.gov/Divisions/Utilities/default.htm [https://perma.cc/6QZT-Z2P3] (last visited Jan. 5, 2016) ("Mission: To recommend thoroughly researched, sound regulatory policy and rate recommendations to the commissioners, which are based on a balanced analysis of the benefits and impacts on all stakeholders and are consistent with the public interest.").

75. *See* Herman K. Trabish, *Arizona Preserves Net Metering by Charging a Small Fee to Solar Owners*, GREENTECH SOLAR (Nov. 15, 2013), http://www.greentechmedia.com/articles/read/Charging-a-Fee-to-Solar-Owners-Preserves-Net-Metering-in-Arizona [http://perma.cc/29H8-ULTB]; *see also* Plumer, *supra* note 5.

76. Warrick, *supra* note 71.

77. *See id.*

78. *See* Ari Phillips, *New Mexico's Largest Utility Wants to Charge Solar Owners up to $30 a Month*, CLIMATE PROGRESS (Dec. 22, 2014), http://thinkprogress.org/climate/2014/12/22/3605710/new-mexico-utility-charge-solar-owners-30-a-month/ [http://perma.cc/39ND-45M7] (quoting and summarizing statements from Susan Snyder Sponar, Senior Communications Representative at PNM, New Mexico's largest electricity provider).

79. *Id.*

energy systems.[80] The second contention is that solar energy is expensive and thus a luxury typically available only to the wealthy; thus, when the utilities increase the costs of electricity to paying members within the grid, a price shift from the rich to the poor occurs, which one utility executive argues is "not something that's beneficial to the public interest."[81]

Yet, as mentioned earlier, the most common method of financing solar panel installation is through some form of third party ownership.[82] Though certain states, such as Kentucky and North Carolina, do not permit third parties to participate in net metering[83]—and therefore prevent such a market from forming—in states that have pro-third party financing laws, the asserted cost burden shift from wealthy to poor is not entirely apparent. Advocates of third party financing maintain that its structure makes solar panel installation and usage more available to the general public.[84] Moreover, much of the impetus for third parties to invest in solar energy originates from favorable tax credits and government policies, including net metering.[85] In short, solar panel owners and the third party

80. *Id.*; *see* Plumer, *supra* note 5 (noting that utilities "still have to manage the cost of hooking [consumers] up to the grid" despite their lower usage of grid provided electricity); *see generally* ANDREW SATCHWELL, ANDREW MILLS & GALEN BARBOSE, FINANCIAL IMPACTS OF NET-METERED PV ON UTILITIES AND RATEPAYERS: A SCOPING STUDY OF TWO PROTOTYPICAL U.S. UTILITIES 1 (2014), https://emp.lbl.gov/sites/all/files/lbnl-6913e.pdf [https://perma.cc/2U6T-VX6V] ("Utility executives are often concerned about revenue erosion and reduced shareholder returns when customers with net-metered PV are able to avoid charges for fixed infrastructure costs, as well as potential cost-shifting between solar and non solar customers.").

81. *See* Ker Than, *As Solar Grows, Dispute Flares over US Utility Bills*, NAT'L GEOGRAPHIC (Dec. 25, 2013, 10:00 AM), http://news.nationalgeographic.com/news/energy/2013/12/131226-utilities-dispute-net-metering-for-solar/ [http://perma.cc/HC2G-SDPZ] (summarizing an argument by David Owens, executive at Edison Electric Institute, that a cost shift will occur if net metering continues down this path); *see also* COMM. ON ENERGY, TRANSP., & ENV'T, THE NAT'L BLACK CAUCUS OF STATE LEGISLATORS, THE NEED TO DEVELOP & IMPLEMENT EQUITABLE ENERGY POLICIES 2 (2014), http://nbcsl.org/component/k2/item/download/483_d821fc40e47ebc5f1281e633450359b1.html [http://perma.cc/3S28-PGEZ] (arguing that an "energy divide" might emerge if equitable energy policies are not implemented).

82. *See generally* Farkas, *supra* note 55.

83. *See, e.g.*, Farkas, *supra* note 55, at 104–05 (asserting that states have not reacted to the third-party financing climate).

84. *See Third-Party Financing*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/finance-tax/third-party-financing [http://perma.cc/BQS5-WT3B] (last visited Sept. 25, 2015) (maintaining that solar has taken off since third party financing has been made available).

85. *See* Farkas, *supra* note 55, at 100.

within third party financing agreements are uniformly interested in the furtherance of net metering. Consequently, the state commission decisions are important.

In a highly publicized hearing, the Arizona utilities commission, the Arizona Corporation Commission ("ACC"), chose to permit solar energy charges equivalent to almost five dollars per month for all energy sold back to the utilities and credited back to the owner.[86] On the other hand, the Utah Public Service Commission ("UPSC") was not as sympathetic and rejected the utilities' proposal to add a monthly charge to solar power owners.[87] In rejecting the proposal, the UPSC indicated that the utilities did not provide sufficient facts to support their claims that net metering has and will continue to dramatically impact their company.[88] These challenges and hearings occurred within the past three years.[89] The trend has been set and utilities in other states are making similar objections.[90] Since these challenges are in their infancy, there is no reliable data on the impact negative and positive rulings have had on the emergence of solar in the relevant states. This data will be absolutely critical to assessing the importance of net metering in the prolonged rollout of solar energy. Advocates of solar energy have stressed their concerns in response to the unfavorable ruling—from their perspective—of the ACC, alluding to their opinion

86. *See* Trabish, *supra* note 75; *see e.g.*, PacifiCorp dba Rocky Mountain Power 2014 General Rate Case, Docket No. 13-035-184, 33 (Utah Pub. Serv. Comm'n Aug. 29, 2014), http://www.psc.utah.gov/utilities/electric/elecindx/2013/documents/26006513035184 rao.pdf [http://perma.cc/ZW8G-ZWJ7] (noting Arizona's recent decision concerning net metering). As of June 2015, the Tucson Electric Power Company is seeking to receive a waiver of the ACC 2013 decision and reimburse customers at the wholesale, not retail, rate. *See* Herman K. Trabish, *What's Solar Worth? Inside Arizona Utilities' Push to Reform Net Metering Rates*, UTILITY DIVE (June 1, 2015), http://www.utilitydive.com/news/whats-solar-worth-inside-arizona-utilities-push-to-reform-net-metering-r/399706/ [http://perma.cc/T9RK-DHBX] (referencing the Tucson Electric Power Company's filing to receive such waiver).

87. *See* Ian Clover, *Utah Rejects Net Metering Fee*, PV MAG. (Sept. 3, 2014), http://www.pv-magazine.com/news/details/beitrag/utah-rejects-net-metering-fee_100016309/#axzz3KZFFQknw [http://perma.cc/FZY9-TZ2F].

88. *Id.*

89. *Id.*; *see also* Plumer, *supra* note 5.

90. *See* Kiley Kroh, *Push to Impose Extra Fees on Solar Customers Draws Outrage in Wisconsin*, CLIMATE PROGRESS (Sept. 14, 2014, 11:46 AM), http://thinkprogress.org/climate/2014/09/14/3567244/utility-fees-end-wisconsin-solar/ [https://perma.cc/X54T-8HAB]; *see, e.g.*, *Georgia Debates Solar Panel Leasing*, CHATTANOOGA TIMES FREE PRESS (Feb. 24, 2014), http://www.timesfreepress.com/news/2014/feb/24/georgia-debates-solar-panel-leasing/ [http://perma.cc/Q5K7-LXPC].

that even a minor kWh charge for solar energy owners can have a negative impact on the current structure.[91]

An assessment of the future of solar energy, specifically in the United States, must consider the present and future state utility commission decisions and their potential impact on solar energy growth. It may be years before solar energy advocacy groups are able to gather the necessary data and draw applicable conclusions.[92] Until then, the raw cost of solar energy might reach grid parity, but the real cost of solar must overcome several obstacles before meeting this threshold and will remain subject to a number of variables, such as the ITC and the solar industry's relationship with the utilities.

B. The Solar Energy Tax Credit Is Expiring, and It Is Unclear What Impact It Will Have

The second hurdle that solar energy faces is whether Congress should extend the ITC beyond 2016. The solar energy industry has grown exponentially since the first tax credit in 2005.[93] The tax credit is due to expire, however, on December 31, 2016,[94] leading to another question: what impact will the expiration of the ITC have on the apparent, imminent emergence of solar into the mainstream? Answering this question requires a two-step assessment. First, one must consider to what extent the growth was a direct result of the ITC enactment. This step will attempt to determine whether Congress' passing of the ITC held the floodgates open and allowed the solar industry to develop into an affordable and realistic source of renewable energy. Second, one must ask whether the solar industry can withstand Congress' failure to extend the ITC, or whether despite solar's recent growth, the ITC must remain as the motivation for owners to invest in solar energy. Prominent figures within solar businesses have agreed with both the latter and former

91. *See* Trabish, *supra* note 75.

92. The different states' commissioners, as seen in this Section, have only recently made these decisions. The time is not yet ripe for an analysis. *See supra* text accompanying notes 86–91.

93. *See Solar Industry Data: Solar Industry Breaks 20 GW Barrier—Grows 34% Over 2013*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/research-resources/solar-industry-data [http://perma.cc/G4P2-LTRV] (last visited Sept. 28, 2015) (showing the burst of solar growth between 2006 and 2014); s*ee also* SOLAR ENERGY INDUS. ASS'N, *supra* note 41, at 1.

94. *See* MUELLER & RONEN, *supra* note 67, at 1.

premises.[95] This issue is an important one, but addressing it will require deciphering what the growth of the solar energy industry means in relation to government-backed incentives, such as the ITC and net metering.

1. The Solar Tax Credit Was in Place When Solar Energy Began to Grow

The data presented through relevant statistics and charts[96] fails to illuminate the relationship between the growth of the solar industry, the cost of solar energy, and tax incentives for investing in solar. A general examination of the solar industry over the past decade leads to a basic presumption: the solar energy industry began to grow rapidly when the ITC was enacted *and* when the technology became cheaper.[97] For example, since 2006, there has been an increase in the installation of solar panels by business and residential users.[98] Meanwhile, the cost of solar panel installation has decreased in the same timespan.[99] Since the ITC provides a credit on the installation cost, this decrease in price is extremely important. If the cost continues to fall at this pace,[100] then the economic value of the ITC would decrease, as would its importance in the emergence of the solar energy industry. Considering this information, this Section offers two explanations that can undermine the presumably positive links between the ITC, decreased costs, and the expansion of the solar energy industry.

a. The Timing of Solar Market Growth Does Not Coincide with the Removal of the $2,000 ITC Cap

First, when the ITC was enacted in 2006, it had a cap of $2,000; regardless of how expensive the solar installation was, the purchaser could deduct only a maximum of $2,000 from his or her final

95. *See* Gary Quackenbush, *ITC Expiration Raises Concerns*, NORTH BAY BUS. J. (Aug. 4, 2014), http://www.northbaybusinessjournal.com/95842/solar-tax-credit-expiration-raises-concerns/ [http://perma.cc/9YUP-5WKZ] (summarizing the opposing beliefs of the general manager of WestCoast Solar Energy, Peter Renfro, and the president and co-founder of SolarCraft, Bill Stewart, on whether expiration of the ITC will greatly damage the solar industry).

96. *See* Shahan, *supra* note 2 (chronicling the solar power industry through several charts).

97. *Id.*

98. *Id.*

99. *See generally id.*

100. *Id.*

taxable income.[101] Though the cost of solar installation has decreased since 2008,[102] the price remains in the tens of thousands.[103] In all likelihood, many installations at the time of the ITC's enactment easily hit the cap.[104] After expanding and extending the credit in the Emergency Economic Stabilization Act of 2008,[105] Congress completely removed the $2,000 cap through the American Recovery and Reinvestment Act of 2009.[106] Since the installation costs of solar panels were so significant, this action by Congress dramatically altered the incentive within the tax;[107] however, this did not occur until years after the credit was first put in place.[108] Therefore, since consumers could take only a maximum $2,000 tax credit prior to the Emergency Economic Stabilization Act of 2008 and the ITC cap removal, the ITC was not as financially advantageous as it has been since 2008.[109] The growth rate of the solar energy industry, however, has been steadily climbing, almost uniformly since before the ITCs initial enactment.[110] Moreover, solar instal-

101. *See* Energy Policy Act of 2005, I.R.C. § 25D(b)(1)(A) (2006) (amended by Emergency Economic Stabilization Act of 2008, Pub. L. 110-343, § 106, 122 Stat. 3765, 3814–15) ("The credit allowed under subsection (a) for any taxable year shall not exceed $2,000 with respect to any qualified photovoltaic property expenditures.").

102. *See generally* Zachary Shahan, *What Is the Current Cost of Solar Panels*, CLEAN TECHNICA (Feb. 4, 2014), http://cleantechnica.com/2014/02/04/current-cost-solar-panels/ [http://perma.cc/45H4-553M] (detailing the average costs of solar at the per-watt level and its subsequent decrease).

103. *Id.* Shahan provides a chart, "*How Much Solar Costs in Your State*," that depicts a large disparity in the state-by-state installation cost of solar throughout the United States, but, despite this disparity, the average cost is no less than $10,000. *Id.; see also Solar Photovoltaic Technology*, *supra* note 40. Also, note that the cost of solar installation varies greatly depending on the size of the installment. *See Solar Photovoltaic Technology*, *supra* note 40.

104. Removal of this cap would clearly further incentivize consumers to invest in solar. Some commentators analyzed the effect the credit cap had, and its removal would have, on solar users rate of return on their installation. *See e.g.*, ANDY BLACK, PAYBACK ON THE RESIDENTIAL PV SYSTEM WITH 2009–2016 UNCAPPED 30% FEDERAL INVESTMENT TAX CREDIT (2009), http://www.ongrid.net/papers/ResPVEconomicsWithUncappedITC_ASES09web.pdf [http://perma.cc/U56U-GZZF] (arguing the rate of return will increase because of the uncapped ITC).

105. *See Solar Investment Tax Credit*, *supra* note 38 (noting that "the Emergency Economic Stabilization Act of 2008 included an eight-year extension of the commercial and residential solar ITC . . . .").

106. *See Residential Renewable Energy Tax Credit*, DATABASE ST. INCENTIVES FOR RENEWABLES & EFFICIENCY, http://programs.dsireusa.org/system/program/detail/1235 [http://perma.cc/W8FQ-AKDK] (last updated May 13, 2015).

107. BLACK, *supra* note 104, at 1.

108. *Id.*

109. *Id.*

110. *See* Shahan, *supra* note 2.

installations began to increase at a quicker rate in 2011–12 but not until well after Congress had the $2,000 cap removed from the statute.[111] Given these two facts, it is plausible that purchasers of solar were reacting to a force other than Congress' ITC.[112]

This information must be digested with a caveat. The method or equation used to calculate the overall costs of solar energy is not always consistent, nor is it obtainable within reports on these costs.[113] This lack of transparency warrants skepticism. Within the United States, it would be prudent to include the U.S. government tax credit incentives within the computation of decreased solar energy costs. In other words, a description of solar energy decreased costs should include, or at least identify, the impact subsidies offered by states and the federal government have on the numbers provided. Congress has passed and extended favorable solar policy regardless of which political party was in control of Congress;[114] for example, considering the ITC at issue in this Note, its initial enactment and later extensions were passed when different parties were in control of Congress. Since this consistency can arguably lead to predictability, it is reasonable for the compilers of solar energy data to consider U.S. solar tax policy in their analysis. Thus, when reviewing declarations of solar's affordability,[115] one must contemplate whether that information considers expiring pro-solar government policy, then attempt to determine whether it is included in such calculation.

111. *Id.* Chart 11 depicts the growth of U.S. solar power capacity from 2002 through 2013. As shown in the graph, from 2002 to 2006, solar capacity grew by less than 1,000 MegaWatts; while from 2006 to 2013, capacity grew from less than 1,000 MW to almost 9,000 MW. *Id.*

112. Individual state incentives vary greatly and play different roles influencing the adoption of solar energy, but, for example, the GW Solar Institute report places significant importance on the ITC and the impact its expiration can have the industry. *See generally* MUELLER & RONEN, *supra* note 67. I follow this emphasis.

113. *See* Shahan, *supra* note 2 (showing no indication of whether the ITC was a variable in the formula from which the charts were derived). *But see* Randall, *supra* note 4 (noting that expiration of the tax credit would not significantly impact the report's projections).

114. For example, the enactment of PURPA in 1978 under a Democrat-controlled House and Senate, *see* Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117, and the enactment of the Energy Policy Act of 2005 under a Republican-controlled House and Senate, *see* Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594.

115. *See generally* Randall, *supra* note 4.

b. Global Solar Energy Grew at a Similar Rate to U.S. Solar; Thus, the ITC Might Not Be as Significant

Consistent solar growth rates globally might call into question the necessity of the ITC.[116] To begin, the international growth rate of solar energy is in line with that of the United States.[117] Further, changes to global solar energy costs over time follow a curve almost identical to those of the United States.[118] Both of these findings reveal that costs of solar energy are decreasing worldwide; however, the ITC does not apply outside of the United States. If the global statistics display a decreasing rate in the price of solar installation and energy similar to that of the United States,[119] then the U.S. tax credit may not have a significant impact on the domestic trend. Thus, the ITC may not have lasting influence on the emergence of solar energy within the United States.

Some countries have a pro-solar policy,[120] but not all solar policies are created equal, and some policies appear more advantageous than others.[121] Observing the emergence of solar energy throughout the world and noting its reliance on programs more similar to net metering[122] weakens the claim that the solar tax incentive is a necessity rather than a luxury for U.S. taxpayers. Further, since the projections are that the cost of solar energy will continue to decrease as the cost of the technology continues to decrease,[123] in a vacuum, the importance of the ITC would likely decline. Yet combined with the looming battles of net metering in

116. *See* Shahan, *supra* note 2 (depicting the growth of global solar energy capacity through several charts).

117. *See id.* (noting that the international growth rate of solar energy has been symmetrical to that of the United States).

118. *Id.*

119. *Id.*

120. *See* Matthew Wheeland, *Top 10 Countries Using Solar Power*, PURE ENERGIES (Sept. 15, 2014), https://pureenergies.com/us/blog/top-10-countries-using-solar-power/ [https://perma.cc/4DVR-6QJW] (listing the top ten countries for solar power and briefly describing each country's solar energy policy).

121. *See generally Index Highlights*, RENEWABLE ENERGY COUNTRY ATTRACTIVENESS INDEX, June 2015, at 15, http://www.ey.com/Publication/vwLUAssets/RECAI_44/$FILE/RECAI%2044_June%202015.pdf [http://perma.cc/72FW-H9MW] (providing a general overview of the global renewable industry).

122. *See generally* Wheeland, *supra* note 120 (summarizing a solar top ten list and identifying foreign country's FIT and net metering policies).

123. *See* Giles Parkinson, *Solar's Insane Cost Drop*, CLEAN TECHNICA (Apr. 16, 2014), http://cleantechnica.com/2014/04/16/solars-dramatic-cost-fall-may-herald-energy-price-deflation/ [http://perma.cc/3TVF-PYXT] (discussing the decrease in solar costs).

front of the state Public Service Commissions and the uniqueness of the solar industry, the expiration of the ITC remains germane to the industry's continued growth within the United States.

C. Tax Reform Can Disincentivize Businesses from Investing in Solar

As a considerable part of this Note has been a discussion of the implementation of solar energy at the residential level, this Section will briefly discuss solar installation by commercial businesses. In short, the Internal Revenue Code permits a unique tax treatment to commercial solar installations.[124] Due to sheer magnitude, business installations are more costly than residential installations. The Code acknowledges this by permitting businesses to deduct a greater percentage of the cost of their solar system,[125] thus allowing the businesses to lessen their net income and tax liability. Congress has made several proposals to completely revamp the Code.[126] Many proposals suggest reorganizing the schedules within the Code that permit businesses to make the deduction discussed above.[127] These reforms would no longer provide for solar installation systems to depreciate at such a high rate.[128] Instead, they would create a far more streamlined depreciation system for all business asset purchases, under which the solar incentive falls.[129] The GW Solar Institute has expressed great concern for what would happen to the solar industry if such a proposal were to succeed.[130] In a report released in fall 2014, the institute claimed that if one of the three leading tax proposals were to succeed, the cost of solar energy would undoubtedly increase.[131] From proposals such as depreciating the solar asset at a quicker rate to committing the asset to complete straight-line depreciation, no business would receive the same benefit it has under the current tax regime.[132] Tax reforms have

124. *See* MUELLER & RONEN, *supra* note 67, at 2 (describing the Code's treatment for business installations and its solar-favorable MACRS depreciation schedule).

125. *Id.*

126. *See id.* (describing the tax proposals that have been raised by Congress).

127. *See, e.g.*, *id.* (reviewing different proposals and their effect on depreciation schedules).

128. *See id.*

129. *Id.*

130. *Id.*

131. *Id.*

132. *Id.*

been a topic of constant debate[133] and will be relevant in the solar discussion over the next decade; however, unlike the ITC[134] or net metering,[135] tax reform is only in discussions and cannot expire, nor are courts currently adjudicating its provisions. Thus, net metering and the tax credit should remain at the forefront of solar policy deliberation.

D. Since the Solar Industry Will Face These Issues in the Coming Years, Congress Must Find a Consistent Solar Policy

The last Section of this Part will step back from the solar industry and assess the situation from a policy perspective. Proponents of solar energy have a difficult task in the coming years. Their competing interests of maintaining solar subsidies to attract customers while also wanting the industry to appear strong and not in need of those subsidies may lead to counter-intuitive positions on government incentives. As an illustration, a proponent independent of a solar business would want the government to extend solar policy so the cost of solar installation would remain low.[136] A solar company, however, has a far more difficult task. This hypothetical solar company would want the government to continue pushing customers to their doorstep, providing them business and revenue. Yet, those same business owners would benefit from a recognition of the advance of solar energy and the resulting decreased costs. Politically, these are two opposite stances. If the business needs solar incentives from the government, then a reasonable consumer would think that it is because the price of the technology is not competitive with utility electricity prices and the industry thus needs the

133. *See* Andrew Ross Sorkin, *Tax Reform Is the Cry, Until Details Are Offered*, N.Y. TIMES (Feb. 2, 2015, 8:56 PM), http://dealbook.nytimes.com/2015/02/02/tax-reform-is-the-cry-until-details-are-offered/?_r=0 [http://perma.cc/8GYQ-VVZJ] (examining an issue in tax reform).

134. *See* SOLAR ENERGY INDUS. ASS'N, *supra* note 41 (discussing the looming 2016 expiration of the ITC).

135. *See* Plumer, *supra* note 5 (detailing the various cases that Public Service Commissions are currently hearing that will likely shape the future of net metering in the United States).

136. At first glance, one might think that a solar business proponent would want solar cost to increase, but the lower cost of solar allows it to compete with utilities, as seen in solar's growth over the last several years. *See, e.g.*, SOLAR ENERGY INDUS. ASS'N, *supra* note 41 (asserting that since enactment of the ITC, the cost of solar has "sharply" reduced, and as a result the solar energy industry has dramatically grown); *see also* MUELLER & RONEN, *supra* note 67 (maintaining that the ITC and MACRS were "primary drivers" in the growth of solar and subtly acknowledging that they want incentives to continue).

government's support. On the other hand, if the company is highlighting the consistently decreasing cost of solar energy, then the government could ask the judicious question: why does the industry need incentives if the cost of solar energy is similar to utility-provided energy?[137]

This is a difficult debate. First, pushing for the continued growth of the solar energy industry is logical because it produces a limitless supply of clean energy; however, in the near future, it is possible that legislators will reduce the solar incentive policies that directly oppose the interests of the utilities.[138] Since the impact legislation has had on the solar industry's growth remains undetermined, there is no obvious route to take. As of yet, no federal tax incentives for the industry have expired and negatively affected committed buyers of solar technology.[139] Fortunately, the ITC impacts consumers the first year of their purchase.[140] In 2015 and 2016, the buyer will know at the time of his or her commitment whether they will benefit from the government-endorsed policy. Meanwhile, the value in net metering is in the money saved on electricity each month a consumer's solar system is in use. It's a subtle, yet extremely important difference between the two policies. For a user to take complete advantage of net metering, the policy must remain in place; yet, the future of net metering is uncertain.[141] As more state commissions continue to hear utilities' challenges to net

137. The argument can and will be made that the government should incentivize solar and other renewable energy because of its impact, or lack thereof, on the environment. Circumstances such as the impending ITC expiration, however, make it hard to conclude that the government is continuing to place heightened importance on solar energy as it enters into realistic competition with the utilities.

138. *See, e.g.*, Lisa Halverstadt, *Solar Customers Are Still in the Dark on These Big Unanswered Questions*, VOICE SAN DIEGO (Jul. 17, 2015), http://www.voiceofsandiego.org/topics/science-environment/solar-customers-are-still-in-the-dark-on-these-big-unanswered-questions/ [http://perma.cc/RH5E-W5GE] (explaining the uncertainty for Solar customers in California because of the less favorable solar policies they anticipate the California legislature to introduce).

139. *See, e.g.*, SOLAR ENERGY INDUS. ASS'N, *supra* note 41.

140. *See Solar Investment Tax Credit, supra* note 38.

141. *See* Plumer, *supra* note 5 (depicting the landscape of net metering challenges coming from the utilities in state legislatures, and in front of Public Service Commissions). Plumer explains that net metering laws and its current status may change. *Id.* For example, utilities have suggested that state commissions either lower the reimbursement price paid by utilities for net metering, or permit the utilities to charge solar owners a connection fee for remaining connected to the grid. *Id.*

metering and the solar companies,[142] the possibility exists that a solar-using consumer could benefit greatly from net metering one year, but lose those benefits the next year, causing him or her to be stuck with a brand-new, and unexpectedly costly, solar system. This leads to the conclusion that it is in the best interests of all parties for the future of government solar policy to be predictable as to the ITC, net metering, and depreciation. The current uncertainty has not hurt solar's short-term growth, but there are barriers it must overcome to establish itself as a mainstream source of energy.

The most significant barrier might be the utilities' stronghold on the energy industry. Since solar is only just beginning to grow, and its path to becoming a main source of energy remains unknown, it will be difficult for solar to infiltrate the grip that utilities have on the consumer electricity market. It needs a platform on which to grow. Thus, the best aid the law can provide to the solar industry in its next stage of development is predictability, which the GW Solar Institute has similarly indicated in its objectives report to Congress.[143] Predictability is essential to: 1) the solar company, which can then adjust its business accordingly; 2) the utilities who can plan their business accordingly; and 3) the consumer who can invest accordingly.

Due to many uncertainties, the projections that the cost of solar energy will reach grid parity in 2016 are overly aggressive, while the perception that its growth is artificial is equally defective. The solar industry, due to its maturation and success, has reached a tipping point that will dictate whether it becomes a new source of energy rivaling fossil fuels or remains as an alternative source of energy. It is important to discuss next why the future of the solar industry, with so few comparable industries, is unfamiliar and thus unpredictable.

142. *See* Zack Coleman, *Clouds Darken Over Solar* Subsidies, WASH. EXAMINER (Sept. 16, 2014), http://m.washingtonexaminer.com/solar-incentive-faces-headwinds/article/2553430 [https://perma.cc/PN4C-V3SS] (describing how a net metering case heard by the Arizona Corporation Commission began a trend of net metering challenges, as twenty states currently have their net metering subsidies under review).

143. *See* MUELLER & RONEN, *supra* note 67, at 4.

IV. THESE ISSUES EXIST BECAUSE SOLAR ENERGY IS UNIQUE

After many years, solar energy has begun to infiltrate the mainstream commercial energy industry.[144] It was not recently, however, that humanity first realized the opportunity in harnessing the sun's energy. From burning mirrors in ancient times to cooking food in the eighteenth century, solar energy has gone through a long transformation as technology has advanced.[145] Thomas Edison believed in it as a source of power,[146] and now, fewer than one hundred years later, the industry is successfully tackling just that. In that same century, Edison effectively created the utility system and created an energy-generating system that is now based almost entirely on coal, natural gas, nuclear, and hydropower.[147] This institutional industry poses significant barriers to entry. A potential entrant needs access to the market through the grid itself, which implicitly requires exceptional amounts of capital. Further, that effort becomes even harder when the players within such an industry are regulated monopolies that have not faced competition in many years.[148] To successfully enter any industry, a new entrant can have

144. *See Solar Market Insight Report Q2*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/research-resources/solar-market-insight-report-2015-q2data [http://perma.cc/GAX5-X6ZG] (last visited Oct. 13, 2015) (showing the burst of solar growth between 2006 and 2014); *see also Solar Industry Data: Solar Industry Breaks 20 GW Barrier—Grows 34% Over 2013, supra* note 93 (asserting that "through the first half of the year [2015], the solar industry has supplied 40% of all new 2015 electric generating capacity . . . ."); *cf.* Plumer, *supra* note 5 (asserting that utilities would not attack net metering laws if they did not feel threatened by such policies).

145. *See* ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T OF ENERGY, THE HISTORY OF SOLAR, https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf [http://perma.cc/7ZP5-KZG3] (last visited Sept. 23, 2015) (showing timeline of the development of solar energy).

146. *See* Farkas, *supra* note 55, at 91 ("In 1931, Edison, rather prophetically, commented, 'I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait till oil and coal run out before we tackle that.'").

147. *See* THE ENERGY CTR., PURDUE UNIV., ELECTRIC UTILITIES, DEREGULATION AND RESTRUCTURING OF U.S. ELECTRICITY MARKETS, http://www.purdue.edu/discoverypark/energy/assets/pdfs/History.pdf [http://perma.cc/Q7FJ-ZFPB] (last visited Sept. 23, 2015) (chronicling the history of the U.S. utility industry).

148. The U.S. government regulates the utility industry and allows for a "natural" monopoly. *See, e.g.*, THE REGULATORY ASSISTANCE PROJECT, ELECTRICITY REGULATION IN THE US: A GUIDE 3–4 (2011), http://www.raponline.org/document/download/id/645 [https://perma.cc/QD5Y-EL2M] (discussing the history of government regulation indicating competition is not prevalent in the public utility industry). The premise is that utilities such as water, gas, and electricity cannot and should not have true competitors, as they are necessities. Deregulation in the 1980s only occurred within the power wholesale suppliers. Consequently, utilities preserved their monopoly by maintaining the distribution arm of the energy in-

several approaches: it can offer a better product, either in cost or quality, or carve out a specific niche from which it can then grow. In this situation, solar can fit that specific niche, if not in cost, then by appealing to environmentally-concerned consumers. Yet, it still has had to overcome the particular obstacles of the energy industry. Contemplating not only the traditional but also industry-specific barriers to entry, it is understandable why it has taken many years for solar energy to emerge.

A. A Short Comparison of Solar Energy with New Technologies Since the Eighteenth Century

Comparing solar technology to other technological evolutions in the past three centuries reveals the solar industry's inimitability. A recent technological evolution, historically speaking, was the Industrial Revolution. Through several "waves" in the nineteenth century, the industrial machine emerged and changed society.[149] From advancements in textile[150] to evolutions in transportation,[151] industry as a whole evolved. These technologies replaced well-established and accepted methods of operation that had been in place for hundreds of years.[152] A revolution of similar importance occurred near the end of the twentieth century[153] and is arguably still ongoing. First, the Internet appeared.[154] Then, the personal computer was introduced, fully able to crunch numbers at an incredible rate and provide instant access to an incredible amount of

dustry. Up to this point, solar's most significant usage has been on the individual level. In theory, solar can compete within the wholesale market, but, thus far, that has not been solar's niche. Moreover, deregulation of the utilities did not impact their role as a distributor. Solar, however, does disrupt distribution because users will spend money on their solar system, rather than on the utility to provide electricity. Thus, the utilities are facing direct competition from solar power. It is a perplexing dynamic. *See, e.g.*, *id.* at 3, 8, 10, 32.

149. *See Industrial Revolution*, HISTORY, http://www.history.com/topics/industrial-revolution [http://perma.cc/ED8N-4XJ6] (last visited Sept. 21, 2015) (describing the history of the Industrial Revolution).

150. *Id.*

151. *Id.*

152. *Id.*

153. *See* MATHIAS HUMBER, TECHNOLOGY AND WORKFORCE: COMPARISON BETWEEN THE INFORMATION REVOLUTION AND THE INDUSTRIAL REVOLUTION 2–3 (2007), http://infoscience.epfl.ch/record/146804/files/InformationSchool.pdf [http://perma.cc/5VLY-DBRW].

154. *See* BARRY M. LEINER ET AL., BRIEF HISTORY OF THE INTERNET 1 (2003), http://www.internetsociety.org/sites/default/files/Brief_History_of_the_Internet.pdf [http://perma.cc/6SXT-HF5N].

information.[155] Later, the cellular phone arrived, and within a short time period became a mini computer operating at levels significantly higher than computers from almost a decade earlier.[156] In time, it was accepted practice that the technology would advance and improve; the only thing needed was time for it to develop.[157] Further, the electronics industry did not consist of computers, cell phones, Internet routers, or anything of the like prior to the Information Age. The innovators of the Information Age created their own industry and market.[158] Similar to the Industrial Revolution, no market penetration or infiltration needed to take place. These small examples begin to spell out how different solar technology and its advancement are compared to other new technologies. Beyond the basic premise that the solar industry is attempting to infiltrate a traditional industry, additional characteristics of the solar industry distinguish it further from other technological evolutions.

1. Solar Is Entering an Industry Where It Offers the Same End Product as Its Competitors

First, the final product of solar is identical to the product provided by the utilities, creating a complex situation.[159] Regardless of the chosen electricity provider, the consumer receives the same final product: electricity. The Industrial Revolution was about creat-

155. *See Invention of the PC*, HISTORY, http://www.history.com/topics/inventions/invention-of-the-pc [http://perma.cc/8F6Z-PNHM] (last visited Sept. 21, 2015) (describing the invention of the PC).

156. *See* MICHIO KAKU, PHYSICS OF THE FUTURE: HOW SCIENCE WILL SHAPE HUMAN DESTINY AND OUR DAILY LIVES BY THE YEAR 2010 15 (2011) (describing Moore's Law and the theory that computer power doubles every eighteen months).

157. *Id.* In short, creators and inventors could envision items or products with knowledge that the science to create an idea did not exist, but they could assume that the ability to create or use such a product would likely become available as the technology advanced. *See, e.g.*, John Scott Lewinski, *Avatar Review: We Have the Technology. Now What?*, POPULAR SCI. (Dec. 15, 2009), http://www.popsci.com/technology/article/2009-12/avatar-review-we-have-technology-now-what [http://perma.cc/KC8A-VVRZ] (discussing how James Cameron thought of Avatar in the mid-1990s but waited years with confidence that the technology would develop for him to capture the film that he desired).

158. *See* HUMBER, *supra* note 153, at 6 (asserting that the service industry evolved in ways unforeseen).

159. This final product is energy that a household can, for example, use for electricity in their home. At a fundamental level, solar only provides this energy when the sun is out; however, the cost of solar energy battery storage is decreasing along with the solar technology. Thus, this intermittency distinction might become less and less of a problem. *See infra* notes 179–80 and accompanying text.

ing more than offered before, in a purely economic sense.[160] A textile mill could produce a far greater amount of textile after the new technology was introduced,[161] and new energy based on coal and oil provided more energy than before.[162] Solar panel systems are also innovations in technology, but the appeal of solar lies in its potential to be a clean and limitless source of energy. Right now, solar is a more sustainable source of energy than commonly-used fossil fuels; yet its price is only just becoming competitive, and its cost-efficiency might derive from legislative schemes. A huge factor in assessing the viability of solar power in one of the U.S. states is the net metering policy of that state. Above, this Note identified net metering as a policy requiring the utilities to reimburse their customers for using solar.[163] In other words, the utilities had to pay their customers for using a source of energy provided by the utilities' competitors. Though there was government assistance in establishing corporate law, banking, and a legitimate infrastructure, this type of mandate, where a business was required to compensate its customer for using the business's competitor, did not occur in the Industrial Revolution. With the help of enabling policies from state and federal governments (that did not include paying a customer when using a competitor's product), superior processes emerged, and the industry began to grow. Solar energy has not approached that level of influence. If an alternative option to providing electricity were economically feasible and practical, such an option would likely succeed. Thus, there is an opportunity to enter the electricity supplier market, yet the prevailing solar energy industry does not currently seem ready to do so.

2. The Solar Market Has Not Yet Revolutionized the Energy Market

The Information Age resulted in new products and therefore new markets and industries.[164] Thirty years ago, there was no cell phone market, no Internet provider market, and the personal

160. *See Industrial Revolution*, *supra* note 149.

161. *See id.*

162. *See generally* Tony Wrigley, *Opening Pandora's Box: A New Look at the Industrial Revolution*, VOXEU (Jul. 22, 2011), http://www.voxeu.org/article/industrial-revolution-energy-revolution [http://perma.cc/3D75-2ZWL].

163. *See supra* Part II.A.

164. *See generally* HUMBER, *supra* note 153.

computer industry was in its beginnings.[165] Meanwhile, over fifty years ago, the utilities controlled a grid that was not significantly different than the grid currently in place.[166] Further, the solar industry continues to rely on that grid.[167] The Information Age, on the other hand, piggybacked on the technology from the past and advanced it. Today, we look at computers from the 1990s as ancient, while the solar industry works with a grid from the first half of the twentieth century. Moreover, the Information Age introduced new technology that people could use in their everyday lives in ways they never had before. There was a new industry frontier that had a low cost market entrance and undefined room for innovation available. However, neither the option to overhaul an existing technology nor the choice to create a new market for electricity supply is available to solar industry participants at this juncture. Thus, the solar industry is distinct from past emerging technologies.

3. One of Solar Energy's Most Attractive Qualities Is That It Offers Self-Sustainability and Environmental Awareness

I assert that solar energy's most appealing characteristics at the present time are that it is a renewable energy and has the potential to reach a price that can replace other sources of energy such as natural gas, coal, or oil. It is a renewable energy that can be clean and sustainable. Past emerging technologies, to reiterate, offered better products, cheaper prices, or new opportunities. Solar does not yet present market-altering possibilities that will revolutionize the energy industry.[168] I contend that the solar industry has carved out a sustainable niche that will capture a number of consumers, but for it to compete with and replace fossil fuels, solar must offer

165. *See Invention of the PC*, *supra* note 155.

166. *See* JS, *How Electricity Grew up? A Brief History of the Electrical Grid . . .* , BUZZ (Oct. 25, 2012), https://power2switch.com/blog/how-electricity-grew-up-a-brief-history-of-the-electrical-grid/ [https://perma.cc/H9D6-23M3].

167. *See supra* Part II.A. A solar owner must be connected to the grid to receive the benefits of net metering. *See supra* Part III.A.

168. *But see* Randall, *supra* note 4 (relying on the Deutsche Bank report and contending that the solar power industry is emerging in the near future). In using the words "market altering," I do not dismiss the various soft factors (i.e. environmental awareness, self-sustainability, etc.) that play a role in one's decision to invest in solar energy. However, I do contend that solar cannot reshape the utility and national grid model by solely relying on attractive soft factors and government incentives. There is a difference between having below a ten percent market share and providing a majority of the electricity to consumers.

more than a social argument grounded in environmental concern or self-sustainability. Advocates claim solar does and can offer a better product than most utilities, but their definition of better is different than the utilities' definition.[169] In their opinion, "better" means a sustainable energy source that not only benefits the environment, but also exists with an almost unlimited gas tank.[170] It is an attractive alternative with cost limitations, though in recent years, the cost of solar has decreased to a level where utilities are challenging certain solar policies, as stated earlier in this Note.[171] As beneficial as solar is, it still must come at an economical price for the benefits of sustainability to outweigh the inexpensive electricity offered by utilities. The benefits and detriments are allegedly beginning to offset, yet the driving force for this must be natural instead of artificial.[172] Hence, solar incentives that are approaching expiration and facing utility challenges, on the federal and state levels, have created a tipping point where, once it passes, whether the growth of solar energy is artificial or natural will be ascertainable. Accordingly, a proper review of this tipping point must explicitly develop these characteristics in the context of other technologies to illustrate the original impetus for solar.

4. The Government Actively Has Attempted to Advance Solar Technology

Finally, because solar remains a realistic source of renewable energy, the government has been heavily involved in advancing solar energy. This Note assumes that some form of government incentives at the federal, state, or local level will continue to exist.[173] Since the introduction of PURPA, favorable solar policy has ex-

169. For example, some solar supporters assert that large-scale solar plants can be one solution that is superior to the fossil fuel supported grid. *See e.g.*, *Utility-Scale Solar Power*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/power-plant-development/utility-scale-solar-power [http://perma.cc/6J6T-ZJTT] (last visited Sept. 26, 2015) (making a case for utility scale solar power and its advantage over the utility industry).

170. *Id.*

171. *See* Randall, *supra* note 4. *See also supra* Part III.A.

172. *Id.*

173. *See generally* DATABASE ST. INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/ [http://perma.cc/5PU9-PVC6] (last visited Sept. 26, 2015) (displaying a general map where upon selecting a state, the database provides an exhaustive list of that state's renewable energy policies). There are expansive renewable energy incentives in many states. *See id.*

panded to state and local levels.[174] These incentives, though, were the natural progression of the U.S. government's conscious investment in solar industry. The U.S. government for years invested resources in renewable energy.[175] The investment in solar research and later enacted incentives depict a consistent desire to make solar energy a realizable source of electricity for U.S. citizens. This approach can be criticized by solar opponents or commended by solar advocates, but either way, it adds to the particularity of the solar industry. Governments throughout the U.S. political system wanted to advance solar energy and therefore took steps to make the technology feasible.[176]

B. Solar Energy's Most Distinct Quality Is Derived from Its Inherent Limitations and the Resulting Relationship with the Utility Companies

Having established that solar energy is unlike other products that have come before it because: 1) it is a product based not only in economic efficiency, but also in social awareness; 2) it is not creating a new market; and 3) it is openly supported by the federal and many state governments in the United States, this Section identifies the most problematic feature of solar energy to be its dependence on the grid. This dependence is not innate; rather, it is an indirect product of solar energy's inherent limitations. First, where people live greatly influences the amount of solar energy available to them.[177] People who live in Seattle, Washington, for example, will not receive the same amount of sunlight as those in Scottsdale, Arizona. This can have an impact on consumers' decision to invest in solar energy, and therefore limit the market for solar. Second, solar does not provide sufficient certainty for a casual investor to completely disconnect from the grid because the panels will not be

174. *Id.*

175. *See, e.g.*, Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, § 210, 92 Stat. 3117, 2144 (enacting one of the United States' earliest incentives for consumers to invest in renewable energy); s*ee also* ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T OF ENERGY, *supra* note 145 (describing an incident when astronauts attempted to work with solar energy while in space).

176. *See, e.g.*, DATABASE ST. INCENTIVES FOR RENEWABLES & EFFICIENCY, *supra* note 173.

177. *See Solar Energy*, ALTERNATIVE ENERGY, http://www.altenergy.org/renewables/solar.html [http://perma.cc/S75Y-97BE] (last visited Sept. 26, 2015).

in use for a portion of the day.[178] To rely solely on one's own solar energy system, without the aid of utility-provided power, a consumer must invest in solar storage batteries.[179] Although the capacity of such batteries has increased over the past few years, this still is another expense in the installation of solar energy.[180] Nonetheless, the fact remains that solar panels will not be effective during the night. Thus, the government is backing a technology that is inherently limited.[181] Given these limitations, and as the next Section will address, the states' and utilities' apprehension to consider battery-stored energy as "renewable," solar energy users must remain connected to the grid.

1. The Net Metering Incentives for Consumers

The net metering laws referenced earlier all require that the solar user be connected to the local grid.[182] The meter in net metering calculates the amount of excess energy a household has from its solar panels and nets that amount with the total amount of energy used from the utility-provided energy.[183] The household's excess energy is a credit to the energy bill from the household's usage of

178. *See* Stephen Lacey, *Storage Is the New Solar: Will Batteries and PV Create an Unstoppable Hybrid Force?*, GREENTECH MEDIA (June 15, 2014), http://www.greentechmedia.com/articles/featured/Storage-Is-the-New-Solar-Will-Batteries-and-PV-Create-an-Unstoppable-Hybri [http://perma.cc/H9FB-HJ8R] (showing that the capacity for solar batteries is increasing, with a hopeful future).

179. *Id.*

180. *Cf.* Ehren Goossens & Mark Chediak, *Battery-Stored Solar Power Sparks Backlash from Utilities*, BLOOMBERG BUS. (Oct. 8, 2013), http://www.bloomberg.com/news/2013-10-07/battery-stored-solar-power-sparks-backlash-from-utilities.html [http://perma.cc/8FMD-U6B7].

181. However, the increasing storage capacity and decreasing costs of ion batteries are mitigating the problems associated with solar energy capacity during nighttime hours. *See* Valentin Muenzel, Iven Mareels & Julian de Hoog, *Affordable Batteries for Green Energy Are Closer than We Think*, CONVERSATION (July 22, 2014), https://theconversation.com/affordable-batteries-for-green-energy-are-closer-than-we-think-28772 [http://perma.cc/6KVT-JAQT] (discussing study that indicates that storage costs are "rapidly falling"). Were this to continue, a solar owner, in theory, would no longer need to rely on the grid; in essence, severing his or her relationship with the utilities.

182. *See* Michael Giberson, *No Net Metering Without Grid Connection, No Net Metering Controversy Where Wires and Energy Products Are Unbundled*, KNOWLEDGE PROBLEM (Mar. 19, 2014), http://knowledgeproblem.com/2014/03/19/no-net-metering-without-grid-connection-no-net-metering-controversy-where-wires-and-energy-products-are-unbundled/ [http://perma.cc/6FCG-JVW2]; *see also Net Metering 101*, *supra* note 7 (detailing the net metering process).

183. *See Net Metering 101*, *supra* note 7 (describing the net metering calculation).

grid energy.[184] Net metering laws are strictly drafted, though, and some do not permit a household to credit excess energy that has been stored in an external battery before being given back to the utilities.[185] As utilities have stated, the law is to incentivize the usage of energy from a renewable source, and in their opinion, stored excess energy does not come directly from a renewable source.[186] This is another battle within net metering, and this situation portrays one more example of why solar owners stay connected to the grid. Through net metering, there remains a guaranteed benefit that offers the homeowner the possibility to recover his or her initial investment in the technology at a faster rate.[187] As a result, solar owners do not disconnect from the grid, meaning solar is rarely the sole source of energy for the user.

2. A Strange Arrangement: The Solar Industry's Current Benefits from Net Metering

The utilities established the grid system in the twentieth century.[188] The utilities provide their electricity through the grid system,[189] and they are caretakers of that grid.[190] Their competitor—the solar industry—is incentivized to have customers stay connected to the grid at the expense of the utilities.[191] This is an abnormal business relationship. An electric car company such as Tesla directly competes with other major car developers.[192] The appeal of Tesla is that it is an affordable luxury car that can compete with other luxury cars of similar price.[193] Tesla has a natural competitor in

184. *Id.*

185. *See generally* Goossens & Chediak, *supra* note 180.

186. *See id.* This is how utilities claim that storage systems increase the possibility of fraud because they do not know where the energy comes from, and thus they reject solar owners' applications for net metering. *Id.*

187. *Id.*

188. *See* JS, *supra* note 166.

189. *See* Richard Hirsh, *Emergence of Electrical Utilities in America*, NAT'L MUSEUM AM. HIST., http://americanhistory.si.edu/powering/past/h1main.htm [http://perma.cc/9MAY-5ER7] (last visited Sept. 26, 2015).

190. *Id.*

191. *Id.*

192. *See Tesla Motors, Inc. (TSLA): Competitors*, YAHOO! FIN., http://finance.yahoo.com/q/co?s=TSLA+Competitors [http://perma.cc/K7JT-CQHU] (last visited Sept. 26, 2015) (providing a list of Tesla's direct competitors).

193. *See* Alex Davies, *Consumer Reports: Tesla Model S Is the Best Car You Can Buy*, BUS. INSIDER (Feb. 25. 2014), http://www.businessinsider.com/consumer-reports-tesla-model-s-

other car companies, yet Tesla's competitors do not pay Tesla-using consumers for every mile they have driven their Tesla. Most state legislatures, on the other hand, have created a law that forces local energy companies to buy electricity from customers.[194] The utilities do not need this excess energy; they are capable of generating the necessary level of energy to support the electricity usage of their customers. Yet they are required to purchase excess solar energy from their pseudo-customer, who is connected to the grid, but does not use it.[195] The solar energy industry, thus, partially relies on its customers to remain connected to the grid and for the caretakers of the grid, the utilities, i.e. solar's competitors, to compensate those very customers.

That arrangement is downright bewildering.[196] The solar industry exists within an unfamiliar dynamic, and because of this the next steps in its development are entirely unpredictable. One cannot look to history to create a reasonable prediction of where the solar industry will be twenty years from now. In the same way, one cannot look to the aggressive projections of solar reaching grid parity by 2016 to confirm that the solar industry is about to take off.[197] Further, it is difficult to claim grid parity for solar energy when some of solar's earliest incentives rely on its direct competitor as a subsidizer. This Note does not assert there is one approach to guaranteeing either the success or demise of Solar Energy. Its purpose is rather to emphasize that policymakers must make a decision on how to approach solar energy so that the industry can grow in a truly cognizable way. Since the industry is in uncharted territory, those policies must be subject to change, but how the government will approach solar must be predictable. Moreover, within that policy-making, Congress must acknowledge the particular relationship between solar energy and its utility competitors. Ignoring this giant

best-overall-car-2014-2 [http://perma.cc/KR4E-QK6L] (summarizing the consumer report detailing the appeal of a Tesla).

194. *See Net Metering 101*, *supra* note 7 (noting that excess energy is sold back to the utility within net metering).

195. *Id.*

196. In essence, net metering has the makings of a parasitic relationship with its host, the utilities. The more energy the solar panels generate, the more energy the utilities must buy-back from the customer, though the utilities do not need this excess energy nor have offered to purchase it. The owner uses net metering at the expense of the utilities, yet must be connected to the grid to receive any benefit.

197. *See* Randall, *supra* note 4 (citing a recent report that solar will reach grid parity by 2016).

hurdle might preclude solar and the utilities from finishing the race and creating a solution, e.g., creating a platform where utilities can switch their own permanent source of energy to solar and coexist with residential solar owners who maintain their own system. This leads us to the next issue: the governmental justification for encouraging the development of solar energy.

3. The Governments' Justification for Its Net Metering Policy and Other Favorable Solar Policies Might Have Been to the Solar Market's Detriment

The governments of the United States have followed this pro-solar path for almost half a century, on the grounds that solar energy could be a source of sustainable energy and thus the energy source of the future.[198] This is a fair assumption given the limited life of fossil fuels. These policies have created an interesting dynamic within the solar industry. Investing resources in developing solar energy is dramatically different than incentivizing consumers to invest in solar panels. At first, when the technology of solar was still expensive, this incentive system had little impact, and the utilities were not nearly as concerned with their new competition.[199] Since 2013, though, solar has become more commercially viable and has continued to grow.[200] Consequently, those incentives, which benefit consumers, have instigated a reinvigorated roadblock in the utilities, which—due to certain government policies—have played a role in the advancement of their direct competitor.[201] This is an issue because the solar industry relies on competitors who have little interest in continuing to permit it to take a free ride on the grid system. Thus, though consumers are now benefitting from the government incentives to invest in solar, in the long run these very policies could be preventing solar from instituting an in-

198. *See* MARK BOLINGER, AN ANALYSIS OF THE COSTS, BENEFITS, AND IMPLICATIONS OF DIFFERENT APPROACHES TO CAPTURING THE VALUE OF RENEWABLE ENERGY TAX INCENTIVES 4–5 (2014), http://eetd.lbl.gov/sites/all/files/lbnl-6610e_0.pdf [http://perma.cc/8GJ7-HYRT] (describing the economic rationale for incentives and specifying that some of the externalities caused by using fossil fuels are not reflected in energy prices, thus making incentives necessary).

199. *See* Plumer, *supra* note 5 (summarizing challenges to net metering that have occurred within the last several years).

200. *See* Shahan, *supra* note 2.

201. *Id.*

frastructure that does not directly rely on utilities and the grid to the extent that it now does.

This Note contends that this is the result of pushing a social alternative onto a fundamentally economic market.[202] An alternative form of energy was introduced to the market because of the concerns created by a finite fossil fuel supply. As seen in the last quarter of the twentieth century, those social concerns did not jumpstart the emergence of the solar industry. That jump occurred because the costs of installing solar energy fell to an economically viable level.[203] Solar has continued to become cheaper, and socially-based policies are now at the forefront because the industry has grown. Projections are that solar will continue to grow, but not all have considered the inherent limitations these policies have placed on the solar market.[204] Solar energy continues to get cheaper, yet net metering, which requires utilities to reimburse customers, might serve as Cupid's arrow to the customers' initial attraction to solar energy. Looming Public Service Commission net metering decisions can fracture that arrow and lessen that incentive to participate in net metering and solar. In other words, a state government policy meant to incentivize the use of solar energy could instead cause the industry to participate in a battle it would not have to fight had the legislatures not enacted net metering. Beyond this policy, a similar argument can be made against the ITC.

The ITC was extended several times and has undoubtedly been an incentive for consumers to invest in solar technology.[205] Congress never intended for that incentive to last permanently.[206] The credit played some role in the expansion of solar technology, for it allowed the solar industry to create an observable base within residential areas. Congress had to foresee that the incentive would eventually expire. For residents or third parties investing thousands of dollars in solar energy, a thirty percent ITC is massive. The disappearance of such a credit surely would negatively impact

202. *See* BOLINGER, *supra* note 198 (noting that these are not easily seen externalities and are only capable of being seen when used in the extreme aggregate).

203. *See, e.g.*, DATABASE ST. INCENTIVES FOR RENEWABLES & EFFICIENCY, *supra* note 173.

204. *See Net Metering 101*, *supra* note 7.

205. *See* SOLAR ENERGY INDUS. ASS'N., *supra* note 41.

206. *Id.*; *see also* MUELLER & RONEN, *supra* note 67 (discussing in the report that Congress is considering finally letting the tax expire with little indication of extending the tax at this rate).

the solar industry.[207] Solar cost has decreased to an extent where expiration of the ITC will not permanently damage the solar industry. Yet, reasonable investors, regardless of price, will find an investment less attractive once they become aware that such an investment would have been cheaper only months earlier. I do not conclude that solar is permanently affected by these policies, nor do I proclaim solar will easily overcome this situation or that the government indirectly made the solar industry's path to independence from utilities more difficult. The verdict is that these three explanations depict the state of solar industry. The spark of solar policy permitted the industry to take off, but only within margins unintentionally put in place by Congress and state legislatures.

V. CONCLUSION: PROPERLY ASSESSING THE SOLAR INDUSTRY REQUIRES AN ALTERATION OF EXPERTS' ANALYTICAL PRESCRIPTION

The history and arguments discussed reveal the opaque situation within the solar energy industry. Solar faces crucial years that will impact generations of people after ours. It is proper at the current time to dive into the murky water that surrounds the solar industry because common projections[208] and favorable articles are becoming more commonplace without acknowledging certain hindrances that the solar industry must overcome to reach a significant market share within the energy industry. One must acknowledge the uniqueness of the solar market to give it a proper assessment. Solar energy will not disappear because of these problems or features, but its trajectory is not secure. Its path is wavering, and the range for what it will become will shrink within the next few years. Government policy will greatly influence whether solar energy falls between a new major source of sustainable energy on one side and simply an alternative source of energy on the other. The policy in

207. *See Third-Party Financing*, *supra* note 84.

208. These common projections range from the state to the international level. Projects—such as the *Pathways to Deep Decarbonization* report—anticipate a large increase in renewable energy production to combat the negative effects of climate change. *See* SUSTAINABLE DEV. SOLS. NETWORK & INST. FOR SUSTAINABLE DEV. AND INT'L RELATIONS, PATHWAYS TO DEEP DECARBONIZATION 207 (2014), http://deepdecarbonization.org/wp-content/uploads/2015/06/DDPP_Digit.pdf [https://perma.cc/6YZF-FJKQ] (projecting that renewable energy will account for forty percent of United States electricity generation by 2050). As I have stated, there is no proscribed route to accomplish this growth, but these forecasts only increase the pressure for conscious U.S. government support like that which has occurred in the past half-century.

place has allowed the solar industry to grow to its current status, and now the government must support a policy that will rid the solar industry of utility-based constraints and allow it to, for better or worse, develop as an independent source of energy.