

# SOLAR POWER IN THE U.S.

LESSONS LEARNED AND GUIDANCE FOR POLICYMAKERS



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## FOREWORD

Solar power is the fastest growing energy source in the United States. With the number of regulations governing the power sector rising and the cost of solar panels dropping, many policy makers and utilities have looked to solar power as a sound investment for the future. Individual consumers, too, have pursued rooftop solar in hopes of reducing household electricity costs and becoming more independent of their power provider. Today, according to the Solar Energy Industries Association, there are now more than half a million homes and businesses in the country with a solar installation.

For all of its positive contributions, though, the rapid rise of solar power has also introduced a new set of challenges. Homeowners have been exposed to unscrupulous installers and sales teams, warranty troubles, insurance issues, maintenance complications, and property transference issues. Previously hidden problems such as fire safety concerns have come to light. In some cases, solar companies have even run afoul of federal and state lawmakers. The reality is, given the nation's relative lack of experience with wide-scale solar use, no one knows the magnitude of the challenges solar power presents today or the challenges that lie ahead of us.

The taxpayers, consumers, and electricity ratepayers of the United States have much at stake in the nation's pursuit of a solar future, whether they choose solar for their homes or businesses or not as solar policy can impact all ratepayers. For that reason, regulators, policy makers, and market innovators have a responsibility to address the challenges solar power poses today and begin to anticipate future problems that could arise. This is especially true as issues surrounding solar power continue to be politicized, rendering objective analysis difficult.

This paper is intended to provide a useful starting point for discussions among policy makers about how to chart a path toward a solar future that is fair and sustainable for everyone, including the solar industry. Consumers deserve to have a full understanding of the benefits and challenges of this growing technology. There is no doubt our shared energy future will include solar power. Let's learn the lessons the past has to offer.

## CARE



Founded in 2005 by former TV anchor and radio talk show host, Mark E. Mathis, **Citizens' Alliance for Responsible Energy (CARE)**, advocates for responsible energy policies. CARE's mission is to simplify the conversation about energy production and provide citizens with a more thorough understanding of how energy policy decisions affect their day-to-day lives.

## MARITA NOON



**Marita Noon** joined CARE as Executive Director in 2007. As an author of 20 books and with an accomplished career as a Christian public speaker, Marita has utilized her enthusiasm and experience to call for more responsible energy policies. With Marita's help, CARE has broadened the national dialogue about the costs and benefits of energy resources and the importance of protecting consumers.



# SOLAR POWER IN THE U.S.

## LESSONS LEARNED AND GUIDANCE FOR POLICYMAKERS

### INTRODUCTION

In 1997, the U.S. Department of Energy (DOE) introduced the Million Solar Roofs initiative. Upon its conclusion in 2006, the program claimed to have contributed to the installation of more than 377,000 solar water-heating, photovoltaics (PV), and solar pool-heating systems with 200 megawatts (MW) of grid-connected PV capacity and 200 MW of solar water-heating capacity. The program boasted an investment of over \$16 million.<sup>1</sup> Next came the DOE's Solar America Initiative, which had the goal of cost parity with traditional electricity generation, and ended in 2009. The DOE invested more than \$168 million in an attempt to transform the solar market.<sup>2</sup> In 2011, the DOE announced its Sunshot Initiative and has funded over 350 projects to date, with the goal of making solar power more affordable and competitive with traditional energy sources.<sup>3</sup>

People in the United States, especially in the Southwest, have eagerly embraced the technology that promises “free” electricity and the opportunity to make a positive impact on the environment. As solar implementation has become a reality, many early adopters of solar have had a change of heart. One example is the New Mexico community of Eldorado, about 15 miles outside of Santa Fe, which contains close to 200 solar installations. Many systems installed are larger than needed and have created friction between residents over the aesthetics of the panels.<sup>4</sup>

The U.S. government continues to encourage the growth of the solar energy market even though problems like this have arisen, along with new concerns about consumer protection. According to the Solar Energy Industries Association, more than half a million homes and businesses in the country have a solar installation. Much of that is attributed to subsidies and the declining cost of the panels. Since 2010, the cost of solar panels has dropped 62 percent.<sup>5</sup> While the majority of solar installations sit in California and the Southwest, the industry continues to make significant inroads into other states, such as North Carolina and New Jersey, and will likely continue to grow into new markets.

This has produced its share of policy, regulatory, and consumer protection issues, as the nascent industry expands into new markets. Several companies have run afoul of federal and state officials, while homeowners have been exposed to unscrupulous installers and sales teams, warranty troubles, insurance issues, maintenance complications, and property transference issues. Additionally, hidden problems such as fire-safety concerns have become apparent. Given the infancy of this new industry, significant additional problems likely will arise over the coming years.

All of this affects the citizens of the United States, as taxpayers, consumers, and ratepayers—whether they choose solar for their homes or businesses or not. As such, regulators, policy makers, and market innovators have a responsibility to address the problems that have become apparent, as solar power continues to spread, and anticipate any issues that might arise in the future with better policy today. The subject of solar power, and its associated virtues and issues, has become highly politicized over time—making earnest analysis difficult.

**All of this affects the citizens of the United States, as taxpayers, consumers, and ratepayers—whether they choose solar for their homes or business or not.**

This paper intends to provide a clear starting point for regulators, policy makers, market innovators, and especially consumers to have a better understanding of rooftop and ground-based solar programs and installations by aggregating and exploring the key issues related to solar power, as they have manifested within the last decade.

### SUBSIDIES, CREDITS, LOANS AND MANDATES

The 2014 elections saw more outside and third-party spending than any election in history.<sup>6</sup> Tom Steyer, a retired hedge-fund billionaire, donated close to \$74 million and at least \$50 million of that went to the group NextGen Climate, which supports solar power and climate-change legislation. The solar industry has previously played a major part in California elections, but now solar-backed funding is making an impact across the country.

<sup>1</sup> U.S. Department of Energy. Laying the Foundation for a Solar America: The Million Solar Roofs Initiative <http://www.nrel.gov/docs/fy07osti/40483.pdf>

<sup>2</sup> U.S. Department of Energy Solar Technologies Program. The Department of Energy's Solar America Initiative. <http://web.ornl.gov/sci/solarsummit/presentations/DOEHQsolar.pdf>

<sup>3</sup> Energy.Gov: Office of Energy Efficiency & Renewable Energy. <http://energy.gov/eere/sunshot/about>

<sup>4</sup> Constable, Anne. (2015, Jan. 24). Eyesore or asset? Eldorado Wrangles with Solar Boom. Santa Fe New Mexican. [http://www.santafenewmexican.com/news/local\\_news/eyesore-or-asset-eldorado-wrangles-with-solar-boom/article\\_c3b84409-cb6e-58f1-9d7c-88508d016269.html](http://www.santafenewmexican.com/news/local_news/eyesore-or-asset-eldorado-wrangles-with-solar-boom/article_c3b84409-cb6e-58f1-9d7c-88508d016269.html)

<sup>5</sup> Solar Energy Industries Association. Q2 2014 SMI Fact Sheet. <http://www.seia.org/research-resources/solar-industry-data>

<sup>6</sup> Khan, Naureen. (2014, Nov. 5). Big Money Prevails in 2014, With Outside Spending Playing A Starring Role.

Aljazeera America. <http://america.aljazeera.com/articles/2014/11/5/big-money-prevailsin2014withoutsidespendingplayingstarringrole.html>

Examples include the highly contested Public Service Commission race in Louisiana between solar candidate Forest Bradley-Wright, a Democrat who changed his party affiliation and ran against incumbent Eric Skrmetta as a Republican. Pro-solar PACs made significant contributions in the primary to get Bradley-Wright to the runoff.<sup>7</sup> The solar industry paid out more than any other donor in the Georgia Public Service Commission race<sup>8</sup> and in Arizona, the Arizona Corporate Commission race saw candidates receiving large donations from groups like Tell Utilities Solar Won't Be Killed (T.U.S.K) and Save Our Future Now.<sup>9</sup>

If the solar industry continues to exert power politically, it can be expected to have significant influence on local, state, and national policy. The political pressure and money from the solar industry will bring on mandates, more subsidies, and tax credits—accelerating the adoption of renewable energy sources, without a complete picture of the full consequences.

## Federal Loan Program Controversies

The United States Department of Energy offers three loan programs<sup>10</sup> supporting clean energy, summarized in Veronique de Rugy's testimony before the House Committee on Oversight and Government Reform:

- Section 1703 of Title XVII of the Energy Policy Act of 2005 authorizes the U.S. Department of Energy to support innovative clean energy technologies that are typically unable to obtain conventional private financing due to high technology risks.
- Advanced Technology Vehicles Manufacturing loans support the development of advanced technology vehicles and associated components in the United States. They also meet higher-efficiency standards.
- The Section 1705 Loan Program authorizes loan guarantees for U.S.-based projects that commenced construction no later than September 30, 2011 and involve certain renewable-energy systems, electric power-transmission systems, and leading-edge biofuels.<sup>11</sup>

Solyndra was one of the most high-profile companies to fail after receiving a loan from the Section 1705 program. Formed in 2005, Solyndra was a manufacturer of solar cells based in Fremont, California. Solyndra received a \$535 million U.S. Department of Energy loan guarantee in 2009. In 2011, the Chinese solar-panel market drove prices down as much as 42%, causing the company to file for bankruptcy, close its plant, and lay off 1,100 people. Solyndra also received a \$25.1 million tax break from California's Alternative Energy and Advanced Transportation Financing Authority.<sup>13</sup>

Funded by the same federal program as Solyndra, Abound Solar was a Colorado company that manufactured cadmium telluride modules—a thin-film photovoltaic technology. Abound Solar failed to pay nearly \$1 million in property and equipment taxes for the 2011 year before it went bankrupt in July 2012. Like Solyndra, Abound Solar was affected by the fall in panel prices from the global oversupply caused by competition with China. Before its bankruptcy, Abound had drawn down \$70 million on a \$400 million loan guarantee from the Department of Energy. Taxpayers are estimated to have lost \$40-\$60 million in the collapse.<sup>14</sup> Weld County was estimated to have lost more than \$180,000 due to the unpaid taxes. After the bankruptcy, state inspectors found 2,000 pallets of panels in Denver and Longmont warehouses, and gallons of cadmium waste in Fort Collins and Longmont facilities that had to be cleaned up.<sup>15</sup> (Although the environmental impact of solar panels and waste are beyond

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the scope of this paper, it is important to note that cadmium is extremely toxic and known to cause cancer.<sup>16</sup>) Some of the other solar companies that have filed bankruptcy, after receiving a DOE loan, include: Beacon Power, with a \$43 million loan<sup>17</sup> and Evergreen Solar, with a \$25 million loan.<sup>18</sup> Of note in the Evergreen Solar case is how much money was

<sup>7</sup> Hammer, David. (2014, Nov. 10). Alternative Energy Advocate Forest Bradley-Wright Gets Key Endorsement. WWLTV.

<http://www.wvltv.com/story/news/2014/11/10/alternative-energy-advocate-forest-bradley-wright-received-a-key-endorsement/18790213/>

<sup>8</sup> Swartz, Kristi E. (2014, April 28). Solar Industry is a Top Donor in Georgia PSC Elections. E&E Publishing. <http://www.eenews.net/stories/1059998355>

<sup>9</sup> Gilger, Lauren. (2014, Oct. 27). Fact Check: Dark Money Floods Normally Low-Profile Corporation Commission Race. ABC15 Arizona.

<http://www.abc15.com/news/local-news/investigations/fact-check-dark-money-floods-normally-low-profile-corporation-commission-race>

<sup>10</sup> Energy.Gov: Loan Programs Office. <http://energy.gov/lpo/open-solicitations>

<sup>11</sup> de Rugy, Veronique. (2012, June 19). "Assessing the Department of Energy Loan Guarantee Program: Testimony Before the House Committee on Oversight and Government Reform."

Mercatus Center George Mason University. [http://mercatus.org/sites/default/files/DeRugy\\_testimony\\_final.pdf](http://mercatus.org/sites/default/files/DeRugy_testimony_final.pdf)

<sup>12</sup> Coons, Rebecca. (2011) "Solyndra Files For Bankruptcy." Chemical Week 173.22.

<sup>13</sup> Nash, James. (2011, Oct. 19). "Solyndra's \$25 Million Tax Break Defended by Lockyer." Bloomberg.

<http://www.bloomberg.com/news/2011-10-19/solyndra-s-25-million-california-tax-break-defended-by-lockyer.html>

<sup>14</sup> Harder, A. (2012, June 28). Solyndra Redux: DOE-Backed Solar Company Preparing to File for Bankruptcy. National Journal Daily.

<sup>15</sup> Jaffe, Mark. (2013, July 8). Bankrupt Abound Solar's Toxic Wastes Cleaned at Colorado Facilities.

The Denver Post. [http://www.denverpost.com/ci\\_23621546/bankrupt-abound-solars-toxic-wastes-cleaned-at-4](http://www.denverpost.com/ci_23621546/bankrupt-abound-solars-toxic-wastes-cleaned-at-4)

<sup>16</sup> United States Department of Labor. Cadmium. Occupational Health and Safety Administration. <https://www.osha.gov/SLTC/cadmium/>

<sup>17</sup> Hargreaves, Steve. (2012, Oct. 22). Obama's Alternative Energy Bankruptcies. CNN Money. <http://money.cnn.com/2012/10/22/news/economy/obama-energy-bankruptcies/>

<sup>18</sup> Groom, Nichola. (2011, Aug. 15). Solar Company Evergreen Files for Bankruptcy. Reuters. <http://www.reuters.com/article/2011/08/15/us-evergreensolar-idUSTRE77E49320110815>

also lost to taxpayers through the state of Massachusetts. The state received stimulus money through the American Recovery and Reinvestment Act and granted the company \$5.3 million for solar installations at 11 higher education institutions, as well as at a recycling facility and education center.<sup>19</sup>

SolarCity is often pointed to as the next Solyndra. In November 2013, Barron's summarized the company's financial state: "[SolarCity] has lost \$322 million since 2008, including \$91.6 million last year, on \$128.7 million in revenue. Analysts expect SolarCity to lose \$1.84 a share this year on \$146.1 million in revenue." The article notes that, although there is a divide on SolarCity's net worth, "what analysts can agree on is that SolarCity will need more financing, particularly as federal tax credits fall to 10% in 2017."<sup>20</sup>

## ...many third-party solar companies...exploit the benefits of the federal Solar Investment Tax Credit by over-reporting prices.

Employee and customer complaints about misleading marketing and flawed installations have plagued SolarCity. Accusations of inflating prices for panels and installations by as much as 50 percent in order to receive larger tax credits for investors have followed the company. A study by Molly Podolefsky in 2013, found that many third-party solar companies, in particular SolarCity, SunRun and Sungevity, exploit the benefits of the federal Solar Investment Tax Credit by over-reporting prices.<sup>21</sup> Podolefsky also found that the price between the systems sold outright by the companies, versus the systems they financed, were dramatic. In her study, SolarCity's mean third-party system price exceeded that of the customer-owned system by \$3.00 per watt.

In March 2014, SolarCity admitted that it discovered an error in its financial reporting. The company found that \$20 million to \$23 million in expenses for system sales, the largest part of its business, were incorrectly allocated to its smaller leasing business. Its stock had been trading at near an all-time high of \$88.23 and dropped 2 percent on that news. Then on March 18, SolarCity issued a statement that its year-end reports for the previous three years were no longer reliable,

causing the stock to plunge another 6 percent.<sup>22</sup> SunRun and Sungevity have received subpoenas from the U.S. Treasury for accusations of similar practices. The suit will likely last two more years, while reviews of the books of the companies take place.

## Subsidies

Subsidies renewable industries receive on the federal and state level create, perhaps, the greatest boon to them. In a 2010 report, the EIA estimated that \$14.6 billion had been spent on subsidies and support for the renewable energy programs<sup>23</sup>. Estimates show \$70 billion spent globally on renewable energy subsidies.<sup>24</sup> This may also constitute the biggest threat to the industry in the U.S., as more states cut back on the subsidies and the federal government must choose whether or not to extend solar subsidies in 2016. The industry must prove that it can stand alone without the subsidies—which it may not.

In January 2015, a renewable-energy project filed for bankruptcy after ten, or more, years of operation. Minwind owns two small community-based wind farms in the southwest corner of Minnesota. One went online in 2002, the other in 2004. Investors, often local farmers, could take advantage of federal wind-energy credits, a now-discontinued state assistance program, and USDA grants. Minwind showed profits until 2012, however after some damage due to severe weather and a change in state policy that ended the subsidies, Minwind has filed for reorganization and seeks a buyer who will pay off the remaining debt. The owners stand to lose their investment, and the wind farms may have to shut down. Reports indicate that Minwind may be just the first of the approximately 100 small wind farms in Minnesota to find themselves in financial difficulty, as many were developed "in a way that was not in the public interest or the interest of the people developing it."<sup>25</sup>

As was learned at Minwind, subsidies and tax incentives mask what renewables actually cost. When these disappear, consumers can face unexpected expenses. Subsidies can also encourage rapid adoption of solar, leading to issues our infrastructure cannot deal with yet—an example of which is taking place in Europe. In the 1990s, Europe tried to transition to solar and wind rapidly, and in 2008 wholesale electricity prices fell in Europe and America. Investors put their money in renewable energy sources and Europe began closing fossil-fuel power plants that became less profitable because of the

<sup>19</sup> Noon, Marita. (2012, Sept. 30). Obama Never Admits Green Failure. Townhall Finance Daily.

[http://finance.townhall.com/columnists/maritanoon/2012/09/30/obama\\_never\\_admits\\_green\\_failure](http://finance.townhall.com/columnists/maritanoon/2012/09/30/obama_never_admits_green_failure)

<sup>20</sup> Salzman, Avi. (2013, August 31). Dark Clouds over SolarCity. Barrons. <http://online.barrons.com/articles/SB50001424052748704719204579025283044181654>

<sup>21</sup> Podolefsky, Molly. (2013, November). Tax Evasion and Subsidy Pass-Through under the Solar Investment Tax Credit. Discussion Papers in Economics, University of Colorado at Boulder.

<sup>22</sup> Martin, Christopher. (2014, March 12). SolarCity to Restate Results to 2012 on Accounting Error. Bloomberg.

<http://www.bloomberg.com/news/2014-03-03/solarcity-to-restate-results-to-2012-on-accounting-error.html>

<sup>23</sup> U.S. Energy Information Administration. (2011, Aug.1). Direct Federal Financial Interventions and Subsidies in Energy Fiscal Year 2010. <http://www.eia.gov/analysis/requests/subsidy/>

<sup>24</sup> Farge, Emma. (2012, Sept. 13). Gas Glut Threatens Climate Battle-IEA. Reuters. <http://uk.reuters.com/article/2012/09/13/energy-iea-gas-idUKL5E8KD4ZJ20120913>

<sup>25</sup> Shaffer, David (2015, Jan. 7). Owners of Two Minnesota Wind Farms File for Bankruptcy Court Protection. StarTribune. <http://www.startribune.com/business/287867471.html>

subsidies renewables received, including over 50 gigawatts of gas-fired plants. The German government now requires some of those power plants to stay operational, as they are needed to stabilize the system. Because the renewables receive dispatch priority, traditional power plants cannot operate profitably. Operators now seek subsidies in order to keep the plants open.<sup>26</sup>

Germany paid \$31.1 billion in subsidies in 2014 alone. Enormous guaranteed feed-in tariffs led to a very rapid, unexpected growth of PV installations during the past few years in Germany. When subsidies fall or go away, a significant loss of jobs could follow.<sup>27</sup> The rapid adoption of renewables here also caused a significant impact on the energy infrastructure. These renewable energy sources still need backup energy sources that can come online quickly and now Germany is building more coal plants and many European countries are building gas-fired plants along their borders for back up. Gas is extremely expensive in Europe, and this could mean consumer electricity costs will climb even more.<sup>28</sup> By September 2013, according to the leading German news magazine *Der Spiegel*, over 300,000 households in Germany saw their power shut off each year due to unpaid bills, and the government predicts that the renewable energy surcharge added to every consumer's electricity bill will increase from 5.3 cents to between 6.2 and 6.5 cents per kilowatt hour. On top of that, consumers pay a host of taxes, surcharges and fees for renewable energy, such as the *Erneuerbare-Energien-Gesetz* (EEG) levy.<sup>29</sup> The EEG levy increased from a 1.4 percent contribution to retail electricity rates in 2000 to 18 percent by 2013. Germany plans to revise its EEG system and, while a small reduction in the EEG levy is projected for 2015, predictions estimate this reduction will not have a significant effect on energy costs. Philipp Vohrer, managing director at the Agency for Renewable Energies, forecast this past October that an "average three-person household could save around €30."<sup>30</sup>

In April 2014, reports indicated the Europeans have found that subsidies have grown too large, are hurting their economies, and, as a result, many countries are now

slashing the subsidies. Costs have become so enormous that governments in European countries are unilaterally rewriting their contracts with renewable-generating firms and renege on the generous deals they initially provided. Spain, for example, ended its feed-in tariff, which guaranteed an extremely high price for renewable power, replacing it with a much lower subsidy or, in some cases, no subsidy. Spain reels from unanticipated cost hikes and has not recouped \$41 billion that it has provided to renewable generators since 2000.<sup>31</sup> Despite these efforts, the Solar Trade Association now anticipates that large solar farms in the UK may have to rely on subsidies for the next 14 years.<sup>32</sup>

## Germany paid \$31.1 billion in subsidies in 2014 alone.

Another example to look at is Australia. Australia's current Renewable Energy Target (RET) has subsidies for renewable energy projects costing taxpayers up to \$21.6 billion by 2020.<sup>33</sup> Due to government incentives, more than 126,000 rooftop solar systems were sold within two years but sales fell as soon as the incentives were cut back. Consumer complaints are numerous due to "solar suppliers flooding the market in recent years [with] aggressive marketing tactics, misleading practices and substandard products."<sup>34</sup>

The government is currently reconsidering their RET and investments have started to dry up after the announcement that the target of generating 41,000 gigawatt hours (GWh) a year by 2020 would decrease to 27,000 GWh per year. Many companies are cutting jobs, and customers are left without the resources to support the warranties on the products<sup>35</sup> they purchased.<sup>36</sup>

America may find itself on a similar path with heavy subsidies for solar.<sup>37</sup> The federal government's subsidy program gives a 30-percent credit off of solar installations. Many states offer a wide range of their own subsidies. The state with the most generous tax credits is Louisiana where it has spent \$151 million in tax credits on top of the federal government's

<sup>26</sup> Noon, Marita. Germany's "Energy Transformation"—Unsustainable Subsidies and an Unstable System. RedState.

<http://www.redstate.com/diary/energyrabbit/2014/12/15/marita-noon-germanys-energy-transformation-unsustainable-subsidies-unstable-system/>

<sup>27</sup> Bastasch, Michael. (2012, Sept. 13). Europeans Struggle to Pay Their Electric Bills. <http://dailycaller.com/2014/08/04/europeans-struggle-to-pay-their-electric-bills/>

<sup>28</sup> Spiegel Staff. (2013, Sept. 4). Germany's Energy Poverty: How Electricity Became a Luxury Good.

<http://www.spiegel.de/international/germany/high-costs-and-errors-of-german-transition-to-renewable-energy-a-920288.html>

<sup>29</sup> Poser, Hans. Jeffrey Altman. Felix ab Egg. Andreas Granata. Ross Board. Development and Integrations of Renewable Energy Energy Lessons Learned From Germany.

Finadvice. [http://www.finadvice.ch/files/germany\\_lessonslearned\\_final\\_071014.pdf](http://www.finadvice.ch/files/germany_lessonslearned_final_071014.pdf)

<sup>30</sup> (2014, Oct. 16). Germany Plans First Ever Cut to Green Energy Levy. EurActive. <http://www.euractiv.com/sections/energy/germany-plans-first-ever-cut-green-energy-levy-309218>

<sup>31</sup> Institute for Energy Research. (2014, April 9). <http://instituteforenergyresearch.org/analysis/europe-slashing-renewable-subsidies-2/>

<sup>32</sup> Gosden, Emily. (2014, Nov. 9) Solar Farms Will Still Need Subsidies Far Beyond 2020, Industry Admits. The Telegraph.

<http://www.telegraph.co.uk/news/earth/energy/solarpower/11242069/Solar-farms-will-still-need-subsidies-far-beyond-2020-industry-admits.html>

<sup>33</sup> Hepworth, Annabel. (2014, May 22). Subsidies for Clean Energy to Hit 21 Billion.

<http://www.theaustralian.com.au/national-affairs/climate/subsidies-for-clean-energy-to-hit-21bn/story-e6frg6xf-1226926300631>

<sup>34</sup> Donely, Beau. (2014, May 20). Rise in Consumer Complaints Over Solar Power. The Sydney Morning Herald.

<http://www.smh.com.au/national/rise-in-consumer-complaints-over-solar-power-20140519-38k8b.html>

<sup>35</sup> Sturmer, Jake. (2014, April 7). First Solar Reconsiders Australian Investments Amid 'Uncertainty' Over Renewable Energy Target.

<http://www.abc.net.au/news/2014-04-08/solar-company-reconsiders-investment-in-australia/5373664>

<sup>36</sup> Howden, Saffron. (2014, Oct. 26). Australia Green Energy Firms Hit By Target Cuts. <http://www.bbc.com/news/world-australia-29782142>

<sup>37</sup> Spiegel Staff. (2013, Sept. 4). Germany's Energy Poverty: How Electricity Became a Luxury Good. *Der Spiegel*.

<http://www.spiegel.de/international/germany/high-costs-and-errors-of-german-transition-to-renewable-energy-a-920288.html>



subsidies. This has led the state to eliminate the credits in 2017. The state originally anticipated only a handful of people would sign up for the credits, but the costs soared, costing the state more than 120 times the original highest estimates made when the legislation for the credits was introduced in 2007. When lawmakers originally budgeted the bill, they estimated it would cost \$500,000 per year for 40-100 customers claiming the credit, but by the most recent fiscal year more than 1,500 customers had claimed the credit costing the state \$61 million.<sup>38</sup>

In the community of Eldorado, New Mexico, some solar users have found the state and federal subsidies covered 40 percent of the cost of the installation of their system. One resident had a 22-panel rooftop and ground system installed for her four-bedroom home and states: "Our cost of what's left is just a little more than our average monthly electric bill." As outlined in this report, many additional costs may arise, and, at the end of the typical 20-year lease, customers may find that they own a system that is damaged, in need of repair or is obsolete.<sup>39</sup>

## Mandates

In 2010, the Heritage Foundation found that if a national mandate for renewables was instituted, by 2035 it could raise industrial electricity rates by 60% and residential electricity rates by 36% above baseline prices.<sup>40</sup> Although, today no

## Electricity prices stand almost 40% higher in states with renewable energy mandates.

federal law requires utilities to sell or produce a certain amount of electricity from renewable sources, 29 states currently have renewable electricity mandates, with increasing percentage targets. West Virginia has an alternative energy mandate and 6 states have renewable electricity goals without mandates.<sup>41</sup> Electricity prices stand almost 40% higher in states with renewable energy mandates.<sup>42</sup> The Manhattan Institute for

Policy Research found, in 2012, that 8 of the 10 states with the highest electricity prices had mandates for renewable energy and that between 2001 and 2010, rates for residential and commercial customers increased at faster rates in states with renewable energy mandates.<sup>43</sup> A 2009 Oak Ridge National Laboratory Report points out that these higher rates disproportionately impact low-income, elderly and vulnerable residential ratepayers.<sup>44</sup>

One only needs to look at Europe to see potential issues with national mandates for renewable energy. Germany—the country upheld as the world leader in renewables—is sticking to its high renewable energy goals despite growing pushback from its citizens. The average electricity price has risen 60% in the last five years but Germany is staying with the RET of 40%-45% by 2025 and 80% by 2050. Chancellor Angela Merkel has stated that she does not believe Germany will have a problem meeting this target and that it will be broken down among individual member states.<sup>45</sup> Many large, corporate supporters are pulling back as concerns grow over electricity reliability and the renewable energy surcharge continues to grow. Citizens grow less supportive, as the aesthetic reality of the new energy infrastructure becomes apparent, and concerns over conservation issues arise.<sup>46</sup>

Other countries are leery of such goals after witnessing the effects in Germany. In July, the European Union announced it was backing down from its 40% Renewable Energy Target goal and dropping to a 30% RET by 2030<sup>47</sup>. Australia is currently reviewing its RET, which requires that 41,000 GWh of energy come from renewables by 2020. Since the review has been announced, investments dropped 70% in one year, and, as of October 2014, 100 jobs had already been cut in anticipation of the removal of government support.<sup>48</sup>

Another example of renewable energy mandate problems lies in the Pacific Northwest where wind energy is being developed in an area that is sub-optimal for it. The Bonneville Power Administration administers most of the electricity generation in the Pacific Northwest region—defined as Washington, Oregon, Idaho and Montana west of the Continental Divide. Hydroelectric produces two-thirds of the region's electricity.<sup>49</sup>

<sup>38</sup> Adelson, Jeff. (2014, Dec. 6). Giving Away Louisiana. The Advocate. <http://blogs.theadvocate.com/specialreports/2014/12/06/giving-away-louisiana-solar-energy-tax-credit/>

<sup>39</sup> Constable, Anne. (2015, Jan. 24). Eyesore or asset? Eldorado Wrangles with Solar Boom. Santa Fe New Mexican. [http://www.santafenewmexican.com/news/local\\_news/eyesore-or-asset-eldorado-wrangles-with-solar-boom/article\\_c3b84409-cb6e-58f1-9d7c-88508d016269.html](http://www.santafenewmexican.com/news/local_news/eyesore-or-asset-eldorado-wrangles-with-solar-boom/article_c3b84409-cb6e-58f1-9d7c-88508d016269.html)

<sup>40</sup> Kreutzer, David W. (2010, May 5). A Renewable Electricity Standard: What It Will Really Cost Americans. <http://www.heritage.org/research/reports/2010/05/a-renewable-electricity-standard-what-it-will-really-cost-americans>

<sup>41</sup> Institute for Energy Research. (2011). The Status of Renewable Electricity Mandates in the States. <http://instituteforenergyresearch.org/wp-content/uploads/2011/01/IER-RPS-Study-Final.pdf#2>

Institute for Energy Research. Energy Regulation in the States: A Wake Up Call. <http://instituteforenergyresearch.org/media/pdf/statereport.pdf>

<sup>43</sup> Bryce, Robert. (2012, Feb.) The High Cost of Renewable Electricity Mandates. The Manhattan Institute for Policy Research. [http://www.manhattan-institute.org/html/eper\\_10.htm](http://www.manhattan-institute.org/html/eper_10.htm)

<sup>44</sup> Alexander, Barbara R. (2009, June). Renewable Energy Mandates: An Analysis of Promises Made and Implications for Low Income Customers. <http://liheap.ncat.org/dereg/renewables%20and%20low%20income.doc>

<sup>45</sup> (2014, Oct. 24). EU Leaders Adopt Flexible Energy and Climate Targets for 2030. EuroActive. <http://www.euractiv.com/sections/eu-priorities-2020/eu-leaders-adopt-flexible-energy-and-climate-targets-2030-309462>

<sup>46</sup> Karnitschnig, Matthew. (2014, Aug. 26). Germany's Expensive Gamble on Renewable Energy. The Wall Street Journal. <http://www.wsj.com/articles/germanys-expensive-gamble-on-renewable-energy-1409106602>

<sup>47</sup> Harvey, Fiona. (2014, July 23). EU Agrees to Improve Energy Efficiency 30% by 2030. The Guardian. <http://www.theguardian.com/environment/2014/jul/23/eu-agrees-to-improve-energy-efficiency-30-by-2030>

<sup>48</sup> Taylor, Lenore. (2014, Nov. 11). Renewable Energy Target in Confusion as Negotiations Collapse. The Guardian. <http://www.theguardian.com/australia-news/2014/nov/11/renewable-energy-target-in-confusion-as-negotiations-collapse>

<sup>49</sup> Conca, James. (2014, Jan. 18). Wind Energy of No Use in the Pacific Northwest. Forbes. <http://www.forbes.com/sites/jamesconca/2014/01/18/wind-energy-of-no-use-in-the-pacific-northwest/>

But, most states, including Oregon, exclude hydropower from consideration as a renewable source of energy. This forces states to adopt sources of renewables that don't fit the climate, which result in price increases. For instance, Oregon is being forced to invest in wind energy, when it has an abundance of hydro. Portland General Electric cited the underperformance of one of its wind farms in 2013, as a reason why it would need to raise rates.<sup>50</sup>

The Pacific Northwest has spent \$5 billion and impacted over 50,000 acres of public land for wind. Investors in wind will receive much higher returns than they will in more stable, proven energy sources. This cost is passed on to ratepayers and taxpayers.<sup>51</sup> In 2010, the average Pacific Power customer paid \$9.38 more a month, or about \$112.56 more per year.<sup>52</sup>

## DECEPTIVE AND ILLEGAL BUSINESS PRACTICES

Many problems with solar stem from the business practices of individual companies. Separate from federal financing programs for solar energy systems, most solar companies offer third-party leasing or power-purchase agreements (PPA) to help reduce upfront costs to customers.<sup>53</sup> The companies usually purchase the photovoltaic systems, install them on the customer's home and maintain them within the limits of signed agreements. In exchange, the customer may pay a leasing fee to the company or, with the PPA, may actually buy the electricity generated back from the company. The third-party company collects all state and federal tax credits for the system, as well as any available rebates.

## Many customers sign leases or PPA agreements without fully realizing the terms they are agreeing to...

Many customers sign leases or PPA agreements without fully realizing the terms they are agreeing to when they enter into the contracts. Issues vary from length of time to install

the system, length of time to perform maintenance, what maintenance is actually covered, and rates charged by the companies for power generated, to not understanding that they have given away their tax credits and incentives to the third-party company or finding out the system doesn't generate the savings expected.

Numerous cases of solar companies, with questionable business practices relative to the consumer, have occurred. In Arizona, a state on the forefront of the expansion of the solar industry, the Better Business Bureau released an article in April 2014<sup>54</sup> warning about the lack of transparency in the solar industry. The article goes on to say that many solar companies use opaque marketing and sales tactics. This summer, Arizona Attorney General Tom Horne released a consumer warning<sup>55</sup> related to fraud committed by solar companies and, in December of 2014, U.S. Congressman Paul A. Gosar, (R-Ariz.) D.D.S. requested that the Federal Trade Commission investigate sales practices of third-party solar companies.<sup>56</sup> The Arizona Corporation Commission has also recently opened an investigation into solar leasing practices.<sup>57</sup>

## Installation, Repair and Maintenance

In January 2014, the New York Times reported that, for SolarCity, "Complaints to the Better Business Bureau of misleading marketing and flawed installations, along with negative reviews on social media forums like Yelp, appear to be rising."<sup>58</sup> The following May, the Sydney Morning Herald published an article stating that customer complaints had risen from 5 a month in previous years, back to 2007, to 183 a month the past year. Complaints included, "faulty units, poor installation, service delays."<sup>59</sup>

In Washington state, complaints to the Better Business Bureau included long delays in repairs and replacements as well as finding out contracts did not cover certain aspects of maintenance to keep the system working. A customer, after he had already paid the deposit, reported three complaints against SolarCity and Sunrun, over failure to respond to complaints, complete installations and repairs in a timely manner, and wait times of up to 8 months. The companies

<sup>50</sup> Sicking, Ted (2013, Feb. 15). PGE Looks for Rate Hike, 9.1 Percent for Residential Customers.

<sup>51</sup> Conca, James. (2014, Jan. 18). Wind Energy of No Use in the Pacific Northwest. Forbes. <http://www.forbes.com/sites/jamesconca/2014/01/18/wind-energy-of-no-use-in-the-pacific-northwest/>

<sup>52</sup> Sicking, Ted. (2010, Dec. 17). Rates Set to Jump for Pacific Power, PGE Customers in January. Oregon Live. [http://www.oregonlive.com/business/index.ssf/2010/12/rates\\_set\\_to\\_jump\\_for\\_pacific.html](http://www.oregonlive.com/business/index.ssf/2010/12/rates_set_to_jump_for_pacific.html)

<sup>53</sup> U.S. Department of Energy. On-site Renewable Energy. The Green Power Network. [http://apps3.eere.energy.gov/greenpower/onsite/solar\\_financing.shtml](http://apps3.eere.energy.gov/greenpower/onsite/solar_financing.shtml)

<sup>54</sup> States, Kim. (2014, April 4). Transparency Vital to Developing Consumer Trust. Inside Tucson Business. [http://www.insidetucsonbusiness.com/opinion/columnists/guest\\_opinion/better\\_business\\_bureau/transparency-vital-to-developing-consumer-trust/article\\_96c97f2a-bc13-11e3-b195-0019bb2963f4.html](http://www.insidetucsonbusiness.com/opinion/columnists/guest_opinion/better_business_bureau/transparency-vital-to-developing-consumer-trust/article_96c97f2a-bc13-11e3-b195-0019bb2963f4.html)

<sup>55</sup> Stern, Ray. (2014, June 5). Solar-Power Buyers At Risk of Being Ripped Off Says Arizona Attorney General Tom Horne. Phoenix New Times. [http://blogs.phoenixnewtimes.com/valleyfever/2014/06/solar-power\\_buyers\\_at\\_risk\\_of\\_being\\_ripped\\_off\\_says\\_arizona\\_attorney\\_general\\_tom\\_horne.php](http://blogs.phoenixnewtimes.com/valleyfever/2014/06/solar-power_buyers_at_risk_of_being_ripped_off_says_arizona_attorney_general_tom_horne.php)

<sup>56</sup> Smith, Steven D. (2014, Dec. 17). In Case You Missed It: Rep. Gosar Leads Effort to Investigate Solar Sales Tactics. Press Release. <http://gosar.house.gov/press-release/case-you-missed-it-rep-gosar-leads-effort-investigate-solar-sales-tactics>

<sup>57</sup> Randazzo, Ryan. (2014, Dec. 16). Gosar, Other Lawmakers Raise Concerns With Solar Leases. The Arizona Republic. <http://www.azcentral.com/story/money/business/2014/12/16/gosar-lawmakers-raise-concerns-solar-leases/20507709/>

<sup>58</sup> Cardwell, Diane. Julie Creswell. (2014, Jan. 3). Solar Power Craze on Wall St. Propels Start-Up. The New York Times. [http://www.nytimes.com/2014/01/04/business/energy-environment/solar-power-craze-on-wall-st-propels-start-up.html?\\_r=0](http://www.nytimes.com/2014/01/04/business/energy-environment/solar-power-craze-on-wall-st-propels-start-up.html?_r=0)

<sup>59</sup> Donnelly, Beau. (2014, May 20). Rise in Consumer Complaints Over Solar Power. The Sydney Morning Herald. <http://www.smh.com.au/national/rise-in-consumer-complaints-over-solar-power-20140519-38k8b.html>



received four complaints filed against them over installations issues, faulty equipment and building/electrical code violations.<sup>60</sup>



Customers leasing a rooftop solar system also may not know about maintenance costs for which they have the responsibility. They must purchase additional maintenance agreements with the company from which they are leasing. If they do not, and they cannot clean their own panels, they will need to hire cleaners. The average cost of panel cleaning ranges from \$10 - \$20 per panel.<sup>61</sup> An average solar rooftop PV system is made up of around 10 panels with larger rooftop systems containing around 36 panels, resulting in additional cost to the customer each year.

Issues may also arise with trees shading the panels or roof repair. Rooftops in place for 15 years or more will probably require replacement prior to installation of a solar panel system, according to the US Department of Energy. In what could amount to additional costs for the consumer, the department recommends that solar panel users install roofing material that will last for up to 25-30 years.<sup>62</sup> If the roof requires repair after the installation, or modification before the installation, the customer usually bears the costs of these repairs and modifications as well as the removal and reinstallation of the system after completion of the repairs. The customer also usually has the responsibility to remove any trees or objects shading the panels.

In the SolarCity 20-year lease, it clearly states that the lessee will be responsible for keeping “tree, bushes and hedges trimmed so that the System receives as much sunlight as it did when SolarCity installed it.”<sup>63</sup> The lessee must also keep the panels clean and remedy any conditions that may interfere with installation. The lessee must also pay \$499 for removal of the system during roof repairs and replacement after, as well as providing storage for the system.

In Hawaii, Vivint Solar customers had an unpleasant surprise when they discovered the company charges \$500 to remove and reinstall the system if the roof needs repair or replacement. Also, if the roof catches fire and the house burns, or someone receives an injury because of a faulty installation, Vivint bears no liability for “more than the amount you have paid for the energy produced by the system.”<sup>64</sup>

## Property Sales or Transfers

When selling a home with a leased solar-energy system, many third-party solar companies require that the new homeowner meet the company’s credit requirements before transferring the lease. If the buyer does not pass the credit check, the seller may be forced to prepay the remaining lease payments and add this cost to the sale of the home.

In Washington state, the Better Business Bureau received three complaints where two buyers did not know about the requirement to take over a lease for the solar energy system and one where a SolarCity customer found that moving the system to his new home was extremely expensive.<sup>65</sup> SolarCity charges \$499 to determine if the system can be moved and then an additional \$499 to move the system to a new home.<sup>66</sup>

Bloomberg reported in June 2014 that for many home buyers, solar leases are being viewed as a liability. Sellers may actually have to lower the selling price of their homes to keep buyers interested, once they find out the rooftop solar system is not included with the home purchase.<sup>67</sup> The following month an NPR story stated that, due to the length of most solar rooftop system leases (20 years), selling can present problems and even reduce the value of a home.<sup>68</sup>

<sup>60</sup> McCloy, Lauren. (2014, July 21). Consumer Complaints Against Third-Party Owners of Net Metering Systems <http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e/7c68b37d7fe0d21788257d24006e4818!OpenDocument>

<sup>61</sup> Blanch, Craig. (2013, Aug. 26). Hidden Cost of Rooftop Solar: Who Should Pay for Maintenance? RenewEconomy. <http://reneweconomy.com.au/2013/hidden-cost-of-rooftop-solar-who-should-pay-for-maintenance-99200>

<sup>62</sup> U.S. Department of Energy. Own Your Power! A Consumer Guide to Solar Electricity for the Home. <http://www.nrel.gov/docs/fy09osti/43844.pdf>

<sup>63</sup> SolarCity Example Lease. <http://www.solarcity.com/sites/default/files/solarcity-contract-resi-lease-example.pdf>

<sup>64</sup> Cocks, Sophie. (2012, Oct. 16). Vivint Dominates Hawaii Solar Market, Sparks Consumer Fears. Honolulu Civil Beat. <http://www.civilbeat.com/2012/10/17381-vivint-dominates-hawaii-solar-market-sparks-consumer-fears/>

<sup>65</sup> McCloy, Lauren. (2014, July 21). Consumer Complaints Against Third-Party Owners of Net Metering Systems <http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e/7c68b37d7fe0d21788257d24006e4818!OpenDocument>

<sup>66</sup> SolarCity Example Lease. <http://www.solarcity.com/sites/default/files/solarcity-contract-resi-lease-example.pdf>

<sup>67</sup> Wade, Will. (2014, June 24). Rooftop Solar Leases Scaring Buyers When Homeowners Sell. Bloomberg. <http://www.bloomberg.com/news/print/2014-06-23/rooftop-solar-leases-scaring-buyers-when-homeowners-sell.html>

<sup>68</sup> Brady, Jeff. (2014, July 15). Leased Solar Panels Can Cast A Shadow Over A Home’s Value. NPR. <http://www.npr.org/2014/07/15/330769382/leased-solar-panels-can-cast-a-shadow-over-a-homes-value>



The National Association of Realtors also found that solar leases deter home buyers and that sellers often have to lower the price of their home, as a consequence.<sup>69</sup>

## Other Unexpected Costs

Solar customers also often encounter other unexpected costs after leasing their systems. If their state does not allow an exemption, customers may find that rooftop solar systems increase their property taxes, if the home is reassessed after installation of the system. Another consideration should include planning and zoning ordinances. The installer most likely will obtain them but overall costs may increase.<sup>70</sup> For example, SolarCity requires the lessee to obtain all approvals and authorizations from any homeowner's associations or community organizations.<sup>71</sup> An inspection will be required before the installation and the homeowner usually pays for it. An annual inspection is also most likely required and, for the average system, runs approximately \$150.<sup>72</sup>



SolarCity customers have the responsibility to maintain a, "functioning indoor internet connection with a router, one DHCP enabled Ethernet port with internet access and a standard AC power outlet" within 80 feet of the system.<sup>73</sup> SolarCity customers may face a surprise when they find that, on top of their lease payments (that rise each year), they must pay all sales and use taxes as well as property taxes.

Homeowners leasing from Solarcity will also learn they bear the responsibility to make all monthly payments even if their system is stolen or damaged.

PPA customers may find that their rates are not fixed or regulated. In Hawaii, the Hawaii Public Utilities Commission does not regulate the solar company Vivint, nor make available their rates for review. Throughout the islands rates vary from 25 cents per kilowatt to 34 cents and Vivint can raise that rate by 4 percent per year according to its contract. Also of note, in the Vivint contract, it states that customers must pay for all the electricity generated by panels, whether used or not. This could mean that if the house was temporarily vacant for any reason, and no power was being used, the customer would still have to pay Vivint for the electricity generated by the rooftop system.

Another potential problem with leasing through third-party solar companies rears its head when customers may not take into account what could happen if they fail to make payments or make late payments on systems that they lease. Again, an example is shown in the practices of Vivint in the Hawaiian market.<sup>74</sup> The financial penalties for missing a payment can be severe. Vivint can charge \$7 per watt for the system, which equals \$28,000 for an average system. Even though normally none of the money paid during the customer's 20-year lease goes toward purchasing the rooftop system, the customer who defaults on payments may suddenly find himself responsible for the full purchase cost plus penalties. The customer then owns the system but has lost to the company the opportunity for tax credits and incentives.

Home insurance may also increase when policies are adjusted to cover solar panels. Some insurance companies will adjust homeowner's insurance policies to cover residential solar panels, but only up to a certain size. For example, in Missouri, a resident's homeowner's insurance policy was not renewed after the family installed a solar panel system because the kilowatt-production level from the solar panels on the home exceeded the insurance company's maximum allowed kilowatt level for a residential customer.<sup>75</sup>

Some insurance companies may also view solar panels as an increased risk for liability and property damage. One analysis outlined such a scenario saying: "The environmental benefits associated with solar panels cannot mask the potential

<sup>69</sup> Daily Real Estate News. (2014, June 23). Solar-Panel Leases Turning Off Buyers. RealtorMag. <http://realtormag.realtor.org/daily-news/2014/06/24/solar-panel-leases-turning-buyers>

<sup>70</sup> Tuscher, Christine. (2014, May 17). Everything You Need to Know About Adding Solar Panels At Home. Forbes.

<http://www.forbes.com/sites/houzz/2014/05/17/everything-you-need-to-know-about-adding-solar-panels-at-home/>

<sup>71</sup> SolarCity Example Lease. <http://www.solarcity.com/sites/default/files/solarcity-contract-resi-lease-example.pdf>

<sup>72</sup> Blanch, Craig. (2013, Aug. 26). Hidden Cost of Rooftop Solar: Who Should Pay for Maintenance? RenewEconomy. <http://reneweconomy.com.au/2013/hidden-cost-of-rooftop-solar-who-should-pay-for-maintenance-99200>

<sup>73</sup> SolarCity Example Lease. <http://www.solarcity.com/sites/default/files/solarcity-contract-resi-lease-example.pdf>

<sup>74</sup> Cocke, Sophie. (2012, Oct. 16). Vivint Dominates Hawaii Solar Market, Sparks Consumer Fears. Honolulu Civil Beat. <http://www.civilbeat.com/2012/10/17381-vivint-dominates-hawaii-solar-market-sparks-consumer-fears>

<sup>75</sup> KMOV.com Staff. (2014, Oct. 16). Call Colombo: Losing Homeowner's Insurance Due to Solar Panels. KMOV.com.

<http://www.kmov.com/news/investigates/call-colombo/Call-Colombo-Losing-home-owners-insurance-due-to-solar-panels-279479192.html>



bodily injury and property damage risks associated with their manufacture and use.<sup>76</sup>

## Safety

Safety issues are also a concern and are often relatively unknown due to rooftop solar increasing rapidly and recently. One concern lies in the possibility that companies may sell faulty panels. BlueChip Energy, which also operated as Advanced Solar Photonics and SunHouse Solar, manufactured solar panels and solar-electricity packages before failing in 2013. About 300 customers, many in Central Florida who paid \$20,000 to \$40,000 for rooftop solar packages, now have no warranty on panels falsely sold as safe, court records show. Some solar panels had a counterfeit Underwriters Laboratories seal, meaning that they were fraudulently sold as having the industry-required safety approval. Without the safety testing, they shouldn't be connected to the electric grid even though at least half of the customers had already applied for rebates through their utilities, FPL and Duke Energy.<sup>77</sup>

## Safety issues are...often relatively unknown due to rooftop solar increasing rapidly and recently.

Another concern is with building fires. Substandard circuit breakers used by the Queensland-based company Advancetech caused over 70 rooftop fires in Queensland and New South Wales this past spring, leading to the collapse of the company.<sup>78</sup>

The Solar Energy Industries Association lists the following safety issues:

- Concern that the solar product itself will cause a fire. This is extremely rare, but may occur as a result of improper connections to the inverter. These types of concerns are addressed by product standards, which ensure product safety.
- Concern regarding the impact of a pre-existing fire on a building containing solar products, both to the building and to the solar products. The arrangement of a solar product on a building may affect the impact

of a pre-existing fire, by impacting the solar product's reaction to a fire, and impacting the ability of firefighters to combat the fire. Product standards, building codes, and training of firefighters are used to address these concerns.

- Concern regarding the safety of firefighters when addressing a fire involving solar products. The presence of solar products may influence the methods used to combat a fire. Product standards, building codes, and training of firefighters are used to address these concerns.<sup>79</sup>

In Canada, the Ontario Association of Fire Chiefs and the Canadian Solar Industries Association are working together over concerns with structural fires in buildings that have rooftop solar. Firefighters not only run the risk of being electrocuted by the actual systems, which can keep generating current after disconnecting from the grid, but also face increased chances of roof collapse due to the weight of the panels.<sup>80</sup> Solar panels may also contain carcinogens that fire may release or the panels may explode.<sup>81</sup>

Consumers with rooftop systems may forget that, even though solar panels are drawing energy from the sun, they are producing electricity, and electricity has many potential dangers. The U.S. Occupational Safety and Health Administration maintains a page on "Green Job Hazards," which includes dangers such as electric shock, arc flash burn and arc flash blast hazards.<sup>82</sup> It is important for consumers to have certified installers, who are aware of fire and installation dangers, and that they use industry-approved panels.

Snow and ice may also cause a safety concern for those in northern climates who have solar panels. The lease for SolarCity customers states:

Snow or ice may accumulate on rooftops and on solar panels during snowstorms. Accumulated snow or ice may slide or fall, resulting in property damage or bodily harm. If and when conditions safely allow you to remove accumulated snow or ice, you should do so to reduce the likelihood of excess snow sliding or falling.<sup>83</sup>

Even when the panels are tilted at a 40 degree angle or higher they still collect snow and stop producing electricity.<sup>84</sup>

<sup>76</sup> Evans, Samantha. (2014, May 19). Liabilities and Insurance Coverage Implications of Solar Panels. Insurance Journal.

<http://www.insurancejournal.com/magazines/features/2014/05/19/329031.htm>

<sup>77</sup> Lelis, Ludmilla. (2013, July 28). BlueChip Energy Failure Leaves Solar-Power Customers Up in Air. Orlando Sentinel.

[http://articles.orlandosentinel.com/2013-07-28/business/os-blue-chip-solar-customers-20130728\\_1\\_solar-panels-solar-power-customers-bluechip-energy](http://articles.orlandosentinel.com/2013-07-28/business/os-blue-chip-solar-customers-20130728_1_solar-panels-solar-power-customers-bluechip-energy)

<sup>78</sup> King, Simon. Leo Shanahan. (2014, May 20). Solar Firm 'Sold' Day After Recall. The Australian.

<http://www.theaustralian.com.au/national-affairs/state-politics/solar-firm-sold-day-after-recall/story-e6frgczx-1226923247515>

<sup>79</sup> Solar Energy Industries Association. Fire Safety & Solar. <http://www.seia.org/policy/health-safety/fire-safety-solar>

<sup>80</sup> Blackwell, Richard. (2014, Nov. 25). Solar Panels Pose Power Problem for Firefighters, Prompting New Guidelines.

<http://www.theglobeandmail.com/report-on-business/solar-panels-pose-power-problem-for-firefighters-prompt-new-guidelines/article21740616/>

<sup>81</sup> Hsu, Tiffany. (2011, Aug. 3). The Dark Side of Solar and Wind Power Projects. Los Angeles Times. <http://articles.latimes.com/2011/aug/03/business/la-fi-green-safety-20110803>

<sup>82</sup> Occupational Health and Safety Administration. Green Job Hazards: Solar Energy. United States Department of Labor. <https://www.osha.gov/dep/greenjobs/solar.html>

<sup>83</sup> SolarCity Example Lease. <http://www.solarcity.com/sites/default/files/solarcity-contract-resi-lease-example.pdf>

<sup>84</sup> Galbraith, Kate. (2008, Dec. 25). Solar Meets Polar as Winter Curbs Clean Energy. The New York Times. <http://www.nytimes.com/2008/12/26/business/26winter.html>



The accumulated snow not only increases the weight of the rooftop but may melt and then freeze again, loosening panels and mounts and bending racking. Ice dams may also form beneath shingles and eventually allow water to leak down into the home, causing damage.<sup>85</sup> In February of this past year, two solar canopies collapsed from the weight of snow and ice at Teaneck school in New Jersey.<sup>86</sup> The school superintendent said they had been unable to remove the buildup without potentially damaging the panels.

## Deceptive Sales Practices

Many consumer complaints center around deceptive sales practices. The Washington state Better Business Bureau reported three complaints against SolarCity, alleging company sales associates convinced customers to sign a document on an iPad to authorize company evaluation of their homes for a solar-energy system. After signing the electronic document, they received notice they had actually signed a 20-year contract for installation and lease of solar-energy system.<sup>87</sup>

## ...energy costs had not decreased after installation, as promised.

Solar salesmen also have a tendency to inflate performance claims and promise savings that never materialize. The Washington state Better Business Bureau shows four complaints where customers allege companies inflated performance and savings claims. Other claims show customers were led to believe they would save money by avoiding higher rates with PPA agreements.<sup>88</sup>

The Louisiana Attorney General's office is currently investigating Sader Power, the largest solar installer in Louisiana, after consumers filed a class action lawsuit against the company, alleging they had deceived consumers by intentionally overstating energy-cost savings, failing to install the solar equipment in a timely manner, and violating

state laws, which require licenses for solar panel installers.<sup>89</sup> The Better Business Bureau profile for the company shows numerous complaints, including extreme delays in installation and that energy costs had not decreased after installation, as promised.<sup>90</sup> In December 2014, an additional lawsuit was filed against Sader in federal court charging that the company inflated its books to secure credit that CEO John Sader has been unable to pay back.<sup>91</sup> The California company SunRun also faces investigation in a class action complaint claiming deceptive sales practices by overstating energy-cost savings.<sup>92</sup>

## Consumer Fraud

Other examples of solar companies under investigation for fraud include Salt River Solar and Wind and Certified Solar. A multi-count indictment filed in Pima County Superior Court against Michael Allen Fricker, owner of Phoenix-based Salt River Solar and Wind,<sup>93</sup> accuses him of keeping customers' rebates and not paying manufacturers and dealers for solar panels. The 35-count indictment says Fricker and his company took more than \$350,000 from residential customers and solar panel companies between 2009 and late 2013. Charges also include money laundering, fraudulent schemes and artifices and theft.

Certified Solar, Inc., a Canadian solar company, based in Windsor, lost its accreditation a year ago. The Better Business Bureau staff says the number of complaints against Certified Solar is high.<sup>94</sup> The company closed in March 2014, but as of May, the complaints had risen to 70. Some customers complained of paying up to \$50,000 and never received panels or were not hooked up to the power grid.<sup>95</sup>

<sup>85</sup> Cinnamon Solar. HatiCon Solar. Orion Solar Racking. Quick Mount PV. Solar Marketing Group. (2014, March). Solar Panels Last 25 Years-But Will They Stay Attached to Your Roof? The Importance of Reliable Solar Mounting Systems. [http://cinnamonsolar.com/wp-content/uploads/2013/05/The-Importance-of-Reliable-Solar-Mounting-Systems-White-Paper\\_March-2014-copy.pdf](http://cinnamonsolar.com/wp-content/uploads/2013/05/The-Importance-of-Reliable-Solar-Mounting-Systems-White-Paper_March-2014-copy.pdf)

<sup>86</sup> Burrow, Megan. (2014, Feb. 26). A Second Solar Panel Canopy Collapses in Teaneck School Lot. The Record. <http://www.northjersey.com/news/a-second-solar-panel-canopy-collapses-in-teaneck-school-lot-1.730928>

<sup>87</sup> McCloy, Lauren. (2014, July 21). Consumer Complaints Against Third-Party Owners of Net Metering Systems <http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e7c68b37d7fe0d21788257d24006e4818!OpenDocument>

<sup>88</sup> McCloy, Lauren. (2014, July 21). Consumer Complaints Against Third-Party Owners of Net Metering Systems <http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e7c68b37d7fe0d21788257d24006e4818!OpenDocument>

<sup>89</sup> Mackel, Travers. (2014, Feb. 12). I-Team: Lawsuit Accuses Solar Power Company of Deceptive Practices. WDSU News. <http://www.wdsu.com/news/investigations/iteam-suit-claims-solar-power-company-deceived-thousands-of-clients/24393946>

<sup>90</sup> Better Business Bureau - Southeast Louisiana Including the Tri-Parish Area. <http://www.bbb.org/new-orleans/Business-Reviews/solar-energy-system-design-and-installation/sader-power-enterprises-llc-in-new-orleans-la-90004536/Complaints#breakdown>

<sup>91</sup> Thompson, Richard. (2015, Jan. 6). Nearly \$2M Lawsuit Accuses Sader Power Enterprises CEO John Sader of Breach of Contract. The Advocate. <http://www.theneworleansadvocate.com/news/11222295-171/lawsuit-accuses-solar-power-company-boss>

<sup>92</sup> Reed V. SunRun Complaint. <http://forms.greentechmedia.com/Extranet/95679/Reed-v.-SunRun-complaint.pdf>

<sup>93</sup> McNamara, Patrick. (2014, Feb. 6). Salt River Solar Owner Charged With Fraud. Arizona Daily Star. [http://tucson.com/business/salt-river-solar-owner-charged-with-fraud/article\\_b097c69c-f88e-5510-bd52-682474986e86.html](http://tucson.com/business/salt-river-solar-owner-charged-with-fraud/article_b097c69c-f88e-5510-bd52-682474986e86.html)

<sup>94</sup> CTV London. (2014, March 11). Better Business Bureau Working With Solar Panel Customers. CTV News London. <http://london.ctvnews.ca/better-business-bureau-working-with-solar-panel-customers-1.1724707>

<sup>95</sup> Battagello, Dave. (2014, May 28). BBB Still Receiving New Complaints on Local Solar Firm. The Windsor Star. <http://blogs.windsorstar.com/news/bbb-still-receiving-new-complaints-on-local-solar-firm>

## EFFECTS ON TRADITIONAL UTILITY STRUCTURE

One of the biggest challenges of solar distributed generation includes the lack of, or inadequate, regulatory design. What is the true value of residential solar to utilities, how should it be paid for and who should pay for it? Traditionally, ratepayers pay a monthly fee designed to recover metering and billing expenses as well as expenses associated with the supply of energy and demand. When a utility customer begins generating his or her own electricity, how to revise this monthly charge brings debate. The customer cannot have a reliable source of electricity independent of the utility but no longer wholly depends on the utility and, in many instances, will argue that the solar generation actually benefits the utility. While states continue to experiment with feed-in tariff and value of solar models, by and large the most commonly used system remains net-energy metering (NEM).

More than 40 states have NEM policies and each state's policy differs.<sup>96</sup> In general, NEM is a system where customers generating solar push their excess electricity to the grid. They receive credit that they can apply to the purchase of utility-generated electricity when they cannot meet their own needs. Two of the biggest concerns with this type of system are 1) cost-shifting to non-solar customers and 2) lack of investment in the grid maintenance, despite use.

### Cost Shifting

When solar customers receive credit for generated electricity, they collect credit at the retail rate. This creates a loss for utilities that would normally generate their own power or purchase electricity at a wholesale rate. In order to recover from this loss, rates must be raised on all users.

In 2013, The California Public Utility Commission published a study that found by 2020, non-solar customers could have paid as much as \$370 million annually due to NEM.<sup>97</sup> In order to compensate for solar customers not paying to maintain and modernize the grid, utilities must inevitably raise rates

across the board. The study showed that most solar users in California are high-income homeowners, but they shift their costs to lower- and middle-income households.

In 2014, The National Black Caucus of State Legislators released a white paper with similar findings.<sup>98</sup> The paper points out that minority, low-income households spend a significantly larger percentage of their monthly income on electricity and, as the number of solar users grows, this group will have to cover the costs that NEM customers avoid.

**One of the biggest challenges of solar distributed generation includes the lack of, or inadequate, regulatory design.**

One way utilities try to counter the distributed costs of solar is by additional fees for NEM-metering customers. Companies that have proposed these fees have faced significant backlash from solar advocates. In 2013, Arizona Public Service attempted to charge solar customers \$50 a month. It was during this time that Barry Goldwater, Jr. was brought onto the solar scene and the group Tell Utilities Solar Won't Be Killed (T.U.S.K) was formed. The group hired the public relations firm of Jason Rose and sponsored ads, rallies, polling, and other events.<sup>99</sup> The solar industry spent \$370,000 on ads opposing the fee and a \$5 charge was all that regulators eventually approved—though it is expected that the fee will increase.<sup>100</sup>

Now other companies have stepped into the fray. Xcel Energy in Colorado is currently fighting for a 4.6-cent reduction in NEM credits.<sup>101</sup> Salt River Project, Arizona's second largest utility, has proposed a \$50 a month solar fee this year.<sup>102</sup> The Public Service Company of New Mexico recently proposed to begin charging solar customers a \$21 monthly fee starting in January of 2016.<sup>103</sup> St. George, in Utah, is attempting to install a capacity fee for solar installations<sup>104</sup> and the Rocky Mountain Power Company has a NEM proposal under study

<sup>96</sup> DSIRE. Rules, Regulations and Policies. Net Metering for Renewable Energy. <http://www.dsireusa.org/incentives/index.cfm?SearchType=Net&&EE=0&RE=1>

<sup>97</sup> California Public Utilities Commission Energy Division. (2013, Sept. 26). California Net Energy Metering (NEM) Draft Cost-Effectiveness Evaluation. <http://www.cpuc.ca.gov/NR/rdonlyres/BD9EAD36-7648-430B-A692-8760FA186861/0/CPUCNEMDraftReport92613.pdf>

<sup>98</sup> The National Black Caucus of State Legislators. (2014). The Need To Develop and Implement Equitable Energy Policies. <http://www.nbcsl.org/component/k2/item/1293-2014-white-paper-the-need-to-develop-implement-equitable-energy-policies.html>

<sup>99</sup> Sheppard, Kate. (2013, July 11). Here Comes the Son: Barry Goldwater, Jr. Fights for Solar Power in Arizona. Mother Jones. <http://www.motherjones.com/environment/2013/07/barry-goldwater-tusk-arizona-solar-net-metering>

<sup>100</sup> Christie, Bob. 2013, Nov. 13). First Battle in War Between Utilities and Rooftop Solar. San Jose Mercury News. [http://www.mercurynews.com/business/ci\\_24514209/first-battle-war-between-utilities-and-rooftop-solar](http://www.mercurynews.com/business/ci_24514209/first-battle-war-between-utilities-and-rooftop-solar)

<sup>101</sup> Sandoval, Michael J. (2014, Dec. 27). 'Net Metering' A Rate-Payer Funded Give-Away. The Pueblo Chieftain. <http://www.chieftain.com/opinion/3182553-120/solar-metering-grid-panels>

<sup>102</sup> O'Grady, Patrick. (2014, Dec. 1). SRP to seek 3.9% Rate Hike, Chances for New Solar Customers. Phoenix Business Journal. <http://www.bizjournals.com/phoenix/blog/energy-inc/2014/12/srp-to-seek-3-9-rate-hike-changes-for-new-solar.html?page=all>

<sup>103</sup> Robinson-Avila, Kevin. (2014, Dec. 12). Solar Fee is a Lightning Rod for PNM Plan. Albuquerque Journal. <http://www.abqjournal.com/510565/news/solar-fee-is-a-lightning-rod-for-public-service-company-plan.html>

<sup>104</sup> Demille, David. (2014, Dec. 11). St. George Planning New Charge for Residents With Solar. The Spectrum. <http://www.thespectrum.com/story/news/local/2014/12/11/st-george-planning-new-charge-residents-solar/20286399/>

by the Utah PSC.<sup>105</sup> Many companies and state regulatory bodies are commissioning cost-benefit-analysis NEM policies.

## Infrastructure

Not only do solar customers benefit from receiving credit at retail rates for electricity generated by their home systems, they may also avoid paying for the maintenance and modernization of the grid. Many solar customers say that they use the grid less but it may be argued that they actually utilize the grid twice as much by sending and receiving electricity through distribution lines.

## In 2012, grid operators in Germany had to intervene 1,213 times to keep supply and demand of electricity balanced.

In 2013, the Western Electric Industry Leaders found that solar injects power into the grid at various points along distribution lines and therefore increases voltage and stress at points of interconnection.<sup>106</sup> They also determined that the intermittent nature of solar generation increases stress on distribution lines. The output can change drastically and unpredictably in short periods of time and the additional requirements on the grid to keep these voltage swings under control will increase maintenance, operational costs and may even create a need for early replacement. Hawaiian Electric Company actually had to stop allowing solar users to connect to the grid in 2013 due to the amount of power being forced back into the transmission lines and causing disruptions for other users.<sup>107</sup>

Solar customers who use the grid, and other infrastructure, resemble drivers of electric cars who use the roads, bridges and highway systems—primarily paid for through gasoline taxes—without paying for them. Many state and federal lawmakers continue to grapple with how to pay for infrastructure when revenues have seen reductions due to higher gas-mileage cars, hybrid cars, and a growing quantity of electric vehicles. All vehicles that use the roadways should pay for them. But solar customers balk at talk of this added cost.

Germany had to retrofit 315,000 inverters, spending almost \$300 million.<sup>108</sup> In 2012, grid operators in Germany had to intervene 1,213 times to keep supply and demand of

electricity balanced. Forced expansion and investment in the grid has caused increased grid usage fees for all ratepayers in Germany and will likely keep rising.

According to a 2011 report from the Edison Electric Institute, \$39.5 billion are being invested in new transmission projects to support renewable resources and accommodate off-peak production before 2021.<sup>109</sup>

## CONCLUSION

Through the experiences of those on the forefront of solar growth, we can see avoidable issues. An examination of existing problems—the unintended consequences—can help prevent further issues as solar continues to spread across the United States. Many citizens and policymakers with concerns over the environment and existing electricity costs or who philosophically support the idea of a free market, no matter what the market, may find themselves on the wrong end of unforeseen problems. These issues include:

- Mandates, large subsidies, tax credits, and loan programs accelerate the adoption of solar and other renewables without taking into account the shifting of costs onto other taxpayers through increased rates or the potential loss of jobs and raised expenses for the consumer when subsidies and credits end.
- The rapid adoption of solar also increases the likelihood that the consumer will encounter fraud, deception, illegal business practices and even safety issues. The lack of education about solar combined with pressure to cash in on subsidies and credits while they last makes the solar customer vulnerable.
- With solar coming on board too fast to devise a truly effective and fair rate structure, utilities will experience loss, non-solar users will experience cost increases, and the energy infrastructure overall faces threats, as incentive is lost to maintain the grid.

Solar makes up an important part of our energy future, but there must be forethought, taking into account future costs, jobs, energy reliability and the overall energy infrastructure already in place. This technology must come online with the needs of the taxpayer, consumer and ratepayer in mind, instead of giving the solar industry priority.

<sup>105</sup> O'Donoghue, Amy Joi. (2014, Jan. 12). Meeting maps out schedule to study net metering for solar. Deseret News. <http://www.deseretnews.com/article/865619469/Meeting-maps-out-schedule-to-study-net-metering-for-solar.html?pg=all>

<sup>106</sup> Western Electric Industry Leaders. (2013, Aug. 7). Enhanced Inverter Functions-Executive Summary. <https://www.sdge.com/sites/default/files/documents/2060692059/Inverter%20Technical%20Standards%20White%20Paper%20August%202013.pdf?nid=7771>

<sup>107</sup> Cocke, Sophie. (2013, Oct. 15). Solar Customers Get Burned In Hawaii. Huffington Post. [http://www.huffingtonpost.com/2013/10/15/solar-hawaii\\_n\\_4101425.html](http://www.huffingtonpost.com/2013/10/15/solar-hawaii_n_4101425.html)

<sup>108</sup> Poser, Hans. Jeffrey Altman. Felix ab Egg. Andreas Granata. Ross Board. Development and Integrations of Renewable Energy Energy Lessons Learned From Germany. Finadvice. [http://www.finadvice.ch/files/germany\\_lessonslearned\\_final\\_071014.pdf](http://www.finadvice.ch/files/germany_lessonslearned_final_071014.pdf)

<sup>109</sup> Edison Electric Institute. (2011, March). Transmission Projects: At A Glance. [http://www.eei.org/ourissues/ElectricityTransmission/Documents/Trans\\_Project\\_intro.pdf](http://www.eei.org/ourissues/ElectricityTransmission/Documents/Trans_Project_intro.pdf)





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