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NOTES

HOW AMERICA'S SOLAR ENERGY POLICIES SHOULD FOLLOW (AND STRAY) FROM GERMANY'S LEAD: WORKING TOWARDS MARKET PARITY WITHOUT SUBSIDIES

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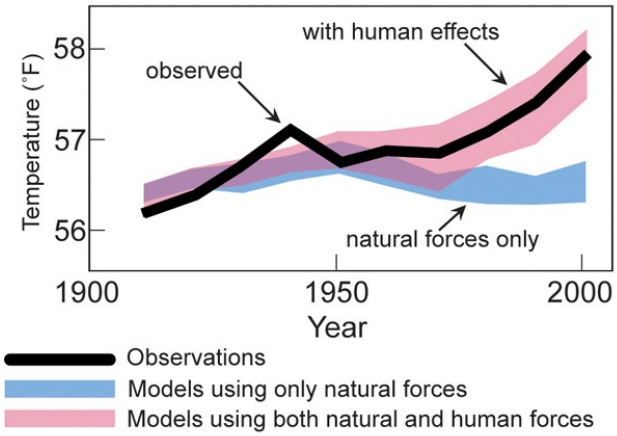
I. INTRODUCTION

Global climate change is real. And human activity, resulting in greenhouse gas emissions, is the chief cause of rising global temperatures in the 20th century, as illustrated by the following graph produced by National Aeronautics and Space Administration ("NASA").[1]



From the invention of the automobile to the Internet, human progress yielded

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1. *A Blanket Around the Earth*, NASA, http://climate.nasa.gov/causes/. ("In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change, a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nation, concluded there's more than 90 percent probability that human activities over the past 250 years have warmed our planet . . . . [T]he rate of increase in global warming due to these gases is very likely to be unprecedented within the past 10,000 years or more"); *Climate Change Facts: Answers to Common Questions*, ENVIRONMENTAL PROTECTION AGENCY, http://www3.epa.gov/climatechange/basics/facts.html [hereinafter *Climate Q&A*].

http://doi.org/10.18060/7909.0051

dramatic change and many positive outcomes in the 20th century. The average lifespan in the United States ("U.S."), for instance, increased from 46.3 years for males and 48.3 for females in 1900 to 73.8 and 79.5 years, respectively, in 1998.[2] But progress has consequences. As illustrated by the following graph, also produced by NASA, the unprecedented industrial and technological innovation witnessed in the 20th century corresponds with an unprecedented spike in atmospheric carbon dioxide, a key greenhouse gas that retains heat in earth's atmosphere, during the same time period.[3]

Global temperatures have increased over 1.4 degrees Fahrenheit in the last 100 years – and it is a crisis.[4] According to the United States Environmental Protection Agency ("EPA"), for every two degrees Fahrenheit increase, the earth can expect up to a 15 percent reduction in crop yields, up to a 10 percent increase in rain fall during big storms, up to a 10 percent decrease in stream flow in some river basins, and a 200-400 percent increase in total area of the U.S. burned by wildfire.[5]

What can be done to stop – or at least slow – greenhouse gas emissions? And what role must government play in the solution? If industrial and technological innovation drove global climate change in the 20th century, it must be part of the solution in the 21st century. Luckily, the greatest minds of our time, including Bill Gates and Elon Musk, are on the case – and they have singled out energy generation as an area where a significant difference can be made. In the U.S., electricity generation accounts for more greenhouse gas emissions than any other source at 31 percent – and approximately 67 percent of U.S. electricity comes from burning fossil fuels, primarily coal and natural gas.[6]

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2. *Life Expectancy in the USA, 1900-98*, BERKELEY. http://demog.berkeley.edu/~andrew/1918/figure2.html.

3. *Climate Change: How Do We Know?* NASA, http://climate.nasa.gov/evidence/.

4. *Climate Q&A, supra* note 1.

5. *Id*.

6. *Sources of Greenhouse Gas Emissions,* EPA, http://www3.epa.gov/climatechange/ghgemissions/sources.html. (crediting transportation as the second biggest source of greenhouse gas emissions at 27 percent).

Alternatives to these sources of energy must be developed in order to reduce greenhouse gas emissions and solar power is arguably the most promising renewable energy technology available, making huge strides to reduce cost and increase efficiency in just the last five years.[7] In fact, the recent breakthroughs in solar energy technology have been compared to "watching the Internet mature in 1995."[8] The optimism surrounding new solar energy technology, while exciting, may not be entirely realistic. Solar energy is simply not as close to reaching market parity with fossil fuel generated energy as some would have the public believe. Bill Gates best described the current state of solar energy technology in a 2015 interview:

> They have this statement that the cost of solar photovoltaic is the same as hydrocarbon's. And that's one of those misleadingly meaning statements. What they mean is that at noon in Arizona, the cost of that kilowatt-hour is the same as a hydrocarbon kilowatt-hour. But it doesn't come at night, it doesn't come after the sun hasn't shone, so the fact that in that one moment you reach parity, so what?[9]

Solar energy must continue to develop in order to reach true parity with fossil fuel-generated energy – and America's government policies must play a role in that development, but not through solar energy subsidies, regardless of whether those subsidies are funded by taxpayers or by utility ratepayers acting under government mandate.[10]

In order to formulate a comprehensive recommendation for the role of America's government policies in developing solar energy technology, this Note looks to Germany's lead. Part II introduces America's and Germany's varied approaches to solar energy technology and concludes by outlining the key lessons America must take from Germany's experiences. Part III takes a closer look at the history and the pros and the cons of the German approach. Part VI outlines recommendations for America's solar energy policies. These recommendations focus on the following topics: the role of utilities; the role of government-run

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7. Eric Roston, *By the Time You Read This, They've Slapped a Solar Panel on Your Roof,* BLOOMBERG BUSINESS (Feb. 25, 2015), http://www.bloomberg.com/news/articles/2015-02-25/in-the-time-it-takes-to-read-this-story-another-solar-project-will-go-up. (reporting that the price of solar panels has decreased 65 percent from 2010 to 2015 and now cost less than 70¢ per watt).

8. Joel B. Eisen, *Can Urban Solar Become a "Disruptive" Technology?: The Case for Solar Utilities*, 24 NOTRE DAME J.L. ETHICS & PUB. POL'Y 53, 60 (2010) (quoting another commentator).

9. James Bennet, *'We Need an Energy Miracle' – An Interview with Bill Gates on the Future of Energy,* THE ATLANTIC (Nov. 2015), http://www.theatlantic.com/magazine/archive/2015/11/we-need-an-energy-miracle/407881/.

10. For this purposes of this discussion, Germany's government-mandated FIT, which required utilities and their ratepayers to fund private solar energy development, will be categorized as a subsidy because of its effect of artificially inflating demand for solar energy through government action.

research and development ("R&D"); the elimination of America's solar tax credits; the role of other U.S. government policies aimed at encouraging renewable energy development, including state renewable portfolio standards ("RPS") and EPA's Clean Power Plan; the role of utility-level feed-in tariffs ("FITs"); and the ideal design of a utility-level FIT. Finally, the Conclusion explores prevailing German and American attitudes regarding global climate change and discusses America's likelihood for effective policy change in this area.

In order to drive solar energy generation towards market parity with traditional fossil fuel generation, the U.S. must focus government investment on R&D instead of on policy mechanisms, like Germany's government-mandated FIT, that effectively subsidize the solar industry. Government-run R&D, in combination with utility-level FITs, implemented as solar energy nears parity with fossil fuel energy in a given market, will most effectively help states achieve the clean energy goals set out and enforced by state RPS programs and the Clean Power Plan.

II. BACKGROUND

Despite the remaining technological hurdles discussed above, Americans are beginning to recognize the potential of solar energy – even in the face of strong resistance from traditional energy utilities and the government entities and policies that regulate these utilities. From 2007 to 2014, solar power generation in the U.S. increased from 16,000 to 15,874,000 megawatt hours annually.[11] Although solar energy still provided only 0.4 percent of U.S. electricity generation in 2014, electric utilities are worried.[12] Technology commentator Patrick DiJusto observed that the dramatic increase "has caused electric utilities across the country either to panic or seriously rethink their business model."[13]

Unfortunately, many utilities have embraced the panicked approach by instituting punitive policies, including monthly surcharges and total bans on photovoltaic hookups to the grid, with the goal of discouraging small-scale solar power generators, such as households and businesses.[14] This resistance to solar energy development by utilities is fueled by economic, cultural, and political forces.

With regard to economics, utilities enjoy a natural monopoly and are resistant to anything that may jeopardize their monopoly power. As David Cran, CEO of NRG Energy, the biggest independent producer of electricity in the U.S., explains: "[t]here's nothing better in business than having a monopoly and not

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11. Patrick DiJusto, *Energy 360: The Solar State*, DWELL (Sept. 2015), at 56.

12. *Frequently Asked Questions: What is U.S. electricity generation by energy source?*, U.S. ENERGY INFORMATION ADMINISTRATION, Mar. 31, 2015, https://www.eia.gov/tools/faqs/faq.cfm?id=427&t=3.

13. Patrick DiJusto, *supra* note 11, at 56.

14. *Id*. at 58.

having to deal with competition."[15] Solar energy poses a threat to this monopoly power because the technology can be leveraged by end users to harvest a free resource, the sun. Richard J. Pierce and Ernest Gellhorn, both renowned legal scholars and professors, explain: "[a natural monopoly] exists when economies of scale available in the process of manufacturing a product are so large that the relevant market can be served at the least cost by a single firm."[16] Solar power's potential to distribute energy generation geographically and economically, potentially among end-users, undermines the traditional economies of scale of energy generation.

Culturally, utilities are slow to evolve – particularly energy utilities and the grid on which they rely, which uses the same basic technology as it did when it was first created.[17] In fact, those in the energy industry like to say that Thomas Edison, who built the first power plant in the U.S. in 1882, would still recognize the grid today.[18]

While economics incentivize utilities' resistance to solar energy development and their culture reinforces it, politics legitimize it. Utilities are regulated by state bodies, often called public utility commissions, which empower and protect utilities' monopoly status in exchange for the power to regulate pricing.[19] Pierce and Gellhorn explain: "[T]he advantages of economies of scale are retained, but price regulation limits the firm's ability to increase price, reduce output, and earn monopoly profits."[20] All too often, however, lobbyists representing the oil and gas industry are able to infiltrate and influence these state utility commissions, which lose sight of their regulatory role to serve the common good.[21]

For example, in 2012, a utility industry trade association hosted a presentation by lobbyists on the threat that rooftop solar posed to electric

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15. Bill Loveless, *NRG Energy Sees Shining Future For Solar*, USA TODAY (May 22, 2015).

16. PIERCE, JR. & ERNEST GELLHORN, REGULATED INDUSTRIES 48 (4TH ED. 1999).

17. Ben Schiller, *You Don't Need An Energy Company When You Can Buy Power From Your Friend*. FASTCOEXIST, Mar. 16, 2015, http://www.fastcoexist.com/3040833/world-changing-ideas/you-dont-need-an-energy-company-when-you-can-buy-power-from-your-friend.

18. *Id*.

19. PIERCE, JR. & GELLHORN, *supra* note 16, at 1-2. ("While government business regulation may at time be so intense as to be indistinguishable from government ownership, in most instances the degree of oversight is less rigorous and the regulated business is allowed considerable freedom to make basic investment and operating decisions. In general, the degree of oversight varies depending on why the regulation is imposed. For example, if it is though that the market favors natural monopoly [such as with electric utilities], comprehensive cost-of-service ratemaking by regulatory commission is imposed as a substitute for the constraints competitors otherwise generated as a matter of marketplace discipline").

20. PIERCE, JR. & GELLHORN, *supra* note 16, at 53-54.

21. *Oil & Gas Industry Profile: Summary, 2015*, OPENSECRETS.ORG (Dec. 18, 2015), https://www.opensecrets.org/lobby/indusclient.php?id=E01. (arguing that expenditure by the oil and gas industries on lobbying in the U.S. totaled $97,349,688 in 2015 – a considerable decrease from the $141,600,272 spent in 2014).

utilities.[22] "Three years later, the [electric 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."[23] The first part of that campaign was an attempt to push for state laws raising prices for solar customers, which failed.[24] Now, the campaign is focused on state public utility commissions "where industry backers have mounted a more successful push for fee hikes that could put solar out of reach for many potential customers."[25]

But solar power is coming, just as surely as global warming.[26] According to a March 2015 *Gallup* poll, a majority of Americans accepted that global climate change is real and believe that its effects are already occurring.[27] Another *Gallup* poll conducted at the same time found that 79 percent of Americans favor more emphasis on solar energy in particular, followed by wind (70 percent), natural gas (55 percent), oil (41 percent), nuclear power (35 percent), and coal (28 percent).[28] And according to a March 2014 *Gallup* poll, Americans, particularly young Americans, are more likely to prioritize environmental protection over economic growth.[29]

Largely symbolic of this shift in public opinion is President Obama's 2010 order to reinstall solar panels on the White House.[30] President Carter originally had the solar panels installed in 1979.[31] President Reagan ordered them to be

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22. Joby Warrick, *Utilities Wage Campaign Against Rooftop Solar*, THE WASHINGTON POST (Mar. 7, 2015), https://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.

23. *Id*.

24. *Id*.

25. *Id*.

26. Eric Roston, *supra* note 7 ("[The solar energy industry's growth is] gradual, but gradual like a locomotive . . . That doesn't mean the pressure to make the economics work is off. It does mean tha[t] in a few years, technology long confined to environmentalists' fantasies has become a viable source of power for many places under the sun.").

27. Lydia Saad, *U.S. Views on Climate Change Stable After Extreme Winter,* GALLUP (Mar. 25, 2015), http://www.gallup.com/poll/182150/views-climate-change-stable-extreme-winter.aspx. (explaining 55 percent of Americans believe the effects of "global warming" are already evident; 33 percent of Americans, meanwhile, believe the effects will never be evident or not in their lifetime).

28. Rebecca Riffkin, *U.S. Support for Nuclear Energy at 51%,* GALLUP (Mar. 30, 2015), http://www.gallup.com/poll/182180/support-nuclear-energy.aspx.

29. Art Swift, *Americans Again Pick Environment Over Economic Growth*, GALLUP (Mar. 20, 2014), http://www.gallup.com/poll/168017/americans-again-pick-environment-economic-growth.aspx.

30. Tom Murse, *A Brief History of White House Solar Panels*, ABOUT NEWS, (Dec. 4, 2015), http://usgovinfo.about.com/od/thepresidentandcabinet/tp/History-of-White-House-Solar-Panels.htm.

31. *Id*.

removed in 1981, almost immediately upon taking office.[32] He believed the symbolism of solar panels on the White House contradicted his view that private industry, including oil and gas, operating in a free market would yield optimal results.[33] Interestingly, President Carter stated upon the solar panels' installation:

> [A] generation from now, this solar heater can either be a curiosity, a museum piece, an example of a road not taken, or it can be a small part of one of the greatest and most exciting adventures ever undertaken by the American people; harnessing the power of the sun to enrich our lives as we move away from our crippling dependence on foreign oil.[34]

While the primary motivator for solar energy development may no longer be America's dependence on foreign oil, most indicators point to a favorable view of President Carter's efforts.[35]

Looking to the future, utilities must realize and embrace solar energy's potential benefits in order to survive. Hal Harvey, CEO of Energy Innovation, a clean energy think tank, assessed utilities' punitive solar power policies as ultimately detrimental to all parties involved, including the utilities that implement them: "[It is] a very bad idea for America because it means we're going to deprive ourselves of free energy. It's bad for homeowners because it deprives them of choice. And it's bad for utilities because it's basically telling customers, 'You're not actually customers, you're hostages.'"[36]

What role should the U.S. government play in helping solar energy overcome cultural, economic, and political resistance? The answer to this question must be informed by Germany's example. Germany boasts more installed solar energy capacity than any other country at 26 percent of the world's total with 35.5 gigawatts as of 2014, which is twice as much as any other country and nearly three times as much as the U.S. – an impressive feat for a moderately-sized country that is not particularly sunny.[37] Germany's Energiewende, translated to "energy transition" (although some argue its ubiquity requires no translation[38]),

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32. *Id*.

33. *Id.* (quoting Natalie Goldstein, author of 2010's *Global Warming*, "Reagan's political philosophy viewed the free market as the best arbiter of what was good for the country. Corporate self-interest, he felt, would steer the country in the right direction").

34. *Id*.

35. *Id*. ("The panels are one piece in the larger plan by Obama to encourage energy efficiency and solar deployment across the country as a means of fighting climate change"); *see also* Laura Barron-Lopez, *Obama Reverses Reagan, Puts Solar Panels on White House Roof*, THE HILL (May 9, 2014), http://thehill.com/policy/energy-environment/205683-solar-panels-return-to-white-house-roof-after-three-decades; Tom Murse, *supra* note 30.

36. Patrick DiJusto, *supra* note 11, at 62.

37. Tim Smith, *Top 5 Countries for Solar Energy,* The World Energy Foundation (May 7, 2015), https://theworldenergyfoundation.org/by-tim-smith/ (explaining the U.S. ranks fifth with 12 gigawatts, which reflects a 750 percent increase in the last four years).

38. Sean Conway, *'Energiewende' Needs No Translation*, RYERSON UNIVERSITY CENTRE

has been primarily driven by a policy mechanism called a FIT, which Germany imposed on a federal level. By definition, FITs "put a legal obligation on utilities and energy companies to purchase electricity from renewable energy producers at a favourable price per unit" for a guaranteed term of years.[39]

Germany's FIT policy has been successful in many regards. It has effectively increased solar energy generation in Germany and helped drive the dramatic advancement of solar energy technology in the last five years.[40] But this success has not been without its downfalls. German energy utilities have been weakened and there is some evidence that Germany's success at increasing solar power generation has had no net effect on global carbon emissions, only helping to drive the price of natural gas down and increasing emissions elsewhere.[41]

Given Germany's significant head start and the immediate threat of global warming, the U.S. must follow Germany's lead in promoting solar energy generation, taking lessons from both its successes and failures. Unlike Germany, the U.S. should invest in R&D aimed at making solar power more efficient and less expensive instead of subsidizing private industry to drive solar power development and installation.[42] Only when solar power generation reaches true parity with fossil fuel generation on the free market will long term reductions in global carbon emissions be realized. When parity arrives in a given market, utilities will be incentivized to voluntarily offer utility-level FITs to customers

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FOR URBAN ENERGY (Dec. 17, 2014), http://www.ryerson.ca/cue/news/blog/energiewende-talk-professor-joachim-knebel-karlsruhe-institute-technology.html. (explaining that this term really came into common use with Chancellor Angela Merkel's 2011 commitment to phase out German generation and use of nuclear power in the wake of the Fukushima nuclear disaster, but can be used more broadly to describe Germany's commitment to developing and using renewable energy sources).

39. Miguel Mendonca, James Corre, *Success Story: Feed-In Tariffs Support Renewable Energy in Germany*, CLIMATE PARLIAMENT, www.e-parl.net/eparliament/pdf/080603%20**FIT**%20toolkit.pdf.

40. Kerstine Appunn, *Germany's Greenhouse Gas Emissions and Climate Targets*, CLEAN ENERGY WIRE, (May 9, 2015), https://www.cleanenergywire.org/factsheets/germanys-greenhouse-gas-emissions-and-climate-targets. (Renewable energy sources provide 27.8 percent of German's domestic power consumption and 26.2 percent of gross electricity generation); *See* JÜRGEN WEISS & SARA BIRMINGHAM, SOLAR ENERGY INDUSTRIES ASSOCIATION, SOLAR ENERGY SUPPORT IN GERMANY: A CLOSER LOOK 27 (July 2014). ("Germany has certainly contributed to the creation of a global solar PV industry and resulting costs of solar PV that have declined dramatically and begin to approach the costs of power generation from new fossil power sources in at least some countries (including Germany, where natural gas prices are high)").

41. Natalia Drozdiak, *Germany's Top Power Utilities Face Dimmer Prospects*, THE WALL STREET JOURNAL (March 11, 2015), http://www.wsj.com/articles/germanys-top-power-utilities-face-dimmer-prospects-1426086921; *See generally id.* at 19 (arguing that report commissioned by the German government concluded that Germany's renewable energy policies have failed to reduce domestic power sector emissions).

42. Yes, that includes eliminating tax credits for installation.

who install solar panels in exchange for renewable energy certificates ("RECs").[43] The value of the RECs can be included in utilities' rate bases, which determine how much they can charge customers for energy, so customers who generate electricity are incentivized by the FIT, while utilities are incentivized by the RECs. This utility-level FIT policy—in combination with non-subsidizing government policies aimed at decreasing carbon emissions, like RPS programs and the Clean Power Plan—will be economically attractive to utilities faced with the alternative of constructing traditional fossil fuel generation plants.

III. ANALYSIS

1. BACKGROUND ON GERMANY'S RENEWABLE ENERGY LEGISLATION

Germany's Erneuer-Energien-Gesetz ("EEG") has faced opposition similar to that posed by America's energy utilities. Germany's Conventional Energy Coalition ("CEC") strives to maintain the energy status quo, like most American utilities, while the Sustainable Energy Coalition ("SEC") promotes the development of renewable energy sources.[44] But unlike the U.S., Germany's drive toward renewable energy generation is twofold: stopping global climate change and stopping nuclear energy generation. Journalist Robert Kunzig explained in his October 2015 *National Geographic* profile of Energiewende:

> I had come to Germany thinking the Germans were foolish to abandon a carbon-free energy source that, until Fukushima, produced a quarter of their electricity. I came away thinking there would have been no [E]nergiewende at all without antinuclear sentiment—the fear of a meltdown is a much more powerful and immediate motive than the fear of slowly rising temperatures and seas.[45]

And that deep-rooted cultural fear easily overcame the CEC's opposition through the 2000s with the birth and development of Energiewende. Gerd Rosenkranz, a former Der Spiegal journalist who is now an energy analyst at a Berlin think tank,

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43. Also known as Renewable Energy Credits.

44. Peter Sopher, *Two Political Lessons from Germany's Energiewende*, ENVIRONMENTAL DEFENSE FUND (Nov. 17, 2014), http://blogs.edf.org/energyexchange/2014/11/17/two-political-lessons-from-germanys-energiewende/.

45. Robert Kunzig, *Germany Could Be a Model for How We'll Get Power in the Future*, NATIONAL GEOGRAPHIC, (Oct. 15, 2015), http://ngm.nationalgeographic.com/2015/11/climate-change/germany-renewable-energy-revolution-text. ("If you ask why antinuclear sentiment has been so much more consequential in Germany than, say, across the Rhine in France, which still gets 75 percent of its electricity from nukes, you end up back at [WWII]. It left Germany a divided country, the front along which two nuclear superpowers faced off. Demonstrators in the 1970s and '80s were protesting not just nuclear reactors but plan to deploy American nuclear missiles in West Germany. The two didn't seem separable. When the German Green Party was founded in 1980, pacifism and opposition to nuclear power were both central tenets.")

explained to *National Geographic*: "It's a project for a generation; it's going to take till 2040 or 2050, and it's hard . . . It's making electricity more expensive for individual consumers. And still, if you ask people in a poll, Do you want the [E]nergiewende? then 90 percent say yes."[46]

Although Germany has explored various schemes to promote renewable energy sources in some form since 1990, solar power did not become central to the EEG until July 2004 when it was added to the country's existing renewable energy legislation, the EEG of 2000.[47] The cornerstone of that legislation was a renewable energy FIT,[48] which guaranteed a higher than market rate to generators for renewable energy fed into the grid, to be paid by utilities and their ratepayers.[49] The generators were then required to pay the standard rate for all energy the producer received from the grid, likely at night and during non-peak sunlight hours.[50]

The FIT offered under the EEG was guaranteed for a twenty year term and included a regression scheme, which means the rate paid for energy would decrease by a certain percentage each year of the FIT.[51] Regression rates are intended to "encourage innovation and cost saving," while the objective of the 2004 solar energy FIT was "to ensure a modest long-term return of profitability in the order of 5 to 7 [percent] net for solar energy producers."[52] If nothing else, the FIT was indisputably successful in spurring solar energy generation and development. From implementation of the FIT in 2004 to 2008, Germany's solar energy generation increased by more than factor of seven, while installed capacity increased by a factor of 13.[53]

In 2009, EEG 2000 was replaced by EEG 2009, which simplified the solar FIT scheme and increased regression rates.[54] In 2012, EEG 2009 was amended to reduce payments and regression schedules.[55] Expert observation of the 2012

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46. *Id*. ("Germany has Europe's second highest consumer electricity prices, yet public support for its [E]nergiewende—an aggressive transition to renewable energy—is at an impressive 92 percent.").

47. David Grinlinton, LeRoy Paddock. Symposium Article: *Climate Change and the Future of Energy: The Role of Feed-In Tariffs in Supporting the Expansion of Solar Energy Production*, 41 U. TOL. L. REV. 943, 949-950 (2010).

48. *See* above for definition of Feed-In Tariff ("FIT").

49. David Grinlinton & LeRoy Paddock, s*upra* note 47, at 950.

50. *Id*.

51. *Id*. at 949-50. (specifying that the regression rate was 5 percent per year beginning in 2005 and was increased to 6.5 percent on January 1, 2006).

52. *Id*.

53. *Id*. at 951-52. ("Since the 2004 amendment to the EEG 2000 that provided greatly enhanced FITs to solar PV electricity production, PV electricity generation has increased from 557 [gigawatt hours] in that year to 4,000 [gigawatt hours] in 2008, with installed capacity increasing from 408 [megawatt peak] to 5,311 [megawatt peak] in the same period.")

54. *Id*. at 950.

55. MARK FULTON, REID CAPALINO, JOSEF AUER, ET AL., THE GERMAN FEED-IN TARIFF: RECENT POLICY CHANGES, GLOBAL HEAD OF CLIMATE CHANGE INVESTMENT RESEARCH,1 (Sept.

amendments focused on the maturation of the FIT and a shift in focus from renewable energy scale-up to grid parity.[56] In 2014, EEG 2009 was amended again and the FIT program was largely eliminated, with an exception for small renewable generators.[57]

This change in German policy has slowed development of solar energy in Germany, which installed just 1.89 gigawatts of new solar energy capacity in 2014, compared to 3.14 gigawatts in 2013 and 7.27 gigawatts in 2012.[58] While the reduced installation was foreseeable, the overall policy disruption has also left German energy utilities adrift, especially E.ON SE ("E.ON") and RWE AGE ("RWE"), Germany's top utilities and two of the world's biggest power companies. Per the *Wall Street Journal*: "Falling demand for power and heavy government subsidies for renewable energy have […] undermined the pair's traditional business model."[59] Indeed, the two companies' financial records reflect this upheaval with E.ON reporting its largest-ever net loss of €3.2 billion in 2014, while RWE's market value has fallen by half since mid-2010.[60]

Additionally, evidence suggests that Germany's efforts to promote renewable energy generation have failed to decrease or even stabilize the country's greenhouse gas emissions with power sector greenhouse gas emissions increasing by around 10 percent from 2009 to 2013, which coincides with the rapid expansion of renewable energy generation in Germany.[61] It is against this policy background that this Note now explores the pros and cons of Germany's efforts to promote solar energy generation.

2. THE PROS OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION

Germany's solar energy policies have effectively increased renewable energy penetration in the country, with renewable energy's share in excess of 30 percent in 2014, without sacrificing reliability.[62] Within Europe, Germany's choice of a

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2012).

56. *Id*.

57. Dr. Matthian Lang & Annette Lang, *Overview Renewable Energy Sources Act*, GERMAN ENERGY BLOG (Oct. 1, 2015, 5:34 PM), http://www.germanenergyblog.de/?p=19194. (specifically excepting "small renewable power plants . . . commission[ed] before January 1, 2016 with an installed capacity of less than 500 kW and plants commissioned after 31 December 2015 with an installed capacity of less than 100 kW."

58. Ian Clover, *Germany Added 1.89 GW of PV in 2014, Stats Show*, PV MAG. (Feb. 3, 2015), http://www.pv-magazine.com/news/details/beitrag/germany-added-189-gw-of-pv-in-2014--stats-show_100018033/#axzz3xdWCt4k7.

59. Drozdiak, *supra* note 41.

60. *Id*.

61. WEISS & BIRMINGHAM, *supra* note 40, at 20.

62. HARRY WIRTH, FRAUNHOFER ISE, RECENT FACTS ABOUT PHOTOVOLTAICS IN GERMANY 5 (Oct. 16, 2015), https://www.ise.fraunhofer.de/en/publications/veroeffentlichungen-pdf-dateien-

FIT has proven more successful in spurring solar energy development than the use of a national RPS, which mandate that a certain percentage of energy come from renewable sources, by other European countries: "Italy, Sweden, and the United Kingdom initially favored RPS, while Germany, Spain, and other countries favored FIT. Consequently, Germany has 200 times the installed solar capacity and 10 times the number of renewable energy jobs as does the UK."[63] It should be noted that the United Kingdom's ("UK") population is about three-quarters that of Germany; however, Germany's renewable gains nonetheless outpace the UK's gains by a considerable margin.[64] Germany met its 2010 target for renewable energy generation in 2007, reflecting a 100 percent increase from 2000 levels.[65] As of 2008, 278,000 were employed in the renewable energy sector in Germany, a 12 percent increase since the year before and a 73 percent increase since 2004.[66]

Additionally, critics' warning that increased renewable energy generation would negatively impact system reliability has so far been unfounded:

> Germans suffer, on average, from merely 7 percent of the outage minutes of [the] average American . . . [And] German SAIDI [System Average Interruption Duration Index] scores have essentially remained flat or even decreased somewhat since 2007, i.e. during the period that saw very rapid increase in power generation from intermittent renewable sources such as solar PV and wind.[67]

It can be argued that this reliability has come at a higher price tag due to the increased reliance on renewable energy sources, but these costs pale in comparison to the cost of implementing those sources.[68] There is no doubt that sustaining reliability will require ongoing investment in transmission and distribution infrastructure; however, this investment is, to a certain extent, inevitable and will reduce some of the costs currently associated with bringing renewable energy sources online, such as re-dispatch and curtailment.[69]

3. THE CONS OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION

Germany's solar energy policies have resulted in high electricity rates and,

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en/studien-und-konzeptpapiere/recent-facts-about-photovoltaics-in-germany.pdf.

63. Steven Ferrey et al., *FIT in the USA*, 148 No. 6 PUB. UTIL. FORT. 60, 62 (2010).

64. *United Kingdom vs. Germany*, Index Mundi, http://www.indexmundi.com/factbook/compare/united-kingdom.germany. (estimating UK's population at 63,742,977 as of July 2014, versus German's population estimated at 80,996,685, also as of July 2014).

65. Eisen, *supra* note 8, at 83.

66. Grinlinton & Paddock, s*upra* note 47, at 952. (It is unclear as yet how the 2014 Amendments' elimination of the FIT program will impact these numbers).

67. WEISS & BIRMINGHAM, *supra* note 40, at 21.

68. *Id*. at 23.

69. *Id*. at 24.

as noted above, these policies have destabilized German utilities. German electricity rates are, on average, about twice as much U.S. rates.[70] Germany's average retail rate has increased by about 50 percent since 1998, adjusted for inflation, and "approximately half of this increase is due to the renewables levy, the surcharge on bills to recover the costs of payments under FITs for various renewable technologies including solar PV."[71]

Households are hit the hardest by these rates, with many unable to pay.[72] This is in large part because the German government shields most companies from the costs of the EEG's FIT to ensure that Germany remains attractive to employers.[73] Despite this effort, however, industrial users in Germany still pay "substantially" more than industrial users in the UK and France and "almost three times as much" as those in the U.S.[74] As a result, many German industrial interests, including chemical giant BASF, an "industrial pillar" in Germany since the 1860s, have been forced to expand operations abroad due to Germany's high energy costs.[75] The market research firm IHS wrote in a recent study: "in a highly competitive world, German industry is at an increasing disadvantage owing to the growing energy price disadvantage that it faces."[76] With industry departing, jobs follow, which means that those households already struggling to afford energy prices may find themselves in even more dire straits due to lost employment.

The term "energy poverty" is commonly used in Germany to describe the effect of the high rates, and there is no reprieve in sight, despite the elimination of the FIT program in 2014.[77] In the aftermath of the 2011 Fukushima nuclear disaster, Chancellor Angela Merkel announced a plan to shut down all of Germany's nuclear plants by 2022.[78] Analysts at RBC Capital Markets estimate that government subsidies for this plan will be $22.7 billion in 2012 and could amount to $40.5 billion by 2020.[79] Whether these costs will be levied by increased taxes or increased rates, the German people will be footing the bill. Michael Hüther, director of the Cologne Institute for Economic Research, opined: "It is great that we have achieved such a high percentage of renewable energy . . . But there are negative repercussions that we are now beginning to feel and

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70. *Id*. at 9.

71. *Id*.

72. Melissa Eddy & Stanley Reed, *Germany's Effort at Clean Energy Proves Complex,* N. Y. TIMES (Sept. 18, 2013), http://www.nytimes.com/2013/09/19/world/europe/germanys-effort-at-clean-energy-proves-complex.html.

73. *Id*.

74. *Id*.

75. *Id*.

76. Matthew Karnitschnig, *Germany's Green Sticker-Shock*, POLITICO.EU, Nov. 25, 2015, http://www.politico.eu/article/the-good-green-german-gets-sticker-shock/.

77. Eddy & Reed, *supra* note 72.

78. *Id*.

79. *Id*.

must be addressed."[80]

The financial difficulties of Germany's energy utilities are likewise troublesome. German utility giant RWE's CEO Peter Terium explained the underlying problem: "[U]p to 45 [percent] of the company's conventional power plants weren't commercially viable because of low wholesale electricity prices. RWE generates almost all of its power from coal, gas, and nuclear energy."[81] This would be a victory for renewable energy enthusiasts, except that conventional power plants are still needed to provide energy to the grid when solar energy is not producing, such as at night and during non-peak sunlight hours. Bill Gates described this conundrum as follows:

> It's kind of ironic: Germany, by installing so much rooftop solar, has it that both their coal plants and their rooftop solar are available in the summer, and the price of power during the day actually goes negative—they pay people to take it. Then at night the only source is the coal, and because the energy companies have to recover their capital costs, they either raise the price because they're not getting any return for the day, or they slowly go bankrupt.[82]

Arguably, the German utilities, which invested heavily in fossil fuel generation in the early 2000s amounting to a 16 percent increase in supply to Europe as a whole, would likely be in trouble regardless of the German FIT .[83] For one, the American shale-gas boom "decreased demand and prices for European coal."[84] The European recession, meanwhile, decreased demand for energy, which was projected to decrease by an additional 2 percent between 2010 and 2015 according to the International Energy Agency.[85] To make matter worse, the price of natural gas remains relatively high in Europe.[86] Then, of course, there is the German FIT, which has increased generation of renewable energy. In sum, the total energy generation capacity in Germany, Spain, and Italy far exceeds peak demand in those countries.[87] This is particularly bad news for energy utilities trying to profit on selling energy. In a sad paradox that the U.S would be wise to avoid replicating, German wholesale energy prices are so low that utilities are struggling to remain viable, while retail energy prices are so high due to the FIT that ratepayers are struggling to keep their lights on.

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80. *Id*.

81. Drozdiak, *supra* note 41.

82. Bennet, *supra* note 9.

83. *How to Lose Half a Trillion Euros*, THE ECONOMIST (Oct. 12, 2013), http://www.economist.com/news/briefing/21587782-europes-electricity-providers-face-existential-threat-how-lose-half-trillion-euros.

84. *Id*. (This influx of American coal has resulted in an increased profit margin for burning coal, which is a large part of the reason why German carbon emissions have not decreased despite their commitment to renewable energy).

85. *Id*.

86. WEISS & BIRMINGHAM, *supra* note 40, at 19.

87. *How to Lose Half a Trillion Euros, supra* note 83.

IV. RECOMMENDATIONS

1. THE ROLE OF UTILITIES

This paradox experienced by German utilities might lead one to question the value of energy utilities in the future; but besides utilities' obvious role as employers and the plight of their investors and bondholders, utilities have a very definite and important role to play in the future distributed energy world:

> [Utilities] will be the electricity generators of last resort, ensuring the lights stay on when wind and solar generators run out of puff. And they will be providers of investment to help build the grand new grid. It is not clear that [the German] utilities are in good enough shape to do either of these things.[88]

U.S. energy utilities must evolve with the market for solar energy technology in order to survive.[89] But that is easier said than done in an industry particularly resistant to change.

Even in Germany, utilities own just 7 percent of the renewable energy capacity.[90] That statistic is likely due in part to the highly distributed nature of solar energy and the fact that German utilities had already invested so heavily in traditional sources of generation, but it also reflects utilities' unwillingness to anticipate and embrace change:

> The problem is that solar energy is so different from what they are used to. The old-fashioned utility has a big expensive power plant with, say, 1-1.5 [gigawatts] of capacity. The plant sits in the middle of a radiating web of wires down which the firm distributes power. Solar power is different. Photovoltaic panels are cheap, tiny (a medium-sized array may have a capacity of just 10MW) and arranged in a net, not as a hub with spokes.[91]

Indeed, solar energy generation is, in many respects, a disruptive technology.[92] And utilities need to act fast to keep up. Joel B. Eisen, professor of energy law at

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88. *Id*.

89. *Id*.

90. *Id*.

91. *Id*.

92. Margaret Rouse, *Disruptive Technology,* WHATIS.COM, (July, 2014), http://whatis.techtarget.com/definition/disruptive-technology ("Harvard Business School professor Clayton M. Christensen coined the term *disruptive technology*. In his 1997 best-selling book, 'The Innovator's Dilemma,' Christensen separates new technology into two categories: sustaining and disruptive. Sustaining technology relies on incremental improvement to an already established technology. Disruptive technology lacks refinement, often has performance problems because it is new, appeals to a limited audience, and may not yet have a proven practical application.").

the University of Richmond, explained why utilities may be resistant to disruptive technologies: "Incumbent companies ignore disruptive innovations because existing technologies look more profitable than innovative products . . . [Disruptive technologies] require companies with the foresight to capitalize on their potential."[93]

The moment to capitalize on that foresight is rapidly passing for solar energy technology and the moment that utilities must act in order to survive is nearing. One market analysis group, GTM Research, calculated that a new home solar energy system is installed in the U.S. every four minutes.[94] The Edison Electric Institute, a lobby group, estimates that $170 billion of utility revenue across the country could be at risk from solar competition by 2017.[95] The International Energy Agency, an autonomous intergovernmental organization, "which has historically taken a conservative approach to evaluating solar power's prospects," projected that solar energy could be the biggest source of power by 2050 by generating as much as 27 percent of the world's energy supply.[96]

With many projecting a "death spiral" for utilities, Elon Musk and his likeminded cousin Lyndon Rive, the CEO of SolarCity, a leading producer of solar power systems, believe utilities can survive in the solar energy-dominated market.[97] Rive recently noted the necessity of the grid to *Financial Times*, calling the transition a "change spiral" instead: "When you've had a monopoly for a hundred years, and you've never seen change, change may seem like death to you."[98] Clean energy consultant and founder of SunEdison, the largest solar service provider, Jigar Shah similarly describes the challenges utilities face: "I think this is a major transition. I think every utility is basically going to have to put personnel [who are] wedded to the past in one company and their personnel [who are] wedded to the future in another company."[99]

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93. Eisen, *supra* note 8, at 63.

94. *How to Lose Half a Trillion Euros, supra* note 83.

95. Chistopher Swann, *U.S. Utilities Face German-Style Solar Burn*, REUTERS (Jan. 3, 2014), http://blogs.reuters.com/breakingviews/2014/01/03/u-s-utilities-face-german-style-solar-burn/.

96. Dickon Pinner & Matt Rogers. *Solar Power Comes of Age: How Harnassing the Sun Got Cheap and Practical*, 94 FOREIGN AFF. 111 (2015).

97. Jean-Marc Ollagnier, *Will Solar Cause A 'Death Spiral' for Utilities?*, FORBES (Jan. 30, 2015), http://www.forbes.com/sites/energysource/2015/01/30/will-solar-cause-a-death-spiral-for-utilities/ (dispelling the notion of a utility "death spiral," but noting: "This is not to say that utilities are off the hook. In fact, while the majority of their customers are likely to stick around, utilities will still face enormous technical challenges around reliably operating the grid, which is already stressed due to its ageing infrastructure and more frequent adverse weather events, especially in the U.S."); Adam Johnston, *Solar & Utilities Can Exist Together, Says Musk*, CLEANTECHNICA (Feb. 11, 2015), http://cleantechnica.com/2015/02/11/solar-utilities-can-exist-together-says-musk/.

98. Johnston, *supra* note 97.

99. Julia Pyper, *As German Utilities Enter a 'New World of Energy, Are Any US Companies on the Same Path?* GREENTECHMEDIA.COM (Dec. 9, 2014), http://www.greentechmedia.com/articles/read/is-nrg-the-next-e.on.

Shah's prediction certainly proved true in the case of NRG Energy ("NRG"), which is the largest independent power supplier in the U.S.[100] NRG dove headfirst into the future of energy, set ambitious carbon emission targets, and began investing in distributed renewable energy technology by acquiring a rooftop solar installation company and a solar energy customer acquisition platform.[101] Ultimately, NRG's experiment to combine the present and the future of energy in one company failed and NRG ultimately decided to spin off its renewable energy business.[102] NRG subsequently formed GreenCo to focus on renewable energy business so that NRG could remain focused on traditional fossil fuel generation.[103]

One key driver of the split was a cultural difference: "NRG's utility business is like a sloth compared to fast-moving solar companies, and the combination of the two couldn't have been easy to balance internally."[104] However, financial considerations also played a significant role:

> The typical investor bases that the two industries serve are also different. Utility and fossil fuel investors want cash flow and dividends. Renewable energy investors want growth and disruption. Clearly, the two didn't combine well in NRG Energy, despite what could have been an interesting corporate structure.[105]

This example is not to imply that the traditional generation model and the new model cannot be merged. Xcel Energy ("Xcel"), a Midwest energy utility primarily operating in Minnesota, has successfully taken on the challenge by pacing their transition into the renewable energy market with outside innovation.[106] Like NRG, Xcel set a goal of reducing carbon emissions by 40 percent by 2030 in their 2016 Upper Midwest Resource Plan.[107] Unlike NRG, Xcel plans to achieve this goal through investment and deployment of emerging technologies developed by others.[108] They note that utilities are at a "pivotal point" and describe customer desire "for diversified services and products" as a driving force behind the change.[109]

In the face of these drivers, utilities like Xcel must evolve in order to survive,

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100. *Id*.

101. *Id*.

102. Travis Hoium, *NRG Energy Abandoning Renewable Energy Vision*, THE MOTLEY FOOL (Sep. 22, 2015), http://www.fool.com/investing/general/2015/09/22/nrg-energy-abandoning-renewable-energy-vision.aspx.

103. *Id*.

104. *Id*.

105. *Id*.

106. XCEL ENERGY , UPPER MIDWEST RESOURCE PLAN 2016 – 2030, XCEL ENERGY (2014), https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/03-Preferred-Plan.pdf.

107. *Id*.

108. *Id*.

109. *Id*.

but as evidenced by NRG's approach, utilities must pace their evolution with the market. Instead of waiting for innovation, NRG sought to drive solar energy technological advancement from within. Xcel, meanwhile, is anticipating technological advancements and planning to take advantage through investment when it makes sense for their bottom line: "Our approach to these emerging technologies is to learn from the current deployments . . . and implement initiatives at the pace of value to our customers and operations."[110] Both companies' foresight is commendable; however, Xcel's market-paced approach has proven more successful for a traditional energy company, regulated or otherwise.

2. GOVERNMENT-RUN RESEARCH AND DEVELOPMENT

Whether or not GreenCo, NRG's solar energy technology spinoff, can survive on its own is yet to be determined.[111] Significant challenges lie ahead for private solar power technology companies because, according to Bill Gates: "there's no fortune to be made."[112] Even a fool-proof solution, i.e. a renewable energy source that has full market parity with fossil fuel energy generation, will still have a hard time competing with traditional sources of energy that are, in Gates' words: "tried-and-true and already operating at unbelievable scale and [have] gotten through all the regulatory problems."[113]

Because of the lack of incentives in the free market for revolutionary renewable energy technologies, Gates advocates for government-run R&D in combination with a carbon tax.[114] Investment in R&D avoids the problem encountered by German utilities, which were forced by government mandate to subsidize private solar energy development through inflated rates for energy generation that they did not need, by keeping government money out of the marketplace for energy. Government investment in R&D will not artificially inflate the solar energy industry; rather, it will produce technology that can sustain itself in the market before it is introduced to the industry.

The counterargument is that private industry, through FITs, has a better opportunity to develop solutions that can scale:

> [R&D] initiatives, although an important component of innovation, are insufficient on their own to drive PV Down the learning curve. An important component of PV innovation and cost reductions comes from the 'learning by doing' acquired by industry and public sector players as

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110. *Id.*

111. Hoium, *supra* note 102.

112. Bennet, *supra* note 9.

113. *Id.*

114. Bennet, *supra* note 9 ("The push is the R&D,' he said, before indicating the arrow on the right. 'The pull is the carbon tax.' Between the arrows he sketched boxes to represent areas, such as deployment of new technology, where, he argued, private investors should foot the bill. He has pledged to commit $2 billion himself").

the market scales up (rather than through advances in the lab).[115]

The German FIT, however, rebuts this counterargument. Despite this policy mechanism's role in the rapid advancement of solar energy technology in the past five years, the technology is simply not there yet for all the reasons discussed in the Introduction. And for all the reasons discussed under the foregoing analysis of Germany's FIT, America should avoid creating the same market inefficiencies suffered by German ratepayers and utilities by investing in government-run R&D instead of by artificially inflating demand in private industry. Gates compares the approach to how the U.S. became a world leader in cancer research:

> When people viewed cancer as a problem, the U.S. government—and it's a huge favor to the world—declared war on cancer, and now we fund all health research at about $30 billion a year, of which about $5 billion goes to cancer. We got serious and did a lot of R&D, and then we got the private sector involved in taking that R&D and building breakthrough drugs. In energy, no government—including the U.S., which is in almost every category the big R&D funder—has really made a dramatic increase. It was increased somewhat under Carter and then cut back under Reagan, and it's now about $6 billion a year—that's the U.S. piece, which, compared with the importance to our economy in general, is too low.[116]

Once government-run R&D produces viable solutions, the private sector, including utilities like Xcel, can then scale those solutions according to demand, avoiding the inefficiencies suffered by German utilities and customers as a result of subsidies in the private sector.

3. ELIMINATION OF THE SOLAR TAX CREDITS

Wait, does focusing government funding on R&D mean eliminating America's solar energy tax credits?[117] Yes, and surprisingly, even some in the

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115. MARK FULTON & NILS MELLQUIST, DEUTCHE BANK CLIMATE CHANGE ADVISORS, THE GERMAN FEED-IN TARIFF FOR PV: MANAGING VOLUME SUCCESS WITH PRICE RESPONSE 3 (May 2011).

116. Bennet, *supra* note 9.

117. The federal tax credits, reinstated in the Energy Policy Act of 2005, allow taxpayers to claim a credit of up to 30% of their total qualified expenditure for a residential renewable energy system. The Business Energy Investment Tax Credit is set to decrease for "equipment that uses solar energy to generate electricity" from 30% to 10% on December 31, 2016, while the Residential Renewable Energy Tax Credit, will expire on December 31, 2016 The federal tax credits, reinstated in the Energy Policy Act of 2005, allow taxpayers to claim a credit of up to 30% of their total qualified expenditure for a residential renewable energy system. The Business Energy Investment Tax Credit is set to decrease for "equipment that uses solar energy to generate electricity" from 30% to 10% on December 31, 2016, while the Residential Renewable Energy Tax Credit, will expire on December 31, 2016. *Business Energy Investment Tax Credit (ITC)*. U.S. DEPARTMENT

solar energy industry agree. Camilo Patrignani, CEO of Greenwood Energy, a full-service solar energy investment and project management firm, advocated in January, 2015, for letting the tax credits die:

> Precedent exists for this model in the California Solar Initiative, which provided incentives for rooftop solar starting in 2007 with the goal of installing 2,000 new megawatts by 2016. But California's ending the incentives this year, well ahead of schedule, and the state's solar industry is growing faster than ever. Why? The answer's simple: regulators volumetrically reduced payments at installation milestones as the industry matured, letting market forces direct incentives, rather than artificial inputs.[118]

Environmental law professors, David Grinlinton and LeRoy Paddock, echo this sentiment, explaining that tax incentives "…do not create price signals that encourage efficiency."[119] SunEdison's Shah admits that subsidies are manipulated by developers to increase profits – basically an admission of striking inefficiency:

> I had a hand in putting in place subsidies so that we could reduce costs through scale in local markets. This strategy has resulted in an average system cost reduction of over 50 [percent] since 2008. But today, solar subsidies in maturing markets like the United States are actually holding us back, not propelling us forward. In fact, Germany has hit an all time high for solar capacity with 30-gigawatts peak (GWp) of solar power installed. Germany has done this by installing solar at far cheaper prices than we are in the United States. That is because solar subsidies are manipulated by investors like me to maximize our returns. The truth is that installer in the United States can, and do, install solar at roughly the same cost as German installers – save for some increased soft costs. If we want to reach higher growth, we need to phase out the solar tax credits and other solar subsidies in mature markets and watch the price of solar fall."[120]

OF ENERGY, *available at* http://energy.gov/savings/business-energy-investment-tax-credit-itc; Additionally, the American Reinvestment and Recovery Act of 2009 removed the maximum credit amount in order to facilitate renewable energy development and expanded the availability of production and investment tax credits. The production tax credit allows taxpayers to recoup a credit for electricity generated on a per-kilowatt hour basis. Dennis L. Arfmann, Tiffany Joye, Eric Lashner, *The Regulatory Future of Clean, Reliable Energy: Increasing Distributed Generation*, 40-OCT COLO. LAW. 31, 37 (2011).

118. Camilo Patrignani, *The Solar Industry Needs to Let Its Federal Tax Credit Die, Says This CEO*, GREENTECH MEDIA (Sept. 28, 2015, 2:21 PM), http://www.greentechmedia.com/articles/read/the-solar-industry-needs-to-let-its-federal-tax-credit-die-says-this-ceo.

119. Bennet, *supra* note 9.

120. Jigar Shah, *Are Subsidies Holding Back U.S. Solar Deployment? (CleanTechnica Exclusive from Jigar Shah)*, CLEANTECHNICA (Oct. 4, 2012), http://cleantechnica.com/2012/10/04/are-subsidies-holding-back-u-s-solar-deployment-cleantechnica-exclusive-from-

One commentator has pointed out that "[s]olar panels are a global commodity."[121] Of course, certain efficiencies in installation and the supply chain have been realized through the scale of German solar power installations.[122] But the price of the panels themselves should be roughly the same in the U.S. as it is in Germany – and savings through scale will be realized as the U.S. market matures. Already, solar energy project costs in the U.S. have decreased by 45 percent since 2012, according to the Solar Energy Industries Association.[123] The National Renewable Energy Laboratory, meanwhile, "forecasts that double-digit annual declines will continue at least several more years."[124] Shah points out that solar energy generation technology is now affordable without subsidies for "ideal customers in 300 utilities in 30 states."[125] Those 300 utilities, according to Shah, amount to about 20 percent of U.S. energy usage.[126] A market analysis completed by Deutsche Bank forecasted that solar power will soon hit parity with fossil fuel generation in 36 states, despite the reduction in the Business Energy Investment Tax Credit from 30 percent to 10 percent at the end of 2016.[127]

The Residential Renewable Energy Tax Credit expired entirely at the end of 2016.[128] Of course, there were calls for Congress to renew the credits in the name of the environmental movement, but as discussed in this analysis, that push might be against the interests of those who wish to see the solar energy industry blossom. Shah acknowledges the argument that solar subsidies should not be eliminated as long as coal and gas are still subsidized, but argues that the solar industry needs "to face up to the realities of our industry," which is that the solar industry does not need subsidies.[129] That money is better spent on government-run R&D than on these tax credits, which have proven largely inefficient and are becoming increasingly unnecessary.

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jigar-shah/.

121. Zachary Shahan, *10 Huge Lessons We've Learned From Solar Power Success in Germany*, CLEAN TECHNICA (Feb. 9, 2013), http://cleantechnica.com/2013/02/09/germany-solar-power-lessons/.

122. WEISS & BIRMINGHAM, *supra* note 40, at 8 ("The importance of the scaling and learning effect for cost declines in Germany has been well documented, and is likely a significant contributor to the lower installed cost of solar in Germany when compared to many other countries including the United States.").

123. Patrignani, *supra* note 118.

124. Patrignani, *supra* note 118.

125. Shah, *supra* note 120.

126. *Id*.

127. Patrignani, *supra* note 118.

128. *Residential Renewable Energy Tax Credit*, U.S. DEPARTMENT OF ENERGY, *available at* http://energy.gov/savings/residential-renewable-energy-tax-credit.

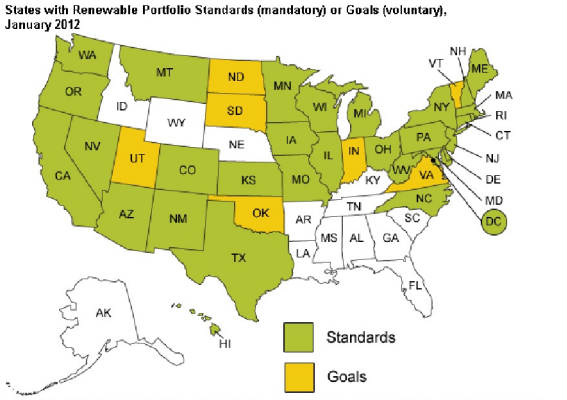
129. Shah, *supra* note 120.

4. OTHER GOVERNMENT POLICIES: RENEWABLE PORTFOLIO STANDARDS AND THE CLEAN POWER PLAN

Tax credits are not the only government policy mechanism currently in place to encourage renewable energy generation. RPS and the controversial Clean Power Plan are other government policies aimed at increasing renewable generation's share of the U.S. energy market and decreasing reliance on traditional fossil fuel energy generation. Eisen explains: "The barrier to bringing solar to the masses is getting consumers to adopt it, not a lack of technological maturity."[130]

Enter government intervention. The design of that intervention, however, makes a big difference in the outcome, as highlighted by the analysis of the German EEG's government-mandate FIT above and the present analysis of RPS programs and the Clean Power Plan. RPS programs and the Clean Power Plan are not designed to artificially inflate the market for solar energy by subsidizing the market and dictating who will bear the costs – taxpayers, in the case of tax credits, and ratepayers, in the case of government-mandated FITs. Instead, RPS programs and the Clean Power Plan set goals for solar generation and consumption on state and national levels but allow state, municipalities, and/or utilities flexibility in how they will reach those goals, which are often sensitive to the market and who will bear the cost.

RPS programs have been enacted in 29 states plus the District of Columbia, as illustrated below.[131] RPS policies require that a percentage of the state's power demand be met with renewable energy, and while these programs undoubtedly interfere somewhat with free market forces, they are not as disruptive as policies that artificially and directly inflate the market for solar energy, like government-mandated FITs and tax credits.[132]



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130. Eisen, *supra* note 8, at 61.

131. Ferrey et al., *supra* note 63, at 66.

132. *Id.*

133. *Most States Have Renewable Portfolio Standards*, U.S. ENERGY INFORMATION

As noted above, RPS programs have not been as immediately successful as FITs at promoting solar energy development in Europe; however, RPS program's avoidance of long-term obligations makes them more market-sensitive and helps avoid the type of over-development experienced in Germany.[134] In fact, many state RPS programs feature "escape clauses," which allow states to fall short of their RPS for renewables if the extra cost of renewable generation exceeds a certain threshold.[135] Most state RPS programs also provide for the trading of RECs between states and utilities with the goal of minimizing the cost of compliance.[136] The U.S. Energy Information Administration explains: "Such a system accommodates timing differences associated with planning and construction of new generation."[137]

Similarly, the Clean Power Plan, put forth by the EPA under the Obama administration, is intended to drive renewable energy development and generation and to decrease fossil fuel energy generation. The plan—the fate of which remains very much undecided as of publication—requires states to "establish standards of performance that reflect the degree of emission limitation achievable through the application of the 'best system of emissions reduction'…."[138] According to the Natural Resources Defense Council: "The Clean Power Plan will sharply reduce carbon pollution and other dangerous air pollutants by shifting our electric power system toward cleaner energy sources at a steady but achievable pace."[139]

As far as design, the Clean Power Plan establishes an eight-year interim compliance period beginning in 2022 with a "glide path" for meeting carbon dioxide emissions goals by 2030.[140] Each state has its own carbon dioxide emissions goal and those goals are weighted according to each state's current reliance on fossil fuel generation.[141] The Obama administration's EPA estimated that the Clean Power Plan will cost up to $8.4 billion annually to implement by 2030,[142] but will result in climate benefits totaling $20 billion and health benefits

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ADMINISTRATION, (Feb. 3, 2012), https://www.eia.gov/todayinenergy/detail.cfm?id=4850.

134. Ferrey et al., *supra* note 63, at 62.

135. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 133.

136. *Id*.

137. *Id*.

138. *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, ENVIRONMENTAL PROTECTION AGENCY, ES-1-2. (Oct. 23, 2015), http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf.

139. NATURAL RESOURCES DEFENSE COUNCIL, ISSUE BRIEF: UNDERSTANDING THE EPA'S CLEAN POWER PLAN 1 (Aug. 2015).

140. *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, ENVIRONMENTAL PROTECTION AGENCY, *supra* note 138, at ES-3.

141. *Clean Power Plan: State at a Glance Indiana,* ENVIRONMENTAL PROTECTION AGENCY 1 (Aug. 3, 2015), http://www.epa.gov/airquality/cpptoolbox/indiana.pdf.

142. *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, ENVIRONMENTAL PROTECTION AGENCY, *supra* note 138, at 3-22.

totaling between $14 billion and $34 billion.[143] EPA also estimated that the Clean Power Plan will prevent 3,600 premature deaths, 1,700 heart attacks, 90,000 asthma attacks, and 300,000 missed work and school days per year.[144]

Interestingly, the Clean Power Plan is only the latest attempt by EPA to regulate greenhouse gases—and carbon dioxide in particular—from stationary sources under the Clean Air Act. The problem is that the Clean Air Act has two main programs aimed at preventing harmful emissions from stationary sources: the National Ambient Air Quality Standards ("NAAQS")[145] and the Hazardous Air Pollution Standards ("HAPS").[146] Neither program explicitly governs greenhouse gas emissions or carbon dioxide, and previous attempts by EPA to regulate these pollutants from stationary sources under these programs have been unsuccessful. Most recently, the Supreme Court ruled in 2014 in *Utility Air Regulatory Group v. EPA* that the Clean Air Act does not compel nor permit EPA to regulate greenhouse gases from stationary sources under its Prevention of Significant Deterioration ("PSD") permitting program.[147] In that case, states and industry groups challenged the EPA's determination that greenhouse gas emissions from stationary sources trigger PSD permitting requirements for air pollutants[148] and won.[149] In the majority opinion, Justice Scalia considered the *Chevron* test[150] and decided against granting deference to the agency's discretion,

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143. *FACT SHEET*: *Overview of the Clean Power Plan*, ENVIRONMENTAL PROTECTION AGENCY 3, http://www.epa.gov/sites/production/files/2015-08/documents/fs-cpp-overview.pdf.

144. *Id.*

145. 42 U.S.C. § 7408-7409 (2015). (Created and governed by the Clean Air Act under these sections, found in the original statute as sections 108 and 109).

146. 42 U.S.C. § 7412 (2015). (Created and governed by the Clean Air Act under this section, found in the original statute as section 112).

147. *Utility Air Regulatory Group v. Environmental Protection Agency*, 134 U.S. 2427, 2431 (2014).

148. (Part of this finding by EPA was justified by the fact that EPA does regulate greenhouse gas emissions from mobile sources as an "air pollutant" within the Clean Air Act – the same statute used here to regulate greenhouse gas emissions from stationary sources. Justice Scalia, however, finds that the definition of "air pollutant," as used to regulate greenhouse gases from mobile sources, does not encompass regulation of greenhouse gases as "air pollutants" from stationary sources under the PSD permitting program.

149. *Utility Air Regulatory Group*, *supra* note 147, at 2427-2428).

150. *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 104 U.S. 2778, 2781-2782 (1984). ("When a court reviews an agency's construction of the statute which it administers, it is confronted with two questions. First, always, is the question whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress. If, however, the court determines Congress has not directly addressed the precise question at issue, the court does not simply impose its own construction of the statute, as would be necessary in the absence of an administrative interpretation. Rather, if the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute."); (*Chevron v. Natural Resources*

stating: "EPA lacked authority to 'tailor' the Act's unambiguous numerical thresholds of 100 or 250 tons per year to accommodate its greenhouse-gas-inclusive interpretation of the permitting triggers."[151]

In consideration of the Supreme Court's holding this case, EPA based the Clean Power Plan in the Clean Air Act's Section 111(d), instead of in its NAAQS or HAPS programs.[152] Section 111(d) allows EPA to enact standards for pollutants not included in NAAQS or HAPS.[153] Section 111(d) nonetheless features an enforcement scheme similar to the NAAQS program where states are allowed to implement and enforce their own plan in order to meet standards promulgated by EPA.[154] Since 1977, Section 111(d) has been used thirteen times to promulgate emissions guidelines.[155] In six of those instances, Section 111(d) was used in conjunction with Section 129 to regulate pollutants from existing solid waste incineration units, while four of the remaining seven attempts resulted in codified emissions guidelines.[156] None of the attempts involved carbon dioxide or any other greenhouse gases.[157]

As discussed briefly above, Section 111(d) requires EPA to develop an "emissions guideline" for the newly-regulated pollutant that reflects "the application of the best system of emissions reduction . . . that has been adequately demonstrated . . . and the time within which compliance with emissions standards of equivalent stringency can be achieved."[158] So, what is the Best System of Emissions Reduction ("BSER") established under the Clean Power Plan? According to EPA: "Consistent with previous BSER determinations in 111(d) rulemakings, the agency considered the types of strategies that states and owners and operators of power plants are already using to reduce [carbon dioxide] from fossil fuel-fired power plants."[159] Those strategies include: increasing efficiency

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Defense Council is most often cited for this test, which is applied to administrative law cases involving a variety of agencies and statutes. It is interesting to note, however, that the case itself actually involved EPA's interpretation of the Clean Air Act, specifically the definition of a "stationary source" in section 111(a)(3)).

151. *Utility Air Regulatory Group v. Environmental Protection Agency*, *supra* note 147, at 2432.

152. FACT SHEET: Clean Power Plan – Built on a Solid Legal and Scientific Foundation, ENVIRONMENTAL PROTECTION AGENCY, http://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-built-solid-legal-and-scientific-foundation.

153. 42 U.S.C. § 7411(d). (Found in the original statute – and commonly referred to – as section 111(d)).

154. *Id*.

155. Dick Pedersen, ACOEL Memo on CAA 111(d) History and Background, THE ENVIRONMENTAL COUNCIL OF THE STATES, 5 (April 8, 2014), https://www.dropbox.com/s/t231ej0orvl5x5o/Legal%20Background%20on%20CAA%20111(d).pdf.

156. *Id*. at 8. (noting that tChe other three resulted in guidance documents issued by EPA).

157. *Id*. at 5-10.

158. *Id*. at 14. (quoting 40 C.F.R. § 7411(d)(2)).

159. *Clean Power Plan – Technical Summary for States*, ENVIRONMENTAL PROTECTION

of existing coal-fired power plants, converting coal-fired power plants into natural gas-fired power plants, and "increasing electricity generation from renewable sources of energy like wind and solar."[160] The Clean Power Plan is not exclusively about promoting renewable energy generation nor does it require those technologies be pursued. States choose how they will reach their emissions goals based on what is most effective and economical in the market.

Unlike tax credits and government-mandated FITs, RPS programs and the Clean Power Plan provide states and utilities with flexibility to respond to the market as solar and other renewable energy technologies and their consumers mature. Tax credits and government-mandated FITs artificially incentivize immediate adoption of solar energy through direct subsidies, whether it is necessary or not. RPS programs and the Clean Power Plan, on the other hand, set long-term, progressive goals for renewable energy generation and consumption, but leave the cost/benefit analysis and decision-making as far as how to achieve that goal to the states and utilities. Naturally, both RPS programs and the Clean Power Plan contemplate and anticipate an increase in renewable energy generation, but neither forces that solution where it does not make economic sense under the market conditions existing at the time.

The German EEG illustrated that subsidies in the market for energy, where there was not a need for additional energy, can corrupt the entire industry to the detriment of utilities and their customers alike.[161] Flexible, market-reactive government policies however, like state RPS programs and the Clean Power Plan, are still necessary to encourage the adoption of solar energy technology as it approaches market parity with fossil fuel generation.

The Clean Power Plan already faces legal challenges, from states and industry alike.[162] The Supreme Court voted 5-4 to grant a stay on implementation of the Clean Power Plan pending its further consideration of the case in early February 2016.[163] Johnathan H. Adler, a constitutional, administrative, and environmental law professor at Case Western, wrote in *The Washington Post* that although a stay of an environmental regulation is virtually unprecedented, this particular stay may have more to do with how the EPA promoted the regulation as revolutionary than the merits of the regulation.[164] He explained that "an unprecedented assertion of regulatory authority may itself have justified an unprecedented exercise of the

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AGENCY, http://www3.epa.gov/airquality/cpptoolbox/technical-summary-for-states.pdf.

160. *Id.*

161. *See* Section III, Part 3: THE CON'S OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION, above.

162. Alan Neuhauser, *Mess of Lawsuits Set to Challenge Clean Power Plan*, U.S. NEWS (Oct. 23, 2015), http://www.usnews.com/news/articles/2015/10/23/mess-of-lawsuits-set-to-challenge-clean-power-plan.

163. Jonathan H. Adler, *Supreme Court puts the brakes on the EPA's Clean Power Plan*, THE WASHINGTON POST (Feb. 9, 2016), https://www.washingtonpost.com/news/volokh-conspiracy/wp/2016/02/09/supreme-court-puts-the-brakes-on-the-epas-clean-power-plan/.

164. *Id.*

Court's jurisdiction to stay the agency's action."[165]

The Supreme Court has yet to decide whether or not they will take up the case.[166] If they deny *certiorari* and let the D.C. Circuit decide the case first, then they will likely have another opportunity to review the case after that, if they so choose.[167] Of course, the passing of Justice Scalia, who voted in favor of the stay, in the week after it was granted and the election of President Donald Trump makes the issue all the more tentative.[168] The Clean Power Plan's fate ultimately relies on whether or not and if so, how the Supreme Court applies the *Chevron* test.[169] But without knowing exactly who will be making those decisions, it is impossible to predict the outcome.[170]

Regardless of the fate of any of these government policies, however, electric utilities must look to the future. As the effects of global climate change become more obvious, so too does the necessity of renewable energy generation. As observed by electric utility Xcel Energy, in their 2030 Upper Midwest Resource Plan: "Even though this is an arena in flux, we can see change afoot and believe it to be reasonable to plan our resources accordingly."[171]

5. THE ROLE OF UTILITY-LEVEL FITS

Sustainable and globally meaningful increases in solar energy generation can only be realized where solar energy reaches parity with fossil fuel generated energy.[172] This is a reality in a few U.S. communities currently and will be a reality in more and more states in the relatively near future, assuming the rapid advancement of solar energy technology continues.[173] But even in those communities that have reached a certain level of parity, the problem of getting people to accept and adopt the technology remains.[174] Enter utility-level FITs. Unlike a government-mandated FIT, like the FIT featured in the German EEG, a utility-level FIT is not required by law.[175] It is a policy pursued voluntarily by

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165. *Id.*

166. Robinson Meyer, *Will a Reconfigured Supreme Court Help Obama's Clean-Power Plan Survive*? THE ATLANTIC (Feb. 14, 2016), http://www.theatlantic.com/politics/archive/2016/02/antonin-scalia-clean-power-plan-obama-climate-change/462807/.

167. *Id.*

168. *Id.*

169. *Chevron, U.S.A., Inc. v. Natural Resources Defense Council*, Inc., *supra* note 150, at 2781-2782.

170. Robinson Meyer, *supra* note 166.

171. Xcel Energy, *supra* note 106.

172. *See* Section III, Part 3: THE CON'S OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION, above.

173. Camilo Patrignani, *supra* note 118 (*discussing* study by Deutches Bank).

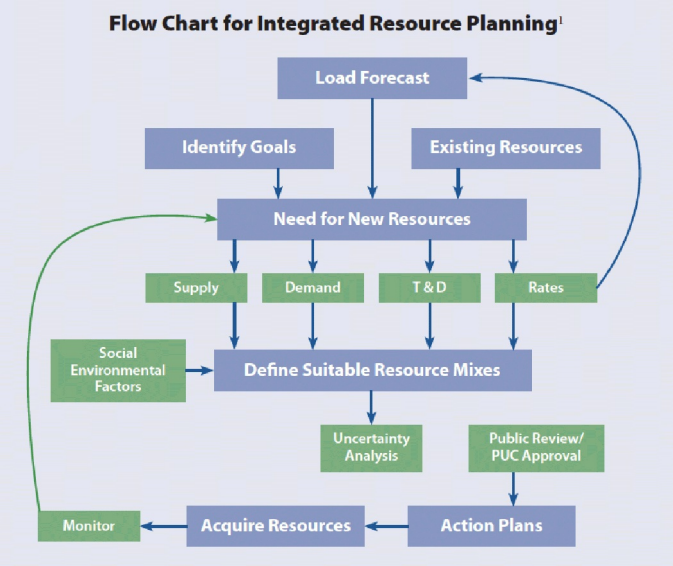
174. Joel B. Eisen, *supra* note 8, at 61.

175. *Feed-in Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies*, U.S. ENERGY INFORMATION ADMINISTRATION, (May 30, 2013),

utilities resulting from a cost-benefit analysis of market forces.[176]

Investment by utilities in a FIT program, intended to incentivize solar energy generation among homeowners and business owners, would replace investment in traditional power sources, especially where the utility is required to invest in renewable sources under a state RPS program, the Clean Power Plan, or other, similar state and federal policies.[177] Utility-level FITs are desirable for a number of reasons: they are effective in spurring solar energy development, like a government-mandated FIT; they efficiently allocate the cost of development; they are responsive to the localized market for energy; and they largely avoid the Constitutional gray area of government-mandated FITs in the U.S.

Utilities are constantly planning ahead by anticipating future energy demand and meeting that demand.[178] This process is called Integrated Resource Planning ("IRP").[179] As illustrated in the chart below, many states require that utilities undergo IRP and the resulting plan must be reviewed and approved by the state's public utility commission.[180]



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https://www.eia.gov/todayinenergy/detail.cfm?id=11471.

176. *See generally id.*

177. *See generally id.*

178. RACHEL WILSON, BRUCE BIEWALD, , THE REGULATORY ASSISTANCE PROJECT, BEST PRACTICES IN ELECTRIC UTILITY INTEGRATED RESOURCE PLANNING 2 (June, 2013), www.raponline.org/document/download/id/6608.

179. *Id.*

180. *Id.*

181. *Id.*

Emphasis on IRP came about in the 1980s in reaction to overruns on nuclear power plant projects and the oil embargoes.[182] But of course, IRP is also useful and necessary to effectively manage traditional power sources, like fossil fuel and natural gas-fired power plants, which take years to build and require significant investment by utilities and their ratepayers. The Regulatory Assistance Project, a global non-profit focused on "the long-term economic and environmental sustainability of the power and natural gas sectors,"[183] explains: "As energy demand across the United States rises and falls and the generation fleet ages, utilities must plan to add and retire resources in the most cost-effective manner while meeting regional reliability standards."[184] Of course, this planning must also factor in state and federal regulations, like RPS programs and the Clean Power Plan, and utility-level FITs are another tool at utilities' disposal in determining their resources mix.

The German model of a government-mandated FIT has proven extremely effective at spurring solar energy development and generation,[185] and a utility-level FIT could replicate that success, while avoiding the pitfalls of a government-mandated FIT. As discussed previously, the biggest hurdle facing solar energy technology is not the technology, but getting consumers to accept and adopt it.[186] A July, 2014 study conducted by the Solar Energy Industries Association concluded that German has been successful at "defossilizing" its energy sector.[187] And indeed, the German FIT, which was offered to all renewable sources, resulted in Germany's renewable generators providing 31 percent of the country's net electricity consumption.[188] For its part, PV-generated power covered approximately 6.8 percent of Germany's net electricity consumption in 2014 and up to 35 percent of momentary electricity demand during sunny weekdays.[189]

Solar energy experts Weiss and Birmingham said it another way in an analysis of Germany's policies for the Solar Energy Industries Association: "[S]upport for renewable energy including in particular solar PV is in part motivated by the desire to cure market failures associated with the early stages of development of certain technologies."[190] The German EEG's FIT achieved this by seeing the technology through its early stages of development to mass adoption. An October 2015 report by Fraunhofer ISE, a European research institute, concluded that solar capacity is greater than all other types of power in

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182. *Id.* at 3.

183. *Id.* at *Introduction*.

184. *Id.* at 3.

185. *See* Section III, Part 2: THE PRO'S OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION, above.

186. Joel B. Eisen, *supra* note 8, at 61.

187. Ellen Killoran. *What Can We Learn From Germany's Solar Experience?* GREEN TECH MEDIA (Aug. 7, 2014) (quoting a study by the Solar Energy Industries Association).

188. WIRTH, *supra* note 62, at 5.

189. *Id.*

190. WEISS & BIRMINGHAM, *supra* note 40, at 25.

Germany.[191] And even more impressive is the fact that Germany's solar capacity is distributed over 1.5 million solar power generators.[192]

Unfortunately, German EEG's FIT also served to exacerbate market failure caused by Germany's oversupply of energy to the detriment of the power utilities and their customers alike.[193] A utility-level FIT would have the same effect of encouraging solar energy development by offering long-term contracts for energy at an above-market rate.[194] But it would avoid the inefficiencies of the German EEG's FIT, which was forced upon utilities, that did not need the additional capacity, and upon consumers, who footed the bill.[195] A utility-level FIT would be structured very similarly to the FIT offered by German utilities under the EEG.[196] But because utility-level FITs are not required by law, utilities would only offer them if the utility determines that the benefits of distributed solar energy generation outweigh the forecasted costs and that investment in solar generation is preferable to the alternatives.[197]

Additionally, utility-level FITs allocate the cost of solar energy development on end users more efficiently than other policy mechanisms. Environmental law professors David Grinlinton and LeRoy Paddock explained: "The mix of legal tools has a direct impact on who bears the cost associated with solar energy production."[198] For example, the federal tax credits discussed above spread the cost of solar energy development widely among taxpayers everywhere, whereas a FIT spreads the cost more narrowly among affected ratepayers.[199] For its part, a utility-level FIT is even narrower than a government-mandated FIT as it allocates the cost on its ratepayers alone, not on all ratepayers of all utilities under a far-reaching government-mandated FIT. A primary complaint with the German EEG's FIT is that it contributed to dramatically increased rates for German ratepayers, due in large part to the EEG's renewable FIT.[200] A utility-level FIT, because it is voluntary, would only be enacted when new sources of energy are necessary and would replace the cost of constructing traditional energy sources to meet future demand.[201] A dramatic or unprecedented rate increase is therefore

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191. Dr. Harry Wirth, *supra* note 62, at 5.

192. *Id*.

193. *See* Section III, Part 3: THE CON'S OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION, above.

194. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 175.

195. *See* Section III, Part 3: THE CON'S OF GERMANY'S POLICIES TO PROMOTE SOLAR ENERGY GENERATION, above.

196. U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 175.

197. *See generally* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 175.

198. Grinlinton & Paddock, s*upra* note 47, at 943.

199. *Id*.

200. WEISS & BIRMINGHAM, *supra* note 40, at 9 (describing Germany's average retail rate has increased by about 50 percent since 1998, adjusted for inflation, and "approximately half of this increase is due to the renewables levy, the surcharge on bills to recover the costs of payments under FITs for various renewable technologies including solar PV").

201. *See generally* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 175.

unlikely.

A utility-level FIT is also the most localized of all policy mechanisms because it is most reactive to the market conditions of that specific location under its specific regulatory condition. Because a utility-level FIT is not mandated by the government, it allows the utility to decide if, when, and how it will enact a FIT based on the local market, factoring in other policy mechanisms, such as state RPS programs and the Clean Power Plan.[202] It is well established that solar energy generation works better and more efficiently in some climates than in others. The U.S. features extremely diverse climates and therefore, solar generated energy will reach parity with fossil fuel generated energy in some areas before others. For instance, Hawaii will reach parity before Oregon does.[203] Germany in general is not especially conducive to solar energy generation, but the southern regions, like Bavaria, are better suited than the northern regions.[204] Yet all utilities nationwide fell under the EEG's FIT. Independent utility-level FITs, unlike a government-mandated FIT, better allow for localized markets to develop at their own pace.

Finally, private, voluntary utility-level FITs better avoid constitutional grey areas than government-mandated FITs in the U.S. Although there is not and has never been a federal FIT in the U.S., several states have enacted state-level FITs, including California, Hawaii, Maine, Oregon, Vermont, and Washington, as of September, 2014.[205] Historically, these state FITs conflicted with federal law, specifically the Public Utility Regulatory Policies Act ("PURPA").[206]

According to PURPA, rates paid for energy by electric utilities shall not exceed the "incremental cost of alternative electric energy."[207] This so-called "avoided cost rate"[208] is further defined in the statute as: "the cost to the electric utility of the electric energy, which, but for the purchase from such co-generator or small power producer,[209] such utility would generate or purchase from another source."[210] The inflated rate that utilities are mandated to pay under a government-mandated FIT exceeds this amount and is therefore considered a violation of PURPA. As "[t]here's no doubt that renewable power sales are typically both wholesale power transactions and interstate power transactions,"

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202. *See generally* U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 175.

203. Grinlinton & Paddock, s*upra* note 47, at 946-947.

204. (It is important to remember that the FIT promoted other renewable energy sources in addition to solar).

205. *Feed-In Tariffs*, NATIONAL RENEWABLE ENERGY LABORATORY (Sept. 8, 2014), http://www.nrel.gov/tech_deployment/state_local_governments/basics_tariffs.html[https://perma.cc/37QL-Y67J].

206. Public Utility Regulatory Policies Act of 1978, 16 U.S.C. § 2601 (2015).

207. 16 U.S.C. § 824(a)-(g)(3)(B) (2015).

208. Ferrey et al., *supra* note 63, at 66.

209. (Alternative energy facilities most often fall under this definition for a qualifying facility).

210. 16 U.S.C. § 824(a)-(g)(3)(B) (2015).

those sales are subject to federal jurisdiction, which preempts state law according to the Supremacy Clause.[211] Accordingly, in its 1995 *SoCal Edison* ruling, the Federal Energy Regulatory Commission ("FERC") "made it clear that PURPA doesn't permit either the FERC or the states to require a purchase rate that exceeds the utilities' avoided cost."[212] In June 2010, Professor Steven Ferry noted of this trend:

> Recent jurisprudence has accentuated the exclusivity of FERC's power in not only setting 'just and reasonable rates' but also exclusively ensuring the performance of the energy market. As the Ninth Circuit has remarked, and the Supreme Court confirmed, when combined with federal preemption precedent, energy market regulatory reforms have contributed to 'a massive shift in regulatory jurisdictions from the states to the FERC.'[213]

Given this background, it was surprising to all that in October 2010, just a few months of Professor Ferry's writing, FERC reversed course, at least to some extent.[214] In an order granting clarification and dismissing rehearing, FERC approved California's mandated FIT for certain combined heat and power facilities of 20 MW or less that meet certain efficiency and environmental requirements, concluding: "California enjoys sufficient flexibility with regard to calculating avoided cost rates so that it can achieve the goals of [the FIT legislation]."[215] The ruling is complex, but one commentator noted: "The sustained ruling[216] appears to indicate that states can set renewable avoided cost rates under PURPA that are distinct from conventional utility avoided cost."[217]

Nonetheless, state-mandated FITs still inhabit a constitutional grey area that utility-level FITs largely avoid. PURPA requires that utilities pay rates that are "just and reasonable and in the public interest."[218] In 1944, Justice Frankfurter, dissenting in the landmark utility law case *Federal Power Commission v. Hope*

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211. U.S. CONST. art. VI ("This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.").

212. Ferrey et al., *supra* note 63, at 66 (quoting *Southern California Edison Co*., 70 FERC § 61,215 (1995)).

213. Ferrey et al., *supra* note 63, at 63. (noting further that many states had enacted and enforced mandated above-wholesale FITs on their utilities).

214. *Southern California Edison Co*., 133 FERC § 61,059 (2010).

215. *Id*.

216. *Southern California Edison Co*., 134 FERC ¶ 61,044 (2011). (later challenged and affirmed).

217. Karlynn Cory, *FERC Ruling Changes Course and Assists Renewables*, NATIONAL RENEWABLE ENERGY LABORATORY (June 6, 2011), https://financere.nrel.gov/finance/content/ferc-ruling-changes-course-and-assists-renewables [https://perma.cc/HBS7-UHXG].

218. 16 U.S.C. § 824a-3(b)(1) (2015).

Natural Gas Company, described the public interest as follows: "[T]he public interest is a texture of multiple strands. It includes more than contemporary investors and contemporary consumers. The needs to be served are not restricted to immediacy, and social as well as economic costs must be counted."[219] Applied to the present analysis, a utility voluntarily offering an above-market rate in order to spur renewable generation has a better argument that they are investing in the future public interest than does a state mandating such a rate on all utilities statewide. This is especially true where the utility opts to invest in a FIT program in lieu of constructing a traditional power source. There, the case could be made that, although the rate offered under the FIT is above wholesale at the time, it is not above the utility's avoided cost in the long run. This cost/benefit argument is much easier and more effectively made by a utility acting voluntarily than by a utility acting under a state mandate.

6. WHAT A UTILITY-LEVEL FIT SHOULD LOOK LIKE

The elements of a well-designed FIT, according to Professor Ferry, are "investor security, low transaction costs, and contract certainty."[220] In addition, a July 2014 study conducted by the Solar Energy Industries Association proffered that a program in the U.S. "might incorporate automatic adjustments to incentives that can respond to higher-than-expected installation rates and adjust to decreases in system costs."[221]

Investor security, in this case, is a three-way street. Those who invest in solar generation must be secure in the guarantee that the utility will pay the promised rate for the promised time period. This is vital for the individual or business and is also absolutely necessary if those parties are to secure favorable financing to build the solar generation facilities. Solar energy experts Weiss and Birmingham explain that FIT-based systems "provide the revenue certainty needed to attract low-cost financing for renewable energy" better than other renewable energy policy mechanisms and therefore "allow for lower cost renewable energy procurement."[222]

In addition to security for the private parties, utilities must also be provided with a contractual promise that they will receive the power. This is necessary to ensure demand is met, according to the utilities' IRP; but also to provide utilities with an asset to calculate into their rate base. According to the principles of public

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219. *Fed. Power Com. v. Hope Nat. Gas Co*., 320 U.S. 591, 627 (1944) (J. Frankfurter dissenting).

220. Ferrey et al., *supra* note 63, at 66-67.

221. Killoran, *supra* note 187. (concluding that the U.S. should view Germany's elimination of the FIT in the EEG "not as an acknowledgement of broad failure of the German system of FITS," but as an "opportunity to 'look ahead' and see how electricity systems and the rule governing them will have to adapt when penetration rates of various renewable energy sources reach levels similar to those in Germany").

222. WEISS & BIRMINGHAM, *supra* note 40, at 28.

utility price regulation outlined in the 1923 Supreme Court case *Bluefield Waterworks & Improvement Company v. Public Service Commission,* public utilities are "entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public…," i.e. the rate base.[223]

Ordinarily, the rate base is the value of the power plants. So, how are utilities supposed to make a rate of return in a FIT program in which they have invested? Enter RECs. As discussed previously, RECs can be traded between utilities in order to meet their RPS requirement, and they can be acquired by utilities from generators through a FIT program. According to the EPA, RECs "represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation."[224] Under a utility-level FIT program, utilities will acquire RECs, which will be calculated into their rate base.

Finally, ratepayers must also be assured that the utilities' investment in a FIT program is secure as it is the ratepayers who will ultimately bear the cost of the FIT program. But luckily, it is ratepayers who are, in fact, pressuring utilities to offer FITs: "Both private and public utilities are subject to consumer pressure, indicating that to encourage implementation of [distributed generation] at the local level, consumers —not federal or state policy —are the driving force."[225] Ratepayers realize that they are investing in a power source that will not only help fend off global climate change, but is ultimately more efficient: "For example, [distributed generation] results in shorter distribution routes, which eventually may allow approximately 30 [percent] in savings on electric bills."[226]

The key to low transaction costs is a straightforward FIT design. The Deutsche Bank Climate Change Advisors ("DBCCA") explained that "[t]ransparency [asks]: How easy is it to navigate the policy structure, understand the risks/rewards, and execute transactions?"[227] If there are too many hoops to jump through, fewer individuals and businesses are going to bother. This is another area where the U.S. should take a cue from Germany.[228] Whereas installing a solar generation system in German is very easy and can occur almost immediately, it takes an average of two months in the U.S. to secure the proper permitting.[229] The U.S. must streamline its processes in order to empower utilities to take advantage of the technological breakthrough in solar energy generation.

Contract certainty is a subset of investor security, but, for the purposes of this discussion, implies that the contract must be well-designed and reasonable in order to ensure that it can and will be fulfilled. Spain's FIT, to a much greater

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223. *Bluefield Waterworks & Imp. Co. v. Pub. Serv. Comm'n of W. Va.*, 262 U.S. 679, 692 (1923).

224. *Renewable Energy Certificates (RECs),* UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, http://www3.epa.gov/greenpower/gpmarket/rec.htm[https://perma.cc/MG2Q-AW9D].

225. Arfmann et al., *supra* note 117, at 36.

226. *Id.*

227. FULTON & MELLQUIST, *supra* note 115, at 21.

228. Shahan, *supra* note 121.

229. *Id.*

extent than Germany's, is a guide for what not to do in this regard. Grinlinton and Paddock explained:

> The Spanish feed-in tariff, supported by government subsidies rather than ratepayers, was set so high that it attracted much more investment than expected . . . As a result, applications were terminated and the government established a lower rate under a new legal structure. This change resulted in very significant job losses in the solar industry in Spain and significantly disrupted the solar panel market.[230]

Spain's 2004 tariff set rates, guaranteed for 25 years, for renewable energy distributors at 575 percent of the Average Electricity Rate ("AET") for facilities producing less than 100 kW and 300 percent of the AET for facilities producing more than 100 kW.[231] In just one year, Spain committed itself to payments totaling $26.4 billion, which led to taxpayer outrage and policy abandonment.[232] Reese Tisdale, solar research director at Emerging Energy Research, observed: "Spain is a perfect example of how drastic change in policy can really kill a market."[233] While Spain is obligated to fulfill those payments, the policy went bust before the market could develop.[234] A FIT policy must be well-designed to offer contract certainty, which ensures investor security.

And finally, a good utility-level FIT design must be market reactive. This element is an off-shoot of the foregoing discussion of rate design. "The tariff rate for electricity generated from renewable sources must be set at a level that guarantees profitability, and reflects the costs associated with electricity production from that source . . . it is important to include a mechanism for adjusting the tariff."[235] This reactivity will ensure the FIT is sustainable for its whole term.

A demand-side cap is one mechanism used to ensure the FIT does not result in an over-installation of solar generation. However, its design caps all installations when a certain number is reached, thus limiting the longevity of a FIT policy.[236] A supply-side cap is another mechanism used to adjust rates: "Once the trigger point is reached, the rate that is available to generators adjusts either upward or downward . . . [However,] [o]ur view is that rates should generally decrease over time in order to chart a path to grid parity."[237] Germany's FIT

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230. Grinlinton & Paddock, s*upra* note 47, at 947.

231. *Id.* at 954.

232. Paul Voosen, *Spain's Solar Market Crash Offers a Cautionary Tale About Feed-In Tariffs,* THE NEW YORK TIMES (Aug. 18, 2009), http://www.nytimes.com/gwire/2009/08/18/18greenwire-spains-solar-market-crash-offers-a-cautionary-88308.html[https://perma.cc/89S2-Y2ZZ].

233. *Id.*

234. *Id.*

235. Mendonca & Corre, *supra* note 39.

236. FULTON & MELLQUIST, *supra* note 115, at 29-30.

237. *Id.* at 30.

approximately followed this design, featuring a regression scheme that would decrease the rate offered by a certain percentage each year.[238] And indeed, solar energy experts observed:

> In hindsight the German FITs for solar PV did not adjust quickly enough to rates of installations far in excess of what had been expected, even though reforms to the renewables law in response to those installations ultimately did not introduce much more frequent and steeper reductions in those FITs, which allowed Germany to avoid a complete crash of PV installations along what happened in Spain and Italy.[239]

Supply-side caps that decrease rates gradually over time are a necessary element of FIT design in order to ensure the FIT is market reactive and sustainable over its full term.

V. CONCLUSION

Global climate change is a crisis. And there are no easy answers. Germany's willingness to address the problem is to be commended and appreciated, not only because of the national unity it required to recognize the problem and to address it, but also because of the policy example the country has set for other countries to follow and not to follow. The U.S. must strive to emulate Germany's forward-thinking attitude and unity, but should be cautious in determining the best use of government funding to make a real difference in the fight against global climate change.

How did Germany largely unify its citizenry in the fight against global climate change? The answer surprisingly has a lot to with German folklore.[240] Germans have their own origin mythology.[241] According to a recent *National Geographic* profile on Energiewende, the myth, which dates back to the Roman historian Tacitus, says that Germans "come from the dark and impenetrable heart of the forest."[242] And throughout the turbulent 20th century, which included the Allied destruction of many of Germany's biggest cities in WWII, the resulting loss of life, both military and civilian, and the ensuing shame of allowing the Nazi revolution, Germans clung to this myth as a source of national identity and pride.[243] The profile explains that "[t]he forest became the place where Germans go to restore their souls—a habit that predisposed them to care about the environment."[244]

Unfortunately, the U.S. has no equivalent unifying national bond with nature and will have to rely instead on the threat of doom to affect change where the

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238. Grinlinton & Paddock, s*upra* note 47, at 949-50.
239. WEISS & BIRMINGHAM, *supra* note 40, at 3.
240. Kunzig, *supra* note 45.
241. *Id.*
242. *Id.*
243. *Id.*
244. *Id.*

Germans have relied on the promise of salvation.[245] Bill Gates said of what lies ahead:

> [To solve the climate change dilemma], we need innovation that gives us energy that's cheaper than today's hydrocarbon energy, that has zero CO2 emissions, and that's as reliable as today's overall energy system. And when you put all those requirements together, we need an energy miracle. That may make it seem too daunting to people, but in science, miracles are happening all the time.[246]

In general, the role of the law is to empower science through sound policy and targeted investment, which precludes subsidizing the solar energy industry, either by taxpayers or ratepayers. This recommendation means eliminating the solar tax credits, while maintaining state RPS programs and the Clean Power Plan. Unlike Germany, the U.S. should invest in government-run R&D of solar power technologies instead of subsidizing private industry. Only when solar power generation reaches true parity with fossil fuel generation on the free market will long term reductions in global carbon emission be realized. And when that moment arrives in a given market, utilities should voluntarily enact FITs to spur development of solar power generation in exchange for RECs that can be added to their rate base, as an alternative to investment in traditional power sources.

The good news is that people in the U.S. are starting to realize that global climate change is happening. A recent poll revealed that a majority of Americans would be willing to spend an additional $25 per year for more renewable energy.[247] Xcel Energy, a Midwest energy utility with a plan in place to reduce its carbon emissions by 40 percent by 2030, explained:

> We are increasingly hearing from our customers that they have a growing interest in increasing their energy management capabilities . . . Residential customers tell us that they value choice and clean, affordable, and reliable energy. At the same time, municipalities within our service territory are expressing changing expectations to address their citizens' interest in achieving sustainability goals and engage residents around energy issues. Our customers are also interested in various types of self-generation.[248]

Change is coming, just as surely as global climate change, and hopefully it is not too late.

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245. Kunzig, *supra* note 45. (This is not to understate the influence of fear of nuclear technology on Germany's Energiewende, as discussed previously).

246. Bennet, *supra* note 9.

247. Greta Guest, *Poll Shows Most Americans Support Renewable-Energy Standards*, THE UNIVERSITY OF MICHIGAN RECORD (June 2, 2015), https://record.umich.edu/articles/poll-shows-most-americans-support-renewable-energy-standards[https://perma.cc/VGS7-9CFS]. (reflecting general attitudes towards policies encouraging renewable energy development).

248. Xcel Energy, *supra* note 106.