The Business, Entrepreneurship & Tax Law Review

Volume 3 | Issue 1 Article 21

2019

The Need for Centralized Government to Encourage a Decentralized Energy Grid

Andrew Dickerson

The Need for Centralized Government to Encourage a Decentralized Energy Grid

Andrew Dickerson[*]

ABSTRACT

Global warming and the subsequent climate change caused many nations and states to rethink energy production and consumption. In place of carbon-emitting energy sources, countries adopted renewable energy sources. However, in the United States, use of these energy sources, while available, is largely hampered by a lack of uniformity in state regulations. While net metering acts, tax credits, and rebates incentivize homeowners and some businesses to incorporate these energy sources, there are still several obstacles to the nation's substantial reliance on renewable energy.

[*] Bachelor of Science in Business Administration and Bachelor of Arts in International Studies, University of Missouri, 2015. J.D. Candidate, University of Missouri School of Law, 2020. Associate Member, Business, Entrepreneurship & Tax Law Review, 2018–2019.

I. INTRODUCTION

"We will make electric light so cheap that only the rich will be able to burn candles."[1] With the help of other industry titans of the day, such as JP Morgan, Thomas Edison invented a system for pumping electricity into the homes of every family in the United States.[2] Initially, Edison's model for electricity distribution resembled a decentralized grid with local power generation.[3] However, Edison realized to achieve economies of scale and ensure reliability, he needed to build a large centralized facility to spread the costs of electricity generation across hundreds of customers.[4] This approach created the centralized system the United States uses for the distribution of electricity today.

By the 1920s, competition in the electric industry disappeared and government regulation took hold.[5] In the 1940s, regulation of electricity fell to the states who all formed regulatory commissions.[6] These commissions control distribution, retail rates, and the placement and construction of transmission facilities.[7] In contrast, the Federal Energy Regulatory Commission ("FERC") regulates wholesale rates and electricity transmission across states.[8] However, FERC does not base wholesale prices upon costs incurred by the utility, rather, the wholesale prices are set by the utilities as long as their market meets FERC's definition of competition.[9]

Centralized energy, while achieving economies of scale and reliability, has some inefficiencies.[10] Electricity cannot be stored; thus, the supply of electricity must always meet the demand of electricity at the time of need.[11] This means energy must be created and then transmitted across power lines over vast distances to the end consumer, incurring billions in transmission costs for consumers.[12] Additionally, the greater the distance over which electricity must travel, the greater the loss in electricity before it reaches its end destination.[13] In most cases, these inefficiencies are ignored due to reliability and cost concerns.[14] However, the current energy

1. Bill Nussey, *How Edison, Tesla, and other Visionaries Invented the Modern Grid (Part 1 of 3)*, FREEING ENERGY PROJECT (Apr. 20, 2018), http://www.freeingenergy.com/how-edison-tesla-and-other-visionaries-invented-the-modern-grid-part-1-of-3/ (quoting Thomas Edison).
2. *Id.*
3. Steven Ferrey, *Power Future*, 15 DUKE ENVTL L. & POL'Y F. 261, 280 (2015).
4. Nussey, *supra* note 1.
5. Robert J. Michaels, *Electricity and its Regulation*, LIBR. OF ECON. & LIBERTY (Feb 5, 2018), https://www.econlib.org/library/Enc/ElectricityandItsRegulation.html.
6. *Id.*
7. Kenneth L. Wiseman et al., *Electricity Regulation in the United States: Overview*, THOMSON REUTERS: PRACTICAL L. (Mar. 1, 2018).
8. *Id.*
9. Michaels, *supra* note 5.
10. *Id.*
11. *Electricity Explained: How Electricity is Delivered to Consumers*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/index.php?page=electricity_delivery (last updated Aug. 31, 2018).
12. John Bernhardt, *The Power of Local Energy*, FORBES (Apr. 28, 2014, 9:53 AM), https://www.forbes.com/sites/realspin/2014/04/28/the-power-of-local-energy/#36a476d275d9.
13. *Id.*
14. E. Donald Elliot, Comment, *Why the United States Does Not Have a Renewable Energy Policy*, 43 ENVTL. L. REP. NEWS & ANALYSIS 10095, 10100 (2013).

system's detrimental effect on the environment caused many nations and states to rethink energy generation and transmission.[15]

The increasingly detrimental effect of climate change led many nations, such as the United States, to institute legal structures encouraging the use of renewable energy.[16] These legal structures incorporate a number of different policies and incentives aimed to make renewable energy both economical and easily accessible.[17] Although these incentives and policies are a step forward for renewable energy and decentralization of the energy grid, they are inconsistent from state to state and lack any cohesive effort from the states to taper off carbon emitting energy sources.[18] This patchwork approach makes renewable energy incentives an easier target for the lobbying efforts of utility companies aiming to retain control of the energy market.[19]

However, global warming is not a new observation.[20] In 300 B.C., Theophrastus, a student of Aristotle, observed a lack of forestry led to a warmer climate.[21] The cause of global warming and subsequent climate change is largely connected to the use of fossil fuels[22]—fuels regularly used in the U.S. utility industry.[23] As a result, global warming is causing ice caps to melt and sea levels to rise.[24] Flooding alone is estimated to cost the world trillions of dollars per year by 2100.[25] Currently, estimates place the costs of global warming and climate change at $240 billion per year from 2007 to 2017 for the U.S. economy alone.[26]

---

15. Tyler Thorne, *Global Warming Mitigation*, STANFORD (Feb. 19, 2015), http://large.stanford.edu/courses/2015/ph241/thorne1/.

16. *The Danish Energy Model*, DANISH ENERGY AGENCY 7, https://ens.dk/sites/ens.dk/files/Globalcooperation/the_danish_energy_model.pdf (last visited Feb. 18, 2019); INT'L RENEWABLE ENERGY AGENCY, RENEWABLE ENERGY POLICY BRIEF: BRAZIL (June 2015), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA_RE_Latin_America_Policies/IRENA_RE_Latin_America_Policies_2015_Country_Brazil.pdf?la=en&hash=D645B3E7B7DF03BDDAF6EE4F35058B2669E132B1; DAILA ZIEDERS, PHILLIP RILEY RESEARCH SERIES, THE FUTURE IS RENEWABLE: TARGETS AND POLICIES BY COUNTRY (2017), https://phillipriley.com.au/wp-content/uploads/2017/04/PR-Report-singapore.pdf.

17. Emiliano Bellini, *Denmark Allocates $16.5 Million in Incentives for Solar up to 1 MW*, PV MAG. (Oct. 5, 2017), https://www.pv-magazine.com/2017/10/05/denmark-allocates-16-5-million-in-incentives-for-solar-up-to-1-mw/; GLOBALDATA, BRAZIL RENEWABLE ENERGY POLICY HANDBOOK 2017 (2017), http://www.arena-international.com/Uploads/2017/11/27/r/c/j/Free-Brazil-Renewable-Energy-Policy-Handbook-2017.pdf.

18. INT'L RENEWABLE ENERGY AGENCY, RENEWABLE ENERGY POLICIES IN A TIME OF TRANSITION (2018), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_IEA_REN21_Policies_2018.pdf.

19. Elliot, *supra* note 14, at 10099.

20. Alister Doyle, David Fogarty & David Cutler, *Timeline: How the World Discovered Global Warming*, REUTERS (Dec. 2, 2011, 7:56 AM), https://www.reuters.com/article/us-climate-history/timeline-how-the-world-discovered-global-warming-idUSTRE7B02DA20111202.

21. *Id.*

22. *A Blanket Around the Earth*, NASA: GLOBAL CLIMATE CHANGE, https://climate.nasa.gov/causes/ (last visited Feb. 18, 2019).

23. *What is Renewable Energy?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/?page=renewable_home (last updated July 13, 2018) [hereinafter *What is Renewable Energy?*].

24. Daniel Glick, *The Big Thaw*, NAT'L GEOGRAPHIC, https://www.nationalgeographic.com/environment/global-warming/big-thaw/ (last visited Feb. 18, 2019).

25. Institute of Physics, *Rising Sea Level Could Cost the World $14 Trillion a Year by 2100*, PHYS.ORG (July 3, 2018), https://phys.org/news/2018-07-sea-world-trillion-year.html.

26. Stephen Leahy, *Hidden Costs of Climate Change Running Hundreds of Billions a Year*, NAT'L GEOGRAPHIC (Sept. 27, 2017), https://news.nationalgeographic.com/2017/09/climate-change-costs-us-economy-billions-report/.

Many nations and states are now considering the use of renewable energy sources such as biofuels, solar, and wind energy.[27] The most extreme conversion to renewable energy is Germany's infrastructure project, *Energiewende*, or "energy transition."[28] The purpose of the *Energiewende* is

> to enable the energy supply to develop in a sustainable manner in particular in the interest of mitigating climate change and protecting the environment to reduce the cost of the energy supply to the economy not least by including long-term external effects to conserve fossil energy resources and to promote the further development of technologies to generate electricity from renewable energy sources.[29]

The infrastructure project specifically called for at least 80% of gross electricity consumption to come from renewable energy sources by the year 2050.[30] However, even with a centralized approach, *Energiewende* created problems with varying rates in energy production, economic and social costs of grid expansion, and energy storage.[31]

In contrast, the United States leaves renewable energy policies and incentives largely to the states.[32] The states use policies such as Renewable Portfolio Standards ("RPS"), RPS Solar Carve-Outs, and interconnection.[33] Respectively, RPS standards mandate that a percentage of energy generation comes from renewable energy sources, RPS Solar Carve-Outs mandate that electric utilities must generate some power from the sun, and interconnection sets forth rules to determine how solar energy users can plug into the grid.[34] However, each state's policy is different. For example, New Jersey requires utilities to use approximately 5% of energy from solar energy sources by 2021, while South Dakota does not require any energy to be produced from renewable energy resources.[35]

Incentives to induce renewable energy consumption include tax credits and net metering.[36] Net metering allows a solar energy producer the ability to offset their electricity bill at the retail rate for energy produced in excess of energy consumed.[37] Some states still compensate for renewable energy production, but may not compensate at the retail rate.[38] For example, Missouri compensates retail energy producers with the retail rate, while Nevada uses a feed-in tariff ("FIT"), a greater rate

27. *What is Renewable Energy?*, *supra* note 23.

28. Anna Milena Jurca, *The Energiewende: Germany's Transition to an Economy Fueled by Renewables*, 27 GEO. INT'L ENVTL. L. REV. 141, 142 (2015).

29. Erneuerbare-Energien-Gesetz [EEG][Renewable Energy Law Act], DUETSCHER BUNDESTAG: DRUCKSACHEN [BT], *translation at* https://www.bmwi.de/Redaktion/EN/Downloads/renewable-energy-sources-act-2017.pdf%3F__blob%3DpublicationFile%26v%3D3 (Ger.).

30. *Id.*

31. Jurca, *supra* note 28, at 148–49.

32. Wiseman et al., *supra* note 7.

33. *2018 State Solar Power Rankings Report*, SOLAR POWER ROCKS (2018), https://www.solarpowerrocks.com/2018-state-solar-power-rankings/.

34. *Id.*

35. *Renewables Portfolio Standard*, DSIRE, http://programs.dsireusa.org/system/program/detail/564 (lasted updated June 8, 2018); S.D. CODIFIED LAWS § 49-34A-94 (2008); S.D. CODIFIED LAWS § 49-34A-101 (2009).

36. SOLAR POWER ROCKS, *supra* note 33.

37. *Id.*

38. *State Net Metering Policies*, NAT'L CONF. ST. LEGISLATURES (Nov. 11, 2017), http://www.ncsl.org/research/energy/net-metering-policy-overview-and-state-legislative-updates.aspx.

than the retail rate.[39] A FIT usually requires two meters, because unlike net metering, the FIT doesn't roll back the customer's meter.[40] Instead, there is one meter for electricity consumption and one meter for electricity production.[41] The electricity produced is then sold on the market for a price higher than the grid energy produced by those with net meters.[42] While these policies and incentives encourage the use of renewable energy, their use and implementation varies from state to state.[43]

The current regulatory scheme of renewable energy law in the United States is deficient for many reasons. First, the lack of uniformity among the states regarding renewable energy laws creates an easy target for utility companies hoping to roll back renewable energy mandates and retain more influence in the electricity market.[44] Second, some state laws create conflicts of interest by leaving utility companies discretion in how they incorporate renewable energy standards.[45] Finally, current retail rates for electricity do not incorporate the external costs of rising sea levels spurred by global warming.[46]

This article addresses issues with the current legal framework in the United States for the use of renewable energy, arguments and impediments to the United States' reliance on solar energy, and possible solutions to establish a more efficient, effective, and clean energy infrastructure. Part II gives a very brief history of renewable energy laws in the United States. Part III addresses arguments against the adoption of renewable energy policies and the need for a centralized regulatory approach. Part IV proposes solutions to the current issues with the decentralized energy grid. The solutions proposed in this section will create a national decentralized energy system. Such a system would eliminate many of the barriers and encourages uniform regulation across the states.

II. BRIEF HISTORY OF RENEWABLE ENERGY LEGISLATION IN THE UNITED STATES

In 1983, Iowa was the first state in the United States to pass a RPS statute requiring utilities to "own or to contract for a combined total of 105 megawatts ("MW") of renewable generating capacity and associated energy production".[47] At the time, the cost of solar energy was two dollars for every kilowatt hour ("kWh")

39. MO. REV. STAT. § 386.890 (2018); NEV. REV. STAT. § 704.7732 (2017).

40. *Feed-In Tariffs or Net Metering? What's the Difference?*, APPLIED MATERIALS (Sept. 14, 2009), http://blog.appliedmaterials.com/feed-tariffs-or-net-metering-what's-difference.

41. *Id.*

42. *Id.*

43. *State Renewable Portfolio Standards and Goals*, NAT'L CONF. ST. LEGISLATURES (Feb. 1, 2019), http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

44. *See* Hiroko Tabuchi, *Rooftop Solar Dims Under Pressure from Utility Lobbyists*, N.Y. TIMES (July 8, 2017), https://www.nytimes.com/2017/07/08/climate/rooftop-solar-panels-tax-credits-utility-companies-lobbying.html.

45. *Iowa Wind Energy Fact Sheet*, IOWA ENVTL. COUNCIL (June 2017), https://www.iaenvironment.org/webres/File/Iowa%20Wind%20Energy%20Fact%20Sheet%20-%20June%202017.pdf.

46. Severin Borenstein, *The Electricity Price Isn't Right*, ENERGY INST. HAAS (Sept. 17, 2018), https://energyathaas.wordpress.com/2018/09/17/the-electricity-price-isnt-right/.

47. *Alternative Energy Law (AEL)*, U.S. DEP'T ENERGY, https://www.energy.gov/savings/alternative-energy-law-ael (last visited Feb. 1, 2019).

and the cost of wind averaged $.14 for every kWh.[48] In 2016, this capacity grew to 6,917 MW, or 36% of Iowa's total generating capacity.[49] In 1991, New Jersey followed suit and adopted a RPS statute requiring utilities to use 50% of renewable energy by the year 2030.[50] By the year 2012, 37 states enacted some form of RPS.[51] In 2012, the price of solar and wind energy cost approximately $.30 and $.05 per kWh, respectively.[52] However, even with RPS, states such as South Dakota, North Dakota, Kansas, Oklahoma, and Utah make their standard or target of renewable energy production and usage voluntary.[53] In Kansas, this voluntary standard was passed to bring in business interests otherwise adverse to a mandatory renewable energy standard.[54]

Net metering laws were adopted in a similar way as RPS standards. Minnesota was "the first state to enact a net metering law" in 1983.[55] As of 1998, 22 states offered net metering programs.[56] However, many states are beginning to roll back their net metering initiatives. That is, states are reducing the rate at which solar customers are to be paid for energy production.[57] For example, in 2018, some states, such as Connecticut and Michigan, completely eliminated net metering.[58]

With decreasing costs in renewable energy production, many utility companies see renewable energy policies and incentives as a threat.[59] The threat is very real; as "customers choose to install solar panels or adopt energy efficiency measures, a utility will sell fewer units of energy."[60] In response to the threat, many utility and fossil fuel interest groups lobbied against renewable energy incentives and policies by establishing "front groups."[61] More specifically, front groups are established separate from corporate interests to relay the impression that there is an "independent, anti-clean energy voice to energy policy debates."[62] An example of these front

48. Sara Hastings-Simon & Barend Dronkers, *Fact Sheet: The True Price of Wind and Solar Electricity Generation*, PEMBINA INST. (May 2016), https://www.pembina.org/reports/true-price-of-wind-and-solar.pdf.

49. IOWA ENVTL. COUNCIL, *supra* note 45.

50. N.J. REV. STAT. § 48:3-87 (2018); NAT'L CONF. ST. LEGISLATURES, *supra* note 43.

51. *Most States have Renewable Portfolio Standards*, ENERGY INFO. ADMIN. (Feb. 3, 2012), https://www.eia.gov/todayinenergy/detail.php?id=4850.

52. Hastings-Simon & Dronkers, *supra* note 48.

53. NAT'L CONF. ST. LEGISLATURES, *supra* note 43.

54. Robert Walton, *Kansas Ends 20% Renewables Mandate, Replaces it with Voluntary Goal*, UTILITY DIVE (June 1, 2015), https://www.utilitydive.com/news/kansas-ends-20-renewables-mandate-replaces-it-with-voluntary-goal/400006/.

55. Fresh Energy, *How does Net Metering Work?*, MINN. ENVTL. PARTNERSHIP (May 29, 2015), https://www.mepartnership.org/how-does-net-metering-work/.

56. YIH-HUEI WAN & H. JAMES GREEN, NAT'L RENEWABLE ENERGY LAB., CURRENT EXPERIENCE WITH NET METERING PROGRAMS (May 1998), https://www.nrel.gov/docs/legosti/old/24527.pdf.

57. Gwen Brown, *The 2018 State Solar Policy Changes You Need to Know*, AURORA BLOG, https://blog.aurorasolar.com/the-2018-state-solar-policy-changes-you-need-to-know (last updated Dec. 24, 2018).

58. *Id.*

59. Mari Hernandez, *Why Utilities are Afraid of Rooftop Solar*, THINKPROGRESS (Aug. 20, 2013, 7:20 PM), https://thinkprogress.org/why-utilities-are-afraid-of-rooftop-solar-5a4799adff22/.

60. *Id.*

61. Matt Kasper, *Industry-Funded Front Groups Working Together to Fight Clean Power Plan*, ENERGY & POL'Y INST. (Aug. 3, 2015), https://www.energyandpolicy.org/industry-funded-front-groups-working-together-to-fight-clean-power-plan/.

62. *Attacks on Renewable Energy Policies in 2015*, ENERGY & POLICY INST. (July 27, 2015), https://www.energyandpolicy.org/renewable-energy-state-policy-attacks-report-2015/.

groups include the Thomas Edison Institute, which coined the phrase "utility death spiral."[63]

Many of these fossil fuel interest groups garner significant financial support from large corporate interests and partnerships, such as the Koch brothers.[64] Special interest groups, such as the American Energy Alliance, use "push polls" to influence the poll-taker into answering the question in a way which helps the American Energy Alliance's goals.[65] Another tactic the group uses is to incorporate false information into the surveys.[66] For example, one false question included the statistic that every purchase of an electric car is paid with the help of $75 from American taxpayers.[67] The groups then use these polls to lobby the U.S. Congress to further help deny climate change.[68] In 2018, fossil fuel interest groups outspent the renewable energy sector ten to one, and the biggest contributors of these lobbying campaigns were electric utilities.[69] The arguments of these fossil fuel interest groups are mapped out below.

III. UTILITY COMPANY ARGUMENTS AGAINST SOLAR ENERGY AND OTHER BARRIERS

A. Battle Over Cost

The battle over cost refers to the ongoing argument between utility companies and proponents of renewable energy to properly define the cost of electricity and the rate at which to pay renewable energy producers for their excess power. This argument is a central issue as the definition of the cost of conventional energy as well as the rate paid to renewable energy producers determines the more attractive option to consumers.

The main thrust of centralized utility arguments against the adoption of renewable energy incorporation is the increase in cost to all consumers.[70] Utility companies argue, for example, that net metering requires them to pay the retail rate, which in their opinion is simply too high.[71] Solar producers are receiving the rate at which utility companies sell power and they are also not paying for the fixed costs of energy production, such as power line maintenance and construction.[72] The utility

63. Tabuchi, *supra* note 44. The term "utility death spiral" refers to the theory that renewable energy will push grid maintenance costs up as more and more energy users disconnect from the grid in favor of the decreasing renewable capital costs.

64. Matt Renburke, *Poll by Former Koch Lobbyist Skews Public Support for Clean Cars, Electric Vehicles*, DESMOG (June 20, 2018), https://www.desmogblog.com/2018/06/20/american-energy-alliance-poll-koch-tom-pyle-electric-vehicles.

65. *Id.*

66. *Id.*

67. *Id.*

68. Itai Vardi, *Fossil Fuel Industry Outspent Environmentalists and Renewables by 10:1 on Climate Lobbying, New Study Finds*, ECOWATCH (July 19, 2018, 1:07 PM), https://www.ecowatch.com/fossil-fuel-lobbying-2588126755.html.

69. *Id.*

70. Tabuchi, *supra* note 44.

71. *Id.*

72. *Id.*

companies argue this spreads the fixed costs across fewer utility customers, causing an increase in their electric rates.[73]

Additionally, renewable energy requires large up-front capital costs to build large solar and wind farms.[74] The average cost in 2017 to install residential solar panels was $3,700 per kW.[75] To add to this cost, net metering requires customers to obtain net meters or bi-directional meters to adequately measure the amount of energy produced by these customers.[76] Utility lobbyists, such as the Edison Institute, argue such large up-front expenditures prevent many of the nation's poorer residents from obtaining renewable energy and unfairly subjects them to higher energy costs.[77]

Utility companies, instead, want to pay solar producers the rate FERC sets as the wholesale rate, or the rate at which it costs utility companies to create energy.[78] Proponents of net metering argue retail rates are necessary to encourage the installation of solar panels on residential homes.[79] Proponents assert the wholesale rate is much lower than the retail rate, thereby decreasing the value of future cash flows necessary to offset initial up-front costs.[80]

Yet another cost is the large infrastructure expenditures needed to transport an abundance of renewable energy. In 2015, Germany faced a problem transporting electricity from the renewable energy abundant north to the less prolific south.[81] To deal with this problem, Germany planned to build "new high-voltage direct current lines" estimated at a cost of $28 billion through 2022.[82] Although such expenditures may not stem from net metering and current state policies, these infrastructure upgrades are a necessary part of increased renewable energy dependence.

Finally, proponents of net metering and solar capacity argue the rates at which energy is produced by utility companies using conventional sources does not reflect the true cost of such sources.[83] At first glance, conventional sources and the centralized grid appear to achieve economies of scale and lower costs.[84] However, many are comparing cost with price rather than cost itself.[85] Costs associated with environmental damages, health problems, and climate changes are not yet factored into the prices on a monthly utility bill.[86] As cited above, the true cost of global warming

---

73. *Id.*

74. *Barriers to Renewable Energy Technologies*, UNION CONCERNED SCIENTISTS (2017), https://www.ucsusa.org/clean-energy/renewable-energy/barriers-to-renewable-energy#.W7EmTPZFz-U.

75. *Id.*

76. Mark Durrenberger, *Different Types of Utility Meters for Solar*, ENERGY MISER (Feb. 15, 2017), https://newenglandcleanenergy.com/energymiser/2017/02/15/different-types-of-utility-meters-for-solar/.

77. Tabuchi, *supra* note 44.

78. Jason Hayes, *Net Metering Decision Raises Hackles of Solar Supporters*, MACKINAC CTR. FOR PUB. POL'Y (Apr. 25, 2018), https://www.mackinac.org/net-metering-decision-raises-hackles-of-solar-supporters.

79. *Id.*

80. *Id.*

81. Jurca, *supra* note 28, at 163.

82. *Id.*

83. Erica Gies, *The Real Cost of Energy*, NATURE (Nov. 29, 2017), https://www.nature.com/articles/d41586-017-07510-3.

84. Héléne Pelosse, *The True Costs of Conventional Energy*, UN CHRON. (Aug. 2009), https://unchronicle.un.org/article/true-costs-conventional-energy.

85. *Id.*

86. *Id.*

for the U.S. economy was $240 billion per year from 2007 to 2017.[87] With the U.S. population at 322 million, a very rudimentary calculation provides these externalities cost each U. S. citizen $745 a year.[88]

B. Intermittency Issues

Renewable energy instruments, such as solar panels and wind turbines, are created to capture and take advantage of naturally occurring energy. However, these energy sources can only be utilized in certain conditions, leading many to argue such energy sources are unreliable.[89] For example, on a cloudy day, solar panels can only generate 10-25% of their total capacity.[90] During the winter months and summer months, residential homes show the greatest variation in peak demand.[91] In essence, demand during the winter can skyrocket, while renewable energy sources can only generate 10-25% of their total capacity.

In Germany, the *Energiewiende* took years to slowly reposition the grid towards renewable energy sources.[92] As of 2017, Germany still relied upon a mix of conventional energy sources and renewable energy sources.[93] Renewable energy accounted for 33.3% of gross power production while natural gas, hard coal, lignite, nuclear, and mineral oil accounted for 67.4% of gross power production.[94] In essence, renewable energy sources, because of their dependence upon circumstantial power sources, need conventional power sources as a fallback when peak loads cannot be met.[95] This leads to concerns about "fluctuations in electricity and grid reliability."[96]

However, Germany enjoys one of the "shortest overall grid downtimes in the world," as of 2015.[97] These downtimes are measured by the amount of time, in minutes, each German citizen experienced a power outage.[98] In 2011, Germany lost 41% of their nuclear power generation, yet averaged a downtime of only 15.31 minutes compared to 21.53 minutes in 2006.[99] Yet, the loss of energy still remains

87. Leahy, *supra* note 26.

88. Robert Schlesinger, *The Size of the U.S. and the World in 2016*, U.S. NEWS (Jan. 5, 2016), https://www.usnews.com/opinion/blogs/robert-schlesinger/articles/2016-01-05/us-population-in-2016-according-to-census-estimates-322-762-018.

89. Toni Pyke, *The Energy Debate: Renewable Energy Cannot Replace Fossil Fuels*, DEVELOPMENTEDUCATION.IE (Apr. 12, 2017), https://developmenteducation.ie/feature/the-energy-debate-renewable-energy-cannot-replace-fossil-fuels/.

90. Dave Llorens, *Do Solar Panels Work in Cloudy Weather?*, SOLAR POWER ROCKS, https://www.solarpowerrocks.com/solar-basics/how-do-solar-panels-work-in-cloudy-weather/ (last visited Feb. 18, 2019).

91. *Homes Show Greatest Seasonal Variation in Electricity Use*, ENERGY INFO. ADMIN. (Mar. 4, 2013), https://www.eia.gov/todayinenergy/detail.php?id=10211#.

92. *The German Energiewende: Transforming Germany's Energy System*, FED. FOREIGN OFF., http://www.energiewende-global.com/en/ (last visited Feb. 18, 2019).

93. Kerstine Appunn et al., *Germany's Energy Consumption and Power Mix in Charts*, CLEAN ENERGY WIRE (Dec. 19, 2018), https://www.cleanenergywire.org/factsheets/germanys-energy-consumption-and-power-mix-charts.

94. *Id.*

95. Jurca, *supra* note 28, at 166.

96. *Id.* at 165.

97. *Id.*

98. Sören Amelang & Jakob Schlandt, *Germany's Electricity Grid Stable Amid Energy Transition*, CLEAN ENERGY WIRE (Nov. 12, 2018, 3:30 PM), https://www.cleanenergywire.org/factsheets/germanys-electricity-grid-stable-amid-energy-transition.

99. Jurca, *supra* note 28, at 165.

a problem in Germany as energy storage systems and infrastructure capabilities are not able to meet consumer demand.[100]

Additionally, proponents of relying upon conventional energy argue renewable energy systems will require a large shift in our socio-economic and cultural lifestyles.[101] Currently, the United States is comprised of approximately 328 million people, in a world of 7.5 billion.[102] Yet, with around 4.37% of the world's population, the United States consumes 17% of the world's energy.[103] With the expected world energy consumption to double by 2050, some argue renewables could only provide 25% of energy needs and any more would require "move[ment] to lifestyles and systems that require only a small fraction of the present rich world per capita energy consumption."[104]

C. Land Use Barriers

The most complicated and serious barrier to increased renewable energy consumption is lack of land, covenants, and land use restrictions. As of 2013, the Energy Department's National Renewable Energy Laboratory ("NREL") estimated a "large fixed tilt photovoltaic ("PV") plant that generates [one] gigawatt-hour per year requires, on average, 2.8 acres for the solar panels."[105] "This means that a solar power plant that provides all of the electricity for 1,000 homes would require 32 acres of land."[106] Thus, if solar energy were to meet 100% of the electricity demand of the United States, it would require 0.6% of all acres in the United States.[107] While this number appears low, one must consider that, in June 2017, coal, natural gas, and nuclear power plants required approximately 12.5 acres per megawatt produced whereas solar and wind source used 43.50 acres and 70.64 acres per megawatt, respectively.[108] Additionally, one must remember that many others wish to use the land for other purposes.[109]

"Not in my backyard" encapsulates the second issue with land use restrictions. Currently, the nation's leading wind energy producer is Iowa.[110] However, many of those living within rural communities near such wind turbines consider them an eyesore.[111] Even from half a mile away, these towering turbines, standing at over

100. *Id.*
101. Pyke, *supra* note 89.
102. *U.S. and World Population Clock*, U.S. CENSUS BUREAU (Oct. 21, 2018, 12:45 PM), https://www.census.gov/popclock/.
103. Ctr. for Sustainable Sys., *U.S. Energy System Factsheet*, U. MICHIGAN (2018), http://css.umich.edu/factsheets/us-energy-system-factsheet.
104. Pyke, *supra* note 89.
105. William Scanlon, *News Release: NREL Report Firms Up Land-Use Requirements of Solar*, NAT'L RENEWABLE ENERGY LAB. (July 30, 2013), https://www.nrel.gov/news/press/2013/2269.html.
106. *Id.*
107. *Id.*
108. Landon Stevens et al., *The Footprint of Energy: Land Use of U.S. Electricity Production*, STRATA 1 (June 2017), https://www.strata.org/pdf/2017/footprints-full.pdf.
109. Christopher Joyce, *Renewable Energy Needs Land, Lots of Land*, NPR (Aug. 28, 2009, 6:00 AM), https://www.npr.org/templates/story/story.php?storyId=112323643.
110. Karen Uhlenhuth, *Iowa, Already a Leader on Wind, Looks to Take the Next Steps on Storage*, ENERGY NEWS NETWORK (Oct. 2, 2018), https://energynews.us/2018/10/02/midwest/iowa-already-a-leader-on-wind-looks-to-take-the-next-steps-on-storage/.
111. Donnelle Eller & Kevin Hardy, *Is Wind Power Saving Rural Iowa or Wrecking it?*, DES MOINES REG. (Apr. 20, 2017, 5:27 PM), https://www.desmoinesregister.com/story/tech/science/environment/2017/04/20/wind-power-saving-rural-iowa-wrecking/99789758/.

300 feet tall, can be seen.[112] Additionally, many believe the wind turbines are lowering their property values while those who agreed to put turbines on their land are raking in the profits.[113] The question of whether or not these monstrous wind turbines affect property values depends upon who you ask.

"Members of the Real Estate and Appraisal business" assert that wind farms do affect the value of neighboring land.[114] Michael McCann, of McCann Appraisal, LLC in Chicago, asserts "[r]esidential property values are adversely and measurably impacted by close proximity of industrial-scale wind energy turbine projects to the residential properties, up to two miles and a range of 25% to approximately 40% of value loss."[115] Additionally, in 2014, the London School of Economics estimated that proximity to wind farms may decrease land value by approximately 12%.[116] Finally, many Iowans contend that wind farms are noisy and dangerous to wildlife.[117] Many might argue solar energy does not present such issues, but this is largely not the case.

With solar, the problems are much the same as wind farms. In Oakville, Missouri, a homeowner placed solar panels upon his roof.[118] Shortly thereafter, this homeowner was sued by the Greycliffe Home Owners Association under a provision that specifically barred the use of solar panels without permission from the Home Owners Association ("HOA").[119] Covenants pertaining to solar panels are not easily trumped, as shown by *Lake at Twelve Oaks Home Association Inc. v. Hausman*.[120] In that case, the Missouri Court of Appeals, Western District, held that "disapproval of two solar panel arrays on subdivision residence was reasonable under restrictive covenants."[121] These HOA covenants usually require a majority vote to be amended and cannot be modified for a pre-determined amount of time.[122]

In California, to prevent HOA laws from stifling solar panel installations, the state legislature passed the California Solar Rights Act (the "Act").[123] Section 714(a) of the Act declares "[a]ny covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument . . . that effectively prohibits or restricts the installation or use of a solar energy system is void and unenforceable."[124] However, the Act was created largely for preventing HOAs from banning solar panel installations for aesthetic reasons, but does not grant a homeowner

112. *Id.*
113. *Id.*
114. Jude Clemente, *Do Wind Turbines Lower Property Values?*, FORBES (Sept. 23, 2015, 10:28 AM), https://www.forbes.com/sites/judeclemente/2015/09/23/do-wind-turbines-lower-property-values/#11cefa5b48cb.
115. *Id.*
116. *Id.*
117. Eller & Hardy, *supra* note 111.
118. Steve Hanley, *Solar Panels Can Cause Neighborhood Arguments*, SOLAR LOVE (Mar. 16, 2015), http://solarlove.org/solar-panels-can-cause-neighborhood-arguments/.
119. *Id.*
120. Lake at Twelve Oaks Home Ass'n, Inc. v. Hausman, 488 S.W.3d 190 (Mo. App. W.D. 2016).
121. *Id.*
122. Pearce v. Scarcello, 920 S.W.2d 643, 645 (Mo. Ct. App. W.D. 1996) (holding a 30-year covenant running with the land prevented homeowners from amending the covenant for 30 years even with a majority of votes).
123. CAL. CIV. CODE § 714 (West 2015); CAL. CIV. CODE § 714.1 (West 2018) (California Solar Rights Act).
124. *Id.* § 714(a).

an outright ability to ignore other covenants that may affect solar panel installation.[125] Currently, 25 states have enacted legislation that restricts HOAs' abilities to prevent solar panel installation, while 15 states only protect easement rights, and ten states offer no protections.[126]

A final barrier to adopting solar energy exists in solar power purchase agreements ("PPAs"). These agreements allow third parties to install solar panels on homes and will either (1) lease the system to that homeowner for a set monthly cost in exchange for the electric offset, or (2) forgo the monthly cost and instead sell the electricity back to the homeowner for a set price per kWh.[127] PPAs are regulated by both state legislatures and FERC.[128] While many states allow such agreements, they are largely dependent upon whether or not the state allows net metering at the retail rate or merely provides the wholesale rate for electricity sold on the grid.[129] Additionally, these agreements only work in states in which the electricity price is high, since the homeowner's benefit is the ability to buy the lower priced renewable energy.[130] In states that do not allow net metering, it is likely PPAs are unprofitable for independent third parties.[131] However, in at least three states—Oklahoma, Tennessee, and North Carolina—PPAs are outright prohibited.[132] While PPAs are largely accepted, many state regulations prevent such agreements from being profitable and, in turn, prevent lower income individuals from obtaining solar energy without high capital costs.[133]

IV. THE SOLUTION: A MORE CENTRALIZED APPROACH TO DECENTRALIZED ENERGY

The issues facing renewable energy stem primarily from inconsistent state laws. As inconsistent as it seems, a decentralized energy system needs a centralized approach.[134] As seen in Germany, in order to achieve the goal of decentralized energy, the method will need to include a centralized approach to reach this goal.[135]

According to economist and philosopher, Friedrich A. Hayek, central planning raises an information disadvantage.[136] Hayek theorized that economic solutions set forth by a central planning agency are not efficient because the data required to

125. Steven J. Tinnelly, *Solar Panels on Common Area Roofs; Have a Policy Yet?*, TINNELLY L. GROUP (Mar. 27, 2018), https://hoalaw.tinnellylaw.com/solar-panels-common-area-roofs-policy-yet/.

126. *Solar Rights and Easements*, COMMUNITY ASS'N INST., https://www.caionline.org/Advocacy/StateAdvocacy/PriorityIssues/SolarRestrictions/Pages/default.aspx (last visited Feb. 1, 2019).

127. *Essential Information About Solar Leases and PPAs*, SOLAR POWER ROCKS, https://www.solarpowerrocks.com/solar-lease-map/ (last visited Feb. 1, 2019) [hereinafter *Solar Leases and PPAs*].

128. Jesse Heibel & Jocelyn Durkay, *State Polices for Power Purchase Agreements*, NAT'L CONF. ST. LEGISLATURES (July 10, 2015), http://www.ncsl.org/research/energy/state-policies-for-purchase-agreements.aspx.

129. *Solar Leases and PPAs*, *supra* note 127.

130. *What is a Power Purchase Agreement*, SOLAR-ESTIMATE, https://www.solar-estimate.org/solar-financing/ppa-solar (last visited Feb. 1, 2019).

131. *Solar Leases and PPAs*, *supra* note 127.

132. *Id.*

133. Ryan Greer, THROWING SHADE: 10 SUNNY STATES BLOCKING DISTRIBUTED SOLAR DEVELOPMENT, CTR. FOR BIOLOGICAL DIVERSITY 18 (Apr. 2016), https://www.biologicaldiversity.org/programs/population_and_sustainability/energy/pdfs/ThrowingShade.pdf.

134. Jurca, *supra* note 28.

135. Appunn et al., *supra* note 93.

136. F. A. Hayek, *The Use of Knowledge in Society*, 1 N.Y.U. J. L. & LIBERTY 5 (2005).

create such a solution can never be given to one individual.[137] Hayek argued "time and place" information—information which one person holds but does not share to take advantage of any given situation—is only available to the "man on the spot."[138] In other words, the "man on the spot" is the only person who can use this information to adapt to the circumstances of time and place.[139] However, the "man on the spot" does not have all the information.[140] The solution, according to Hayek, is to have all of this information delivered to the "man on the spot" via the price mechanism.[141]

The solution to transfer power from state agencies to central agencies appears opposite to Hayek's arguments. However, this transfer of power creates an environment in which the centralized authority can decentralize the market. This decentralization then gives the "man on the spot" the ability to produce, buy, sell, and use his own energy according to the circumstances of time and place.[142] The actions of the "man on the spot" incorporates his information to others via the price mechanism.[143] Instead of centralized utility companies wastefully starting and restarting production to match the rise and fall of demand, the individual "man on the spot"—the consumer/producer—can continually buy and sell according to his own information and information that is fed through the price mechanism.

Arguments that the cost of conventional energy production is far lower than renewable energy production are hard to pin down. The chief problem with analyzing the cost of both is the price of conventional energy production is compared to the cost of renewable energy production.[144] To provide an accurate picture to consumers, FERC should factor in externalities—health risks, environmental damages from climate change, and structural damages to cities from rising sea levels—to the wholesale rate traded between utility companies.[145] Currently, no country imposes a comprehensive economy tax on coal or other fossil fuels for external factors.[146] Rather, countries list these external costs as costs avoided when subsidizing renewable energy.[147] However, raising the cost avoided by increased spending into renewable energy could be advantageous as well.

Additionally, state legislatures must factor these externalities into the retail rate to provide utility companies with an adequate margin. These retail rates need to approach uniformity as, without standardization, renewable energy incentives are

137. *Id.*
138. *Id.* at 7–8, 10–11.
139. *Id.*
140. *Id.* at 10–11.
141. *Id.* at 11.
142. *Id.*
143. *Id.*
144. Pelosse, *supra* note 84.
145. *The Hidden Costs of Fossil Fuels*, UNION CONCERNED SCIENTISTS (Aug. 30, 2016), https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/hidden-cost-of-fossils#.W8z6CvZFz-U ("As of 2008, about 20 percent of U.S. watersheds were experiencing water-supply stress. Power plants substantially contributed to the water stress in one-fifth of these watersheds."); Alex Harris, *The Risk of Sea Level Rise is Chipping Away at Miami Home Values, New Research Shows*, MIAMI HERALD (Apr. 24, 2018, 6:01 PM), https://www.miamiherald.com/real-estate/article209611439.html.
146. *Externalities of Electricity Generation*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/information-library/economic-aspects/externalities-of-electricity-generation.aspx (last updated Mar. 2017).
147. *Id.*

easily defeated in low retail rate states.[148] Finally, lawmakers should separate the retail rate for renewable energy production from the retail rate for conventional energy production—as the two production sources are composed of entirely different costs. With externalities factored into the price of conventional energy, utilities and consumers will turn to renewable energy sources to decrease the price of energy consumption.

As explained above, many will argue paying the retail rate for renewable energy will increase utility bills for all customers. Undoubtedly, they will point to the price of 29.42 eurocents per kWh—the highest rate of any European country and the world—as a basis for this argument.[149] However, 54% of this increase is based upon government charges.[150] For example, the FIT in Germany sets a specific rate—far above the actual rate for electricity—to incentivize homeowners to use renewable energy.[151] Thus, the FIT increases the price of electricity. In other words, the producer makes a pretty penny, but the population suffers.[152] However, as explained above, reflecting the actual cost of conventional electricity will make renewable energy attractive without the need for an increased retail rate for renewable energy production.[153]

Paying the retail rate for all renewable energy production will make PPAs economically favorable for homeowners wishing to capture the profits of renewable energy generation. PPAs would reduce the upfront capital costs of installing solar panels and allow low-income residents the ability to profit from renewable energy sources.[154] To prevent further costs in the future, the federal government should increase infrastructure developments, not solely to manage the increase in cheap renewable energy, but to meet the doubling of energy consumption in 2050.[155]

Although proponents for conventional energy generation argue such generation is necessary to avoid blackouts, the decentralized approach in Germany actually decreased system downtime.[156] Regardless of whether or not the United States decides to adopt more stringent renewable energy policies, the expected increase in energy consumption by the year 2050 already provides a reason for the United

148. Herman K. Trabish, *ALEC Coordinates New Attacks on Renewables Mandates and Net Metering: And Questions Emerge About Google's Support of the Group*, GREENTECH MEDIA (Feb. 24, 2014), https://www.greentechmedia.com/articles/read/alec-coordinates-new-attacks-on-renewables-mandates#gs.SqEYoMqX.

149. Ellen Thalman & Benjamin Wehrmann, *What German Households Pay for Power*, CLEAN ENERGY WIRE (June 5, 2018), https://www.cleanenergywire.org/factsheets/what-german-households-pay-power.

150. *Id.*

151. Jeffrey Ball, *Germany's High-Priced Energy Revolution*, FORTUNE (Mar. 14, 2017), http://fortune.com/2017/03/14/germany-renewable-clean-energy-solar/.

152. Thalman & Wehrmann, *supra* note 149.

153. *See* Megan Mahajan, *Plunging Prices Mean Building New Renewable Energy is Cheaper Than Running Existing Coal*, FORBES (Dec. 3, 2018, 7:40 AM), https://www.forbes.com/sites/energyinnovation/2018/12/03/plunging-prices-mean-building-new-renewable-energy-is-cheaper-than-running-existing-coal/#6da6646031f3.

154. Anne Tazewell & Achyut Shrestha, COMMUNITY SOLAR OPPORTUNITIES FOR LOW TO MODERATE INCOME HOUSEHOLDS IN THE SOUTHEAST, N.C. CLEAN ENERGY TECH. CTR. (Mar. 2018), https://nccleantech.ncsu.edu/wp-content/uploads/2018/05/Community-Solar-LMI-Report-3_27_18.pdf.

155. Pyke, *supra* note 89.

156. *See* Part III.B.

States to increase spending on infrastructure.[157] Although many states are responsible for their own grid expansion, the states can adopt legislation allowing the federal government to take a more centralized role in the grid expansion process.[158]

The main argument against such grid expansion is that the federal government continually favors utility lobbyists and organizations.[159] Professor Troy A. Rule illustrates this current problem with the state legislatures in his article, *Buying Power: Utility Dark Money and The Battle Over Rooftop Solar*.[160] Rule's article calls for limits on state campaign contributions and increased recusal of public utility commissions ("PUCs") in line with *Caperton v. A.T. Massey Coal Co., Inc.*[161] Federal governmental organizations should follow such requirements in campaign financing, but such an issue is outside the scope of this article.

Land use restrictions regarding solar power and wind farms must be made consistent from state to state.[162] Truly capturing the benefits of a decentralized renewable energy system requires national involvement at all levels of energy production process. To achieve uniformity, the states should adopt a commission tasked with setting standards for HOA covenant restrictions in line with California's Solar Rights Act.[163] Further, this commission should address discontent with wind farm locations and disputes between neighbors.[164] Possible solutions to the wind farm problem include determining a more centralized location of wind farms and compensating not only the land owner, but also nearby landowners as well. The commission should determine rates at which these landowners are compensated to prevent unfair business practices by neighbors and renewable energy generators.

V. CONCLUSION

Renewable energy production is becoming an attractive industry. However, there are still barriers preventing the total capture of all the benefits renewable energy has to offer. These problems need a more centralized approach, as well as proactive steps, to avoid the issues Germany now faces. The rates at which land owners are compensated and land use controls need uniformity. Additionally, a centralized approach carries the burden of renewable energy production for the expected increase in energy consumption. While such solutions are hard to implement due to conflicting viewpoints, the continued use of conventional energy sources will create a financial impact far more harmful and permanent than any short-term costs associated with renewable energy production.

---

157. Pyke, *supra* note 89.
158. Jeff McDonald, *Plan for 14-State Power Grid Faces Key Senate Hearing on Tuesday*, SAN DIEGO UNION-TRIBUNE (June 15, 2018, 2:10 PM), https://www.sandiegouniontribune.com/business/energy-green/sd-me-grid-expansion-20180615-story.html.
159. *Id.*
160. Troy A. Rule, *Buying Power: Utility Dark Money and the Battle Over Rooftop Solar*, 5 LSU J. ENERGY L. & RESOURCES 1 (2017).
161. *Id.*; Caperton v. A.T. Massey Coal Co., Inc., 556 U.S. 868 (2009).
162. Patricia Salkin, *The Key to Unlocking the Power of Small Scale Renewable Energy: Local Land Use Regulation*, 27 J. LAND USE & ENVTL. L. 339, 340 (Spring 2012).
163. CAL. CIV. CODE § 714 (West 2015); CAL. CIV. CODE § 714.1 (West 2018).
164. *What are the Legal Issues in Windpower?*, WINDPOWER ENGINEERING DEV. (May 21, 2011), https://www.windpowerengineering.com/projects/policy/what-are-the-legal-issues-of-windpower/.