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Vanishing Power Lines and Emerging Distributed Generation

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VANISHING POWER LINES AND EMERGING DISTRIBUTED GENERATION

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I. INTRODUCTION

"Right now, I'd put my money on distributed resources."[1]

Experts predict that distributed energy will contribute as much as twenty percent of the U.S. power supply by 2020.[2] While no one will wake up tomorrow morning to an entirely new energy distribution system—complete with solar panels on the roof and a wind turbine in the back yard—distributed generation is receiving significant attention as the disruptive technology that will ultimately revolutionize the way energy is delivered in the United States. The reason for this shift is, in part, due to new technology that allows for more flexible localized generation of energy, and in part due to a changing climate resulting in frequent and violent storms that destroy large-scale energy infrastructure.

A variety of distributed energy technologies are available today, including solar photovoltaic panels, battery storage, and micro turbines. These innovative technologies are not only appealing to today's tech-savvy customers, they are also becoming more economically accessible to the average customer. This shift in customer behavior will directly threaten the current energy delivery model. The more customers utilize distributed generation

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1. Chris Clarke, *Federal Energy Expert Backing Distributed Generation*, KCET (Sept. 6, 2012, 2:10 PM), http://www.kcet.org/news/rewire/the-grid/federal-energy-expert-backin g-distributed-generation.html (quoting former Chairman of the Federal Energy Regulatory Commission, Jon Wellinghof).

2. Dan Yates, *Ending the Big Electric Bill Era*, CNBC.COM (July 2, 2013, 11:53 AM), htt p://www.cnbc.com/id/100842506.

the less customers rely upon the transmission grid and the remaining customers will bear a higher burden of the transmission costs. The higher the cost of electricity to the remaining customers, the more likely those customers will seek out on-site generation as well. It could result in a vicious cycle for an unprepared utility company.

Another significant threat to the current energy delivery system is climate change. Increased ambient air temperatures, increased (and more severe) storms, flooding, and sea level rise have all exposed the vulnerabilities in the traditional central energy delivery system. For example, transmission infrastructure and generation facilities are vulnerable to physical damage during storms, fires, and floods, and they operate less efficiently in hotter temperatures. Distributed generation is emerging as a viable alternative that is less susceptible to these changing weather patterns, in part because it utilizes little to no transmission infrastructure and the generation facilities are located on-site, or near the end user.

Utilities and regulatory agencies will need to develop a more sustainable energy delivery system in the face of these climate and technological changes. Given that distributed generation appears to be a culprit in disrupting the traditional energy delivery model as well as a potential solution to a new, more sustainable, model, the focus should, at least in part, be on the flexible inclusion of distributed generation. Unfortunately, in recent years, energy laws and policies—such as Renewable Portfolio Standards and Multi Value Project policies—have instead promoted and facilitated large-scale energy development, resulting in billions of dollars being spent on unsustainable energy delivery systems. Policymakers will need to work to undo these damaging policies.

Part II of this article will provide a brief history and overview of the U.S. electricity industry. It will discuss the evolution of the transmission grid and the central station model for delivering electricity. Part III will review some of the challenges to the current system, including two reports issued in 2013 that call into question the continued viability of the current energy delivery model. One report points to innovative technologies, such as distributed generation, that will ultimately disrupt the current utility model. The other report assesses the current model's vulnerability to the effects of climate change, and recommends distributed generation as one means of adapting to those changes.

Part IV will discuss distributed generation and its potential benefits as an alternative or supplement to the current model. Distributed generation can be less expensive and more efficient. It can incorporate sustainable renewable energy without the use of large-scale transmission lines that create environmental harm. Furthermore, distributed generation is generally less susceptible to large-scale blackouts and natural disasters because more facilities are distributed near customers. Moreover, distributed generation appeals to the growing number of tech-savvy customers who are capable of being, and prefer to be, in more control of their energy consumption.

Part V will recommend that regulators and policymakers continue to develop sound regulatory standards for the incorporation of renewable distributed generation, but more than that, it recommends that policymakers undo some of the damaging policies and laws that have been put into place over the last several years. Finally, Part VI will look at some opportunities for utilities to become full-service energy providers offering a more innovative and technologically advanced product to satisfy the tech-savvy customer and maybe even assist the economically disadvantaged who would otherwise not be able to afford to install or maintain these new technologies.

II. AN OVERVIEW OF THE HISTORY OF THE U.S. ELECTRICITY INDUSTRY

While visiting Barcelona, Spain a few years ago, I had occasion to visit the Basílica i Temple Expiatori de la Sagrada Família, more commonly known as Sagrada Família. Amazingly grand, elegant, and "Gaudi"[3] all at the same time, the massive gothic-style church towers high above all the other buildings in the neighborhood. More interesting however, for the moral of this story, is that construction of the church began in 1882, and it is still unfinished. Although much less of a tourist attraction, the same approach to construction can be seen in the United States with its energy delivery system. Construction began in 1880, and

3. From 1883 until his death in 1926, Gaudí was the engineer, architect, and director of the project. SAGRADA FAMILIA, http://www.sagradafamilia.cat/sf-eng/docs_instit/historia.php (last visited Feb. 2, 2014).

the system has been growing and evolving ever since.[4] Unlike the Sagrada Família, however, the grid was not planned and was not built by a select group of architects.[5]

This section will provide a historical overview of the U.S. energy delivery system and the key players who developed the system. We will begin with a discussion of the evolution of the system from its original localized, distributed generation structure to its current massive (and perhaps monopolistic) centralized delivery structure.

A. In the Beginning: Localized Energy Delivery Systems

Thomas Edison and his team of engineers originally "created an entire electric system—inventing, developing, financing, and managing the generators, parallel distribution lines, and switches needed to bring power to consumers."[6] The first electric generating plant in the United States was built and managed by Thomas Edison's Electric Illuminating Company of New York.[7] In 1882 Edison flipped the switch at the Pearl Street Station in New York City, and within two months of service, his customers grew from fifty-nine to 203.[8] The next year he had 513 customers.[9] Pearl Street utilized direct current to supply electricity—mostly for electric lighting—to businesses in New York's financial district that used the novel form of lighting to attract customers.[10] By 1889, Edison's "construction firm had built

4. *See* DAVID E. NYE, WHEN THE LIGHTS WENT OUT: A HISTORY OF BLACKOUTS IN AMERICA 13 (2010).

5. *See* Maggie Koerth-Baker, *The History of the U.S. Electric Grid*, BOING BOING (May 21, 2012, 5:08 AM), http://www.boingboing.net/2012/05/21/the-history-of-the-u-s-electr.html.

6. RICHARD MUNSON, FROM EDISON TO ENRON: THE BUSINESS OF POWER AND WHAT IT MEANS FOR THE FUTURE OF ELECTRICITY 10 (2005). Thomas Edison and his team also created the incandescent light bulb. *Id.* In all, Edison is credited with over 1000 patents. *Id.*

7. In 1880, Edison "created a new firm, the Edison Electric Illuminating Company of New York, to build the first electric generating plant and distribution system." *Id.* at 16.

8. *Id.* at 22.

9. *Id.*

10. *Emergence of Electrical Utilities in America*, SMITHSONIAN INST., http://www.americanhistory.si.edu/powering/past/h1main.htm (last visited Sept. 2, 2013) [hereinafter *Electrical Utilities*]. "*Powering a Generation of Change* is a project to document the story of electrical power restructuring in North America as it unfolds over the coming years. The project is being conducted by the Division of Information Technology and Society at the Smithsonian Institution's National Museum of American History." *Documenting History in*

500 isolated power plants for buildings and fifty-eight larger units for communities, including Detroit, New Orleans, St. Paul, Chicago, Philadelphia, and Brooklyn."[11] Edison had patented his work for lighting and electricity, and new companies trying to enter the market were required to pay royalties for use of those patents.[12] It was not long, however, until consumers, investors, and inventors looked to use electricity for more than just lighting. "As entrepreneurs saw a large market for electricity consumption, they sought franchises from municipal governments to build power stations that would dot city landscapes."[13]

Most power plants were powered by hydroelectric power, and the grid was made up of multiple self-sustaining micro grids that were not interconnected.[14] Direct current restricted the distance electricity could be distributed, and the cost of technology prevented one company from owning all of the power plants.[15] Over time, hundreds of small individually owned utility companies constructed numerous power plants and transmission lines to provide electricity to select customers within a small geographical area.[16] Because the transmission system was not interconnected and did not have built-in redundancies, customers would experience frequent localized power outages.[17] As a result, most homes and businesses had alternative means to supply light and power when needed.[18] Larger businesses, including the New York Stock Exchange, factories, streetcar lines, and department stores operated their own power generation systems.[19]

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the Making, SMITHSONIAN INST., http://www.americanhistory.si.edu/powering (last visited Sep. 2, 2013).

11. MUNSON, *supra* note 6, at 22–23.

12. *Id.*

13. *Electrical Utilities*, *supra* note 10.

14. *See* Koerth-Baker, *supra* note 5.

15. *Electrical Utilities*, *supra* note 10.

16. *Id.*

17. While this "patchwork of local services" would frequently allow for power outages, the outages were usually localized and brief. NYE, *supra* note 4, at 15.

18. *Id.* at 20.

19. *Id.* at 15, 20.

B. Evolution of the Energy Delivery System: The Economies of Scale

By the late nineteenth century, utility companies began building larger and more centralized generating units.[20] The use of alternating current allowed for "a more dynamic and extensive transmission and distribution infrastructure."[21] Two individuals played a significant role in the shift from local to central distribution: Nikola Tesla and Samuel Insull.

Thomas Edison hired Nikola Tesla, an electrical engineer from Yugoslavia, to help with some of the more complex problems at Edison's lab.[22] Tesla believed the electric distribution system would work better using alternating current.[23] Edison disagreed, claiming that Tesla's ideas were "utterly impractical."[24] Edison's decision to turn away from Tesla's innovative ideas would be a mistake. Direct current "maintained the same low voltage or thrust from the power station to the ultimate consumer," and simply did not have enough power to send electricity over long distances.[25] Alternating current could.[26] "Two years after leaving Edison's lab, Tesla formed the Tesla Electric Company and filed for a patent on a more efficient motor and an electric distribution system that could carry power hundreds of miles with relatively little loss of voltage."[27] George Westinghouse bought Tesla's patents for $1 million and thus began the "war of the currents," with Edison holding onto direct current and Westinghouse promoting alternating current.[28] The war was ultimately won by

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20. Sanya Carley, *Distributed Generation: An Empirical Analysis of Primary Motivators*, 37 ENERGY POL'Y 1648, 1648 (2009).

21. *Id.*

22. *See* MUNSON, *supra* note 6, at 23.

23. *Id.*

24. *Id.*

25. *Id.* at 24.

26. Unlike direct current, alternating current was capable of transmitting electricity over a large distance at an economical price.

> The further direct current was sent, the larger and more expensive the copper wires had to be. Utilities therefore built DC generating stations in the center of a ring of customers, as was the case with the first Edison plant, the Pearl Street Station in lower Manhattan. DC plants had few interconnections, because transmission over long distances was uneconomical, and therefore no large-scale grid was practical.

NYE, *supra* note 4, at 21.

27. MUNSON, *supra* note 6, at 23–24.

28. *Id.* at 24.

alternating current, despite Edison's attempts to publicly illustrate its dangers by electrocuting several animals, including an elephant and a 1230-pound horse.[29]

Interestingly, it was Westinghouse's company, and not General Electric, that won the bid to light Chicago's 1893 Columbian Exposition.[30] General Electric bid $1.7 million for the job, Westinghouse's bid came in at almost half that.[31] The project was much more expensive than his bid, however, and Westinghouse suffered a short-term deficit of $500,000 at a time when loans were hard to obtain.[32] The project was huge and necessitated three times the electricity as that of the entire city of Chicago at the time.[33] It required 250,000 lamps, "advanced motors, more effective transformers, and 1000-horsepower generators," none of which Westinghouse had at the time of the bid.[34] Nikola "Tesla's designs allowed Westinghouse to succeed at Chicago's Columbian Exposition."[35]

Another Edison employee, Samuel Insull, who worked as Thomas Edison's personal secretary for twelve years, ultimately became the president of Chicago Edison.[36] Despite working closely for many years, Edison and Insull did not see eye-to-eye on the future of the electric utility industry.[37] Edison saw competition as a good thing; according to him: "No competition means no invention."[38] And, in the absence of competition, utilities would become complacent and lack innovation.[39] Insull, on the other hand, "envisioned creating giant monopolies."[40] Insull was once quoted as saying: "Every home, every factory, and every transportation line will obtain its energy from one common

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29. *Id.* at 26.

30. *Id.* at 32.

31. *Id.*

32. *Id.* at 34–35.

33. *1893 Chicago World's Fair—The World's Columbian Exposition "The White City"*, HAYGENEALOGY.COM, http://www.haygenealogy.com/hay/1893fair/1893fair.html (last visited Feb. 10, 2014) (quoting ERIK LARSON, THE DEVIL IN THE WHITE CITY (2003)).

34. MUNSON, *supra* note 6, at 33.

35. *Id.* at 39.

36. *Id.* at 23; *Samuel Insull (1859–1938)*, CHICAGO-L.ORG, http://www.chicago-l.org/figures/insull (last visited Feb. 10, 2014).

37. *See* MUNSON, *supra* note 6, at 18, 44.

38. *Id.* at 18 (citing ROBERT CONOT, A STREAK OF LUCK (1979)).

39. *See id.* at 21.

40. *Id.* at 44.

source, for the simple reason that that will be the cheapest way to produce and distribute it."[41] Insull saw utilities as natural monopolies,[42] taking advantage of economies of scale to utilize larger, more powerful turbine-generators to distribute power over a longer distance and deliver power to a large number of customers.[43] He sought to consolidate as many companies as he could, and afterward would convert "their generating stations into substations, relegating the generating equipment to back-up spares, and he used large, efficient steam-turbines to produce power for all customers."[44] By 1907, Insull had acquired and merged twenty utility companies in Chicago; the parent company was renamed Commonwealth Edison.[45]

Over the next 100 years, vertically-integrated utilities would control the entire energy delivery system and benefit from government regulation in exchange for franchises over certain service areas.[46] Economies of scale allowed the utilities to invest in large generators, construct large transmission lines, and deliver inexpensive energy over large distances to the masses.[47] The more readily available energy became to the customers, the more likely the customers were to purchase additional appliances that required additional power to run, thus contributing to the belief that bigger and more is better.[48]

Today's energy delivery industry is a billion-dollar business—the largest of any other industry in the United States.[49] Electric utilities are "roughly twice the size of telecommunications and almost thirty percent larger than the U.S.-based manufacturers of automobiles and trucks" and require "far more investment than the average manufacturing industry and even ten

41. *Id.* at 46 (quoting FORREST MCDONALD, INSULL (1962)).

42. "Natural monopoly conditions exist where a single firm can provide a good or service at a lower average cost than two or more firms." FRED BOSSELMAN ET AL., ENERGY, ECONOMICS AND THE ENVIRONMENT 6–7 (Robert C. Clark et al. eds., Found. Press 2000).

43. *See* MUNSON, *supra* note 6, at 46.

44. *Electrical Utilities*, *supra* note 10.

45. *Id.* In 1905, only approximately five percent of urbanites had electricity. By 1930, the number exceeded ninety percent. NYE, *supra* note 4, at 18.

46. MUNSON, *supra* note 6, at 157.

47. *See id.*

48. *Id.*

49. *Id.* at 3. As of 2005, "traditional generators and deliverers of power-electric utilities–[held] assets exceeding $600 billion and have annual sales above $260 billion." *Id.*

to 100 times more per unit of delivered energy than gas and oil systems."[50] The infrastructure itself is a massive interconnected network of power plants, substations, and transmission and distribution lines that delivers electricity to some 125 million households.[51] It "consists of more than 9200 electric generating units with more than 1000 GW of generating capacity connected to more than 300,000 miles of transmission lines."[52]

III. CHALLENGES TO THE CURRENT ENERGY DELIVERY SYSTEM

In recent decades, experts have articulated several concerns with the U.S. energy delivery system, calling into question its continued viability.[53] Those concerns have generally related to an aging,[54] inefficient,[55] and environmentally

50. *Id.* at 3–4.

51. *Energy Supply and Demand,* THE US POWER GRID, https://www.sites.google.com/site/theuspowergrid/energy-suppy-and-demand (last visited Sept. 2, 2013).

52. U.S. DEP'T OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 12 (2013) [hereinafter VULNERABILITIES TO CLIMATE CHANGE], *available at* http://www.energy.gov/sites/prod/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf.

53. Carley, *supra* note 20, at 1648 ("While centralized electricity and large-scale transmission and distribution networks still dominate the industry, this model of electricity generation has been challenged in recent decades.").

54. Much of the current transmission and distribution system is a relic of decades past. *See e.g.*, NYS 2100 COMM'N, THE ROCKEFELLER FOUND., RECOMMENDATIONS TO IMPROVE THE STRENGTH AND RESILIENCE OF THE EMPIRE STATE'S INFRASTRUCTURE 95 (2013), *available at* http://www.rockefellerfoundation.org/uploads/files/7c012997-176f-4e80-bf9c-b473ae9bbbf3.pdf ("59% of the state [of New York]'s generating capacity and 84% of transmission facilities were put into operation before 1980, and over 40% of the state's transmission lines will require replacement within the next 30 years, at an estimated cost of $25 billion."). The U.S. began constructing the grid over a century ago. Deborah Behles, *An Integrated Green Urban Electrical Grid,* 36 WM. & MARY ENVTL. L. & POL'Y REV. 671, 672 (2012). While it has become more and more interconnected through the decades, it is "[c]omparable to a highway system that has had very few improvements and changes since the 1950's and 1960's, [as it] stems throughout the United States." *The US Power Grid: Aging Infrastructure,* https://www.sites.google.com/site/theuspowergrid/powergrid2 (last visited Sept. 2, 2013).

55. Historically, economies of scale allowed "power producers to spread higher voltages across great distances" at less cost to the end user. Carley, *supra* note 20, at 1648. "By the 1920s and 1930s, centralized electricity operations became the predominant scale of electricity production; electricity became the biggest industry in the US economy . . . ." *Id.* Many argue, however, that the usefulness of this model leveled off in the 1950s and has been on the decline since at least 1967. *See* MUNSON, *supra* note 6, at 4. Since 1967, "[r]ather than lower the average cost of electricity, a new station henceforth would increase it. Economies of scale didn't apply any longer for the utility industry. Continued expansion would no longer benefit the consumer." *Id.* at 85. These inefficiencies could be resulting in a loss of two-thirds of the fuel used to generate electricity, and up to $100

unfriendly[56] infrastructure. While all of these factors have contributed to a vulnerable system, this article will submit that the increased utilization of distributed generation will ultimately result in a tipping point for change. This assertion is supported, in part, by two seemingly unrelated technical reports that were published last year.

A. *Innovative Technologies*

The first report, written by investment banking expert Peter Kind, was prepared for the Edison Electric Institute ("EEI")[57] and published in January 2013.[58] The report provides, in

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billion in costs annually. *Id.* at 4. "[P]ut another way, the typical utility consumes three lumps of coal to deliver one lump of electricity." *Id.* at 4 (citing Thomas R. Casten, *Presidential Campaign Energy Policy Thoughts* (July 11, 2004) (unpublished paper)). A related reason for the decline in effectiveness is the issue that the further a power plant is located away from its end user, the longer the transmission lines must span to reach the end user. The further the power must be sent, the more power is lost during transmission. "While a loss of energy will always occur during a transfer from 'point A' to 'point B,' some of these lines along the power grid suffer continuous and significant losses of energy." *Aging Infrastructure, supra* note 54.

56. America still relies heavily on fossil fuels, including coal and natural gas, to generate the majority of its electricity. Behles, *supra* note 54, at 672. These fossil fuels generation plants account for a significant amount of our greenhouse gas emissions. In addition, the current structure has been criticized for its inability to incorporate efficient and environmentally friendly renewable energy sources. *Id.* To incorporate significant amounts of renewable resources into the grid, utilities have turned to developing large-scale wind and solar farms located far from customers. *Id.* at 674–75 (citing AL WEINRUB, COMMUNITY POWER: DECENTRALIZED RENEWABLE ENERGY IN CALIFORNIA 4–6 (2011), *available at* http://www.oregonrenewables.com/Publications/Reports/Aweinrub_Community_Power_0211.pdf). Large amounts of land are required to develop wind farms and solar fields. *See* Sara C. Bronin, *Curbing Energy Sprawl with Microgrids*, 43 CONN. L. REV. 547 (2010) (discussing the energy industry's continued and increasing consumption of land, particularly rural land, to site generation facilities). It has resulted in "energy sprawl," damaging and using up large plots of land and causing environmental damage to plants and animals that previously inhabited the area. *Id.* at 549, 555. Transmission lines cost money to construct and again result in additional environmental harm. As one columnist put it, "[t]he dirty secret of clean energy is that while generating it is getting easier, moving it to market is not." Matthew L. Wald, *Wind Energy Bumps into Power Grid's Limits*, N.Y. TIMES, Aug. 26, 2008, http://www.nytimes.com/2008/08/27/business/27grid.html.

57. EEI is an association that represents all of the investor-owned electric utility companies in all fifty states, which provide electricity to some 220 million Americans. Its stated purpose is "to provide public policy leadership, education, and strategic business intelligence" with the goal of always trying to stay ahead of the market. *About EEI*, EDISON ELECTRIC INSTITUTE, http://www.eei.org/about/members/Pages/default.aspx.

58. PETER KIND, EDISON ELECTRIC INSTITUTE, DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS 3 (2013), *available at* http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf.

part, that the current model will likely not be sustainable due to changing customer behaviors and "disruptive innovations."[59] A disruptive innovation is defined in the report as a new advancement that improves or displaces an earlier technology by ultimately creating a "new market and value network."[60] For utilities, the most significant disruptive innovation is increased utilization and availability of distributed energy resources.[61]

Distributed generation is generally defined as a small power-generating facility located on-site or near its customer base,[62] producing anywhere from "1 kW and 5 MW of power."[63] Distributed generation projects are generally constructed close in proximity to the end user and "are either connected to the [grid] on the customer side of the meter or at the distribution network."[64] Their systems can be independently owned and operated by the consumer who can give or take power from the electric grid depending on need, or the systems can be owned and operated by the utility.[65] A variety of distributed energy generating technologies are available today, including "solar photovoltaics ("PV"), battery storage, fuel cells, geothermal energy systems, wind, micro turbines, and electric vehicle ("EV") enhanced storage."[66] As the cost of manufacturing and purchasing these technologies decreases, "they could directly threaten the centralized utility model."[67]

The report parallels the utility industry to the telephone industry, suggesting that it provides a good example of how new technologies can disrupt the status quo and replace the traditional service model. Some 35 years ago, the telephone industry was a fully regulated monopoly. Technological advancements "led to deregulation—initially in the long-distance sector and then

59. *Id.* at 6.

60. *Id.*

61. *Id.* at 17.

62. 42 U.S.C. § 16197(g)(3) (2006). According to the Energy Policy Act of 2005: "The term 'distributed generation' means an electric power generation facility that is designed to serve retail electric consumers at or near the facility site." *Id.*

63. Carley, *supra* note 20, at 1649. "Medium to large DG systems can produce over 5 MW and up to 300 MW of power, though there is some dispute over whether these larger systems can truly be classified as DG units." *Id.*

64. *Id.* at 1648–49.

65. *Id.* at 1649.

66. KIND, *supra* note 58, at 3.

67. *Id.*

followed by the local exchange market."[68] Mobile telephones "became commercially viable in the mid- to late-1980s,"[69] which resulted in fewer and fewer customers utilized landlines for their personal phones. In as little as thirty-five years, the telephone industry transformed into something that would not have been recognizable in the 1970s.[70]

No longer is the customer tied to copper wires and stationary telephones (or stationary computers and televisions for that matter). Today's customers have all the information and communication options they need on their cellular phone. No longer is "Ma Bell" the dominating monopoly. The industry is now filled with competition and innovation as well as a new infrastructure system.[71] Telephone companies embraced the new technology and now market themselves to the public as full-service (the bundle) entertainment, voice, and data providers. According to the EEI Report, "if telephone companies had not pursued new technologies and [transformed] their business model, they would not have been able to survive as viable businesses today."[72] Likewise, the report analogizes that utility companies will need to change their business model to survive the threat of innovative technologies, such as distributed generation, and an increasingly tech-savvy customer base that is willing and able to utilize those technologies.[73]

Energy demand is seemingly leveling off. This is due to more energy-efficient technologies and appliances, more customer awareness of spending (during low economic times), and a growing number of individual consumers and businesses

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68. *Id.* at 14. For a thorough discussion of the dramatic change to the telephone industry due to technological advances and a change in customer trends, see *id.* at 14–16.

69. *Id.* at 15. As an example, EEI states that Verizon Communications "lost approximately 45 percent of its wire line customers over the past five years." *Id.*

70. "If Alexander Graham Bell were to resurrect today and look at the telecommunications industry, he would not recognize it, [but] if Thomas Alva Edison were to resurrect today and look at the power industry, it's pretty much the same." Davide Savenije, *The Future of Demand Response: Sneak a Peek at What Lies Ahead*, UTILITY DIVE (Oct. 30, 2013), http://www.utilitydive.com/news/the-future-of-demand-response-sneak-a-peek-at-what-lies-ahead/188111 (quoting Ron Chebra, Managing Director at Utility Subject Matter Experts, Opening Address at Peak Load Management Alliance Conference (Oct. 29, 2013)).

71. *Id.*; KIND, *supra* note 58, at 14.

72. *Id.* at 15.

73. *Id.* at 3.

taking electricity generation into their own hands.[74] Furthermore, from a pure market perspective, the more tech-savvy customers become, the more likely they will utilize on-site generation, causing them to either go off the grid entirely or rely less upon it. The fewer remaining customers utilizing the grid, the higher the cost burden for those who remain. The higher the cost of electricity to the remaining customers, the more likely those customers will seek out on-site generation as well. It could result in a vicious cycle for a utility company that is not prepared for distributed generation.[75]

B. Climate Change

The second report was published in July 2013, by the U.S. Department of Energy ("USDOE").[76] The report outlines the vulnerabilities of the energy industry due to extreme weather and a changing climate.[77] It identifies climate and extreme weather trends in the United States and analyzes how those trends may impact the current energy generation and delivery system.[78] The USDOE identifies several trends, including an increase in ambient air temperatures, the decreasing availability of water, and increasing (and more severe) storms, flooding, and sea level rise.[79] The USDOE then identifies the different sectors that would be vulnerable to the different climate change trends around the country.[80] These sectors include oil and gas exploration and production, fuel transport, thermoelectric power generation,

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74. Yates, *supra* note 2.

75. Ken Silverstien, *Distributed Generation Grabs Power from Centralized Utilities,* FORBES (Aug. 18, 2013, 8:00 AM), http://www.forbes.com/sites/kensilverstein/2013/08/18/distributed-generation-grabs-power-from-centralized-utilities. "Any recovery paradigms that force cost of service to be spread over fewer units of sales . . . enhance the ongoing competitive threat of disruptive alternatives. . . . Customers are not precluded from leaving the system entirely if a more cost competitive alternative is available." *Id.*; *see also* KIND, *supra* note 58, at 3. Concerning—although not fully covered by this article—is the financial implication for customers who may become caught in the middle; they cannot afford to pay their monthly utility bill, and they cannot afford to buy and install their own energy generating technologies.

76. VULNERABILITIES TO CLIMATE CHANGE, *supra* note 52, at 2–3.

77. *Id.*

78. *Id.* at i.

79. *Id.* at 2–3.

80. *Id.* at i.

renewable energy resources, electric grid, and energy demand.[81] The report's "key messages" are as follows:

- The nation's ability to produce, deliver, and store energy is affected by climate change.
- Climate change impacts are expected to vary regionally, but vulnerabilities in one region may have broader implications due to the interconnected nature of energy systems.
- Vulnerabilities of interdependent sectors, such as oil and gas production and electricity generation sectors, may compound one another and lead to cascading impacts.
- Optimal public and private responses to climate change will depend on many factors, including the availability of climate-resilient energy technologies and the cost of various adaptation strategies.[82]

Two areas of focus for this article are vulnerabilities to thermoelectric power generation and vulnerabilities to the electric grid. The USDOE projects that the climate will negatively impact power generation in several ways.[83] First, the higher the ambient air temperatures, the less efficient the power plants are at generating electricity.[84] "Warmer air and heat waves can increase ambient cooling water temperatures, which affects generation efficiency regardless of fuel source."[85] The less efficient the power plant, the lower its generation capacity.[86] The USDOE notes: "While these studies project relatively small changes in percentage terms, when extended over the nation they could have significant impacts on net electricity supplies, if such losses in available capacity are not compensated by reduced demand or greater supplies elsewhere in the system when they are needed."[87] Second, rising water temperatures also pose a problem for power plants.[88] When water temperatures rise, power plants risk "exceeding

81. *Id.*
82. *Id.* at 1.
83. *Id.* at 7.
84. *Id.* at 10.
85. *Id.*
86. *Id.*
87. *Id.*
88. *Id.*

thermal discharge limits established to protect aquatic ecosystems," unless the plants decrease generation output.[89] What is more, the USDOE points out that a bigger problem could be "the cumulative effect of multiple plants discharging high-temperature waters into a receiving body with already elevated temperatures."[90] Third, with regard to power plant vulnerabilities, the USDOE discusses frequent and more severe storms, flooding, rising sea levels, and wildfires.[91] These storm events, particularly along the coast, could literally wreak havoc on the current energy delivery system, resulting in a loss of power to millions of customers.[92] The report lists several examples from the last several years, including Hurricane Jeanne that in September 2004 caused several power plants to shut down, "resulting in nearly 2.6 million customers losing electrical service in northeast, central, and southwest Florida."[93]

The USDOE also notes significant potential vulnerabilities to the electric grid.[94] First, transmission lines operate less efficiently (or even fail to operate) when ambient air temperatures are higher because more electricity is lost during the transmission process.[95] One example given in the Report is the June 2006 heat wave in California that caused more than 2000 distribution line transformers to fail, resulting in a loss of electricity for 1.3 million customers.[96] Second, transmission lines are susceptible to physical damage from more intense and frequent storm events, floods, or wildfires.[97] In essence, if the transmission line is destroyed or damaged, energy produced by centralized generation will not be able to reach the customers.[98] And, the frequency and severity of these outages are on the rise.[99] "Since 2000, there has been a

89. *Id.*

90. *Id.* at 11. In addition to increasing water temperatures, the Report points out that decreasing water supplies could negatively impact the production of fossil fuels (and the availability of nuclear energy sources), which would result in a scarcity of energy resources and a reduction in generation output. *Id.* at 10.

91. *Id.* at 11, 34.

92. *See id.* at 29.

93. *Id.* at 3.

94. *Id.* at 12–13.

95. *Id.* at 12.

96. *Id.* at 12–13.

97. *Id.* at 13.

98. *Id.* at 35.

99. *Id.*

steady increase in the number of storm-related grid disruptions in the United States."[100] Not only are these disruptions inconvenient and frustrating for the customer, they are also extremely expensive. "A Congressional Research Service report estimates that storm-related power outages cost the U.S. economy $20–$55 billion annually."[101]

After addressing the system's vulnerabilities, the USDOE Report proceeds to discuss some adaptation strategies and opportunities for change.[102] The USDOE recommends, among other things, development of "climate-resilient energy technologies" that can withstand these changes to U.S. weather patterns.[103] In particular, the USDOE encourages stakeholders to focus on "[d]evelopment and use of microgrids, controlled islanding, distributed generation, and technologies to maintain service and minimize system vulnerabilities in response to possible climate disruptions of the power grid."[104]

IV. THE FUTURE—DISTRIBUTED GENERATION

Distributed generation appears to be a "culprit" in disrupting the traditional energy delivery model as well as a potential "solution" to a new, more sustainable, model. It may be a culprit because distributed generation is predicted to be a disruptive technology that will ultimately change the utility business model for energy delivery. It may be a solution because of its potential to be compatible with a changing climate.

Distributed generation can be used to provide electricity in several different mediums including peaking plants (either customer or utility owned), standby power systems (generally customer-owned), combined heat and power systems (either customer or utility owned),[105] micro-generation units (generally customer-owned), remote power systems (either customer or

100. *Id.*

101. *Id.*

102. *Id.* at 36–45.

103. *Id.*

104. *Id.* at 43.

105. A co-generator produces, and captures, heat while generating electricity. It is significantly more efficient than traditional power plants that are approximately 33% efficient at producing electricity. Co-generators can be upwards of 80% efficient. MUNSON, *supra* note 6, at 141.

utility owned), and even conventional power plants (generally utility owned).[106] Distributed generation can function as a peaking plant whereby it only generates power during the time of day when demand for electricity is at its highest. It also can be used for backup or standby power during times of short-term power outages. Many hospitals, schools, and industrial plants have their own on-site power generators. Combined heat and power systems are another form of distributed generation. These systems not only generate electricity, but also capture the heat, which traditional power plants release as waste.[107] By capturing the heat, the energy can "be used for cooling, heating, or other power applications, and can increase fuel efficiencies by 80% or more."[108] Distributed generation can also be used, and is probably most often associated with, the concept of consumer micro-generation, or small-scale generating systems in the form of "fuel cells, solar photovoltaic, micro-wind, or micro-hydro."[109]

As will be discussed in the following sections, electricity generated by distributed technology can be less expensive, more efficient, have fewer negative environmental impacts and be less susceptible to a changing climate than traditional large-scale centrally generated electricity.[110] Distributed generation can be less expensive because few or no transmission lines need to be built to distribute the electricity, and as technology has improved manufacturing costs have decreased. It can be more efficient because the electricity does not need to be transmitted over a long distance. It can create less environmental harm because it takes up less land and the projects are smaller. Distributed generation can also be more beneficial than centrally located generation because it is, by its nature, less susceptible to climate change and natural disasters. Distributed generation utilizes micro-level transmission grids (or no grids at all if customers choose to go off the grid),

106. Carley, *supra* note 20, at 1649.

107. *Id.*

108. *Id.* Interestingly, "Edison's vision called for capturing the power plant's heat as well as its electricity. Rather than waste the thermal energy produced by burning coal, the innovator planned to pipe steam to warm the offices of Drexel Morgan." MUNSON, *supra* note 6, at 17.

109. Carley, *supra* note 20, at 1649.

110. *Id.* at 1655–57. This author acknowledges "not all DG systems use renewable energy, nor do they all emit fewer emissions per kWh of power than some conventional sources." *Id.* at 1657.

allowing the facilities to be spread out over an area instead of one central plant that, if destroyed, could result in millions out of power.

A. *Distributed Generation Can Be Less Expensive and More Efficient*

Not all megawatts are the same.[111] According to recent research, when efficiency is calculated into the formula, one megawatt generated on-site or near its customer base is capable of displacing 1.2 to 1.45 megawatts of electricity generated by a central power plant.[112] And, during times of peak transmission and distribution, it can displace as much as two to 2.25 megawatts.[113] The reason for this disparity is that distributed generation is approximately 80% efficient with only small losses of electricity during the distribution, "while the average central generation plant has a 33% delivered efficiency."[114] Studies show that eighty gigawatts of "well-placed" distributed generation "could reduce US electricity costs by $21 billion to $36 billion per year, free transmission lines to carry over 100 GW more renewable energy, and cut overall US greenhouse gas emissions by 4.4%."[115]

In addition, distributed generation can be less expensive because few or no new transmission lines are needed.[116] Distributed generation facilities are generally built on-site or near the customer base.[117] By some estimates, this can result in a savings of $1500 per kilowatt by simply not needing to site and construct transmission lines.[118] Distributed generation projects can also result in less start-up headaches and costs from a regulatory perspective. They basically eliminate the problem of determining where to site, and who will pay for, the construction of new

111. Tom Casten, *Not All Megawatts Are Created Equal*, RECYCLED-ENERGY.COM (July–Aug. 2012), http://www.recycled-energy.com/newsroom/publication/not-all-megawatts-are-created-equal.

112. *Id.*

113. *Id.*

114. *Id.*

115. *Id.*

116. MUNSON, *supra* note 6, at 136–37.

117. Carley, *supra* note 20, at 1648–49.

118. MUNSON, *supra* note 6, at 147.

transmission lines, which can cause a project to be delayed for years and increase costs.[119]

B. Distributed Generation Can Create Less Environmental Harm

Large-scale fossil fuel and renewable energy projects can require significant amounts of land for siting the facility as well as for running the transmission and distribution lines to the end user. This was recently discussed and acknowledged by the Seventh Circuit when a large Midwest regional transmission operator sought $1 billion to run a large transmission infrastructure project to incorporate large wind farms to be constructed in the Great Plains.[120] The regional transmission operator claimed that developing large-scale wind far away from a population center was beneficial because, in part, the "land is cheaper because population density is low (wind farms require significant amounts of land)."[121] This land disruption results in environmental damage and energy sprawl.[122] Distributed generation projects, on the other hand, are small and do not require large amounts of land for construction of power plants. Many sources can even be developed on existing infrastructure, which further decreases the chances of additional negative environmental impact.[123] Finally, they require few or no transmission lines to distribute the electricity to the end users. As a result, less land is disturbed and less environmental damage occurs.

C. Distributed Generation May be Less Susceptible to Climate Change

As discussed in Part III(B) above, the current energy delivery system is generally vulnerable to climate change, with potentially "broader implications" in regions with high

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119. Behles, *supra* note 54, at 679.

120. Ill. Commerce Comm'n v. FERC (*Ill. Commerce Comm'n II*), 721 F.3d 764 (7th Cir. 2013).

121. *Id.* at 771.

122. *See generally* Bronin, *supra* note 56 (discussing the energy industry's continued and increasing consumption of land, particularly rural land, to site generation facilities).

123. Gina S. Warren, *Hydropower: Time for A Small Makeover*, IND. INT'L & COMP. L. REV. (forthcoming).

interconnectivity.[124] Distributed generation is not reliant on an interconnected grid, and instead utilizes micro-level transmission grids (if any at all).[125] "Utilizing distributed generation resources, or on-site power generation, reduces dependence on the electric distribution system that is susceptible to damage during a natural disaster."[126] Superstorm Sandy exposed the vulnerabilities of an integrated central generation plant system, causing widespread blackouts that affected some eight million homes.[127] Areas less affected by the blackouts were those utilizing some form of distributed generation.[128] One caveat before we proceed: while there is evidence that climate change played a role in Hurricane Sandy, this author is not arguing that Superstorm Sandy would not have occurred but for climate disruptions. This section is simply intended to illustrate the significant impacts of a large storm event to the current energy delivery system.[129]

In the early morning hours of Monday, October 29, Superstorm Sandy—with hurricane-force winds—crashed onto the New Jersey shore just south of Atlantic City.[130] The storm hovered over the east coast for thirteen days, devastating everything in its path.

> [It] killed more than 100 people, destroyed whole communities in coastal New York and New Jersey, left tens of thousands homeless, crippled mass

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124. *Id.* at 1.

125. *Id.* at 10.

126. NYS 2100 COMM'N, *supra* note 54, at 95.

127. *Hurricane Sandy: Covering the Storm*, NEW YORK TIMES (Nov. 6, 2012), http://www.nytimes.com/interactive/2012/10/28/nyregion/hurricane-sandy.html?action=click&module=Search&region=searchResults%230&version=&url=http%3A%2F%2Fquery.nytimes.com%2Fsearch%2Fsitesearch%2F%3Faction%3Dclick%26region%3DMasthead%26pgtype%3DHomepage%26module%3DsearchSubmit%26contentCollection%3DHomepage%26t%3Dqry378%23%2Fhurricane-sandy.

128. ICF INTERNATIONAL, COMBINED HEAT AND POWER: ENABLING RESILIENT ENERGY INFRASTRUCTURE FOR CRITICAL FACILITIES 2–4 (Mar. 2013), *available at* http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_critical_facilities.pdf.

129. Hurricane Sandy was a complex storm event due to multiple factors that have not been fully explained. Scientists do know, however, that the storm event would likely have been less severe absent sea level rise. *See* AM. METEOROLOGICAL SOC'Y, EXPLAINING EXTREME EVENTS OF 2012 FROM A CLIMATE PERSPECTIVE (2013), *available at* http://www.ametsoc.org/2012extremeeventsclimate.pdf.

130. *Hurricane Sandy: After Landfall*, IN FOCUS WITH ALAN TAYLOR, THE ATLANTIC (Oct. 30, 2012), http://www.theatlantic.com/infocus.

> transit, triggered paralyzing gas shortages, inflicted billions of dollars in infrastructure damage, and cut power to more than 8 million homes, some of which remained dark for weeks.[131]

The main transmission grid was knocked down and only a few pockets of light and power remained in the areas destroyed by the storm. Those pockets of light were generated by customer on-site, distributed generation. In a recent report published in March 2013, ICF International analyzed some of the distributed generation facilities that were able to keep the lights on while the rest of the coast was dark.[132]

A sampling of the facilities included New York University, South Oaks Hospital, and Nassau Energy Corporation.[133] New York University's campus stayed powered and heated throughout the ordeal thanks to a "14.4 MW combined cycle CHP system, which was installed in 2010."[134] While the University's system is normally connected to the grid, "it went into island mode when the local grid went down, isolating itself from Con Edison's network."[135] New York City officials were able to use the campus as a command post and evacuation safe haven for those who were forced to leave their homes.[136] South Oaks Hospital "operates five 250 kW natural gas-fired reciprocating engines for a maximum capacity of 1.25 MW."[137] When the Long Island Power Authority

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131. Andy Newman, *Hurricane Sandy: Covering the Storm*, N.Y. TIMES (Nov. 28, 2012), h ttp://www.nytimes.com/pages/nyregion/index.html.

132. ICF INT'L, COMBINED HEAT AND POWER: ENABLING RESILIENT ENERGY INFRASTRUCTURE FOR CRITICAL FACILITIES (2013), *available at* http://www.eere.energy.gov /manufacturing/distributedenergy/pdfs/chp_critical_facilities.pdf.

133. *Id.* at 13–30.

134. *Id.* at 29 ("The system runs off of natural gas, with the option of using ultra low-sulfur diesel for limited periods, and replaced an existing engine-driven CHP facility that began operation in 1980. The CHP system includes two combustion turbines, two heat recovery steam generators, and a steam turbine and generates up to 90,000 pounds of steam per hour. The electricity generated supplies 22 campus buildings. The steam is used to produce hot water for 37 campus buildings and meets 100% of their space heating, space cooling, and hot water needs. When campus electrical demand is low, the excess electricity is sold to Con Edison. The CHP has a total operating efficiency of almost 75%.").

135. *Id.*

136. *Id.*

137. *Id.* at 13 ("They are now looking into installing a sixth 250 kW generator to ensure that they can operate isolated from the grid, and cover their maximum peak kW

grid went down, South Oaks was able to isolate itself from the grid and continue treating the critically injured for fifteen days.[138] The Nassau Energy Corporation operates a fifty-seven MW combined cycle natural gas-fired system.[139] During the storm, Nassau Energy Corporation supplied power to the grid, provided thermal energy "to the Nassau University Medical Center, Nassau Community College, and all other end-use customers. The CHP system ran through the entire storm and had no operational issues of any kind."[140]

After Superstorm Sandy, New York's Commission announced that to make it more resilient to natural disasters, "[t]he grid for the 21st century should seamlessly incorporate distributed generation, microgrids, and plug-in electric vehicles."[141] Hurricanes, tornados, superstorms, fires, and earthquakes have all increased in intensity and frequency over the last several years.[142] Utilities and regulatory agencies will need to look toward the future and work to develop a more sustainable energy delivery system in the face of these climate changes. The

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summer demand for an extended period of time. In addition to power, the CHP system provides the hospital with steam, cooling and hot water.").

138. *Id.* ("LIPA was able to restore power to the sub-station that services the facility about five days after the storm. However, the grid was still not stable at that time and LIPA requested that South Oaks remain disconnected from the grid due to continued loss of power and phases in the area.").

139. *Id.* at 25. According to ICF International:

> [t]he CHP system produces 42 MW from a combustion turbine and 15 MW from a steam turbine. The district energy (DE) CHP system produces 90,000 lbs/hr of steam and 8,000 tons/hr of chilled water and is run by 27 staff members of Nassau Energy Corporation. The CHP system sells its power to the Long Island Power Authority (LIPA). The main customer for steam and chilled water from the CHP system is the Nassau University Medical Center (NUMC), a 530-bed trauma hospital. Additionally, the CHP system provides steam and chilled water services to most of Nassau Community College's campus. The Community College also serves as an American Red Cross evacuation center for Nassau County. Additionally, the CHP system provides hot and chilled water to the Nassau Veterans Memorial Coliseum, the Long Island Marriott Hotel, and a museum complex including an Aviation museum, a Firefighter's museum, and a Children's museum.

Id.

140. *Id.*

141. NYS 2100 COMM'N, *supra* note 54, at 15.

142. *See Storm Intensity*, CTR. FOR OCEAN SOLUTIONS, http://www.centerforoceansolutions.org/climate/impacts/cumulative-impacts/storm-intensity (last visited Sept. 6, 2013).

focus should, at least in part, be on the sustainable inclusion of distributed generation.

V. OPPORTUNITIES FOR REGULATORS AT THE FOREFRONT OF CHANGE

Experts predict that distributed energy will constitute up to twenty percent of the U.S. power supply by 2020.[143] If true, state and federal agencies will need to give forethought to the physical and regulatory structures that will work best. Sound policy should not simply encourage increased renewable integration through use of an existing utility model. It should also ensure that the incorporation of those renewables is sustainable. The realities of a changing climate and the introduction of innovative technologies should play a significant role in determining what regulations will best promote sustainable energy delivery. This evaluation should be two-fold. First, regulators should continue to contemplate standards and policies that will encourage incorporation of small or distributed generation as well as smart grid technologies. Second, regulators should reevaluate existing standards and policies that have resulted in unintended negative consequences for sustainable energy delivery.

A. Continue to Develop Regulations to Incorporate Distributed Generation

Policymakers should continue the work begun several decades ago to incorporate small renewable power. In 1978, Congress passed the Public Utility Regulatory Policies Act ("PURPA").[144] At the time, Congress was confronted with predictions that the price of oil would rise to $100 a barrel and was tasked with finding a way to reduce the United States' reliance on foreign oil.[145] Congress looked to diversification and the use of alternative energy sources as a means to reduce this reliance.[146] PURPA encourages (1) energy conservation; (2) "optimization of

143. RESNICK INST. REPORT, GRID 2020: TOWARDS A POLICY OF RENEWABLE AND DISTRIBUTED ENERGY RESOURCES (Sept. 2012) [hereinafter RESNICK, GRID 2020], *available at* http://www.gridwiseac.org/pdfs/grid_2020_resnick_report.pdf.

144. *See* Public Utility Regulatory Policies Act of 1978, 16 U.S.C. §§ 2601–2645.

145. *Cf. id.* § 2611.

146. *Cf. id.*

the efficiency of use of facilities and resources by electric utilities;" and (3) equitable customer electricity rates.[147] It incentivizes power generation by certain qualifying facilities—small independent power producers, cogenerators, and renewable energy suppliers—by requiring utility companies to purchase the power at full "avoided cost."[148]

Avoided costs are generally the cost a utility would otherwise pay to construct a new plant to generate the electricity itself or to buy it from some other source.[149] It is defined as "the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from the qualifying facility or qualifying facilities, such utility would generate itself or purchase from another source."[150] Qualifying facilities—many, small renewable energy producers—that were effectively shut out of the industry prior to PURPA were able to sell power at a competitive price.[151] Some claim "PURPA has been the most effective single measure in promoting renewable energy," credited with "bringing on line over 12,000 megawatts of non-hydro renewable generation capacity."[152]

Over the last few decades, however, many have expressed concerns that the usefulness of the Act for promotion of small renewable development had seemingly come to a close.[153] The majority of the long-term contracts executed between utilities and qualifying facilities in the 1980s have expired.[154] Some states—who administer PURPA—instead enacted laws to deregulate the entire industry and no longer require utilities to purchase power from the independently owned facilities.[155] Furthermore, "[t]echnically, PURPA only calls for renewable energy if it is cost competitive with

147. *Id.*

148. *Id.*

149. Armco Advanced Materials Corp. v. Pa. Pub. Util. Comm'n, 664 A.2d 630, 634 (Pa. Cmmw. Ct. 1995).

150. 18 C.F.R. § 292.101(b)(6) (2013).

151. *See Public Utility Regulatory Policies Act (PURPA)*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/smart-energy-solutions/strengthen-policy/public-utility-regulatory.html (last visited Feb. 15, 2014).

152. *See id.* ("[A]s the guaranteed prices of PURPA contracts signed in the 1980s expire, many renewable power generators are going out of business.").

153. *Id.*

154. *Id.*

155. *Id.*

conventional polluting resources."[156] With the low price and high volume of natural gas available, the "avoided cost" of constructing a new plant using traditional fossil fuel is relatively low, and small power producers are having a hard time competing.[157]

While PURPA ensured small qualifying generators would have a market for their energy, it did not guarantee a connection to the grid. The void of interconnection procedures resulted, and continues to result, in a significant barrier to deployment of distributed generation from these small generators.[158] In an attempt to address these issues, Congress passed the Energy Policy Act of 2005, which mandated that state commissions as well as unregulated utilities *contemplate* interconnection standards on or before August 8, 2007.[159] The Institute of Electrical and Electronics Engineers ("IEEE") first established standards in 2003 and in the Energy Policy Act of 2005, Congress established IEEE as

156. *Id.*

157. *Id.* A recent FERC opinion, however, may bring new life to the Act by allowing an alternative means of calculating avoided costs and "provid[ing] a road map for how a state can implement a feed-in tariff program consistent with PURPA." Behles, *supra* note 54, at 708. FERC held that an avoided cost rate may take into account a utility's requirement to "'scrub' pollutants from coal plant emissions," or a utility's obligation to "purchase their energy needs from, for example, renewable resources." Cal. Pub. Util. Comm'n, 134 F.E.R.C. ¶ 61,044, para. 30 (Jan. 20, 2011) (Order denying rehearing). Finally, FERC stated that the calculation may "look at the actual sources of capacity and/or energy available to the electric utility, rather than at some theoretical source, which is not permitted by state law, that may be cheaper." *Id.*

158. Carley, *supra* note 20, at 1656. On the other hand, some utilities took it as an opportunity to charge large fees for self-generation of energy. Faced with soaring utility bills, in 1985 MIT began looking at ways to generate its own electricity. It decided to install a twenty megawatt, natural gas fired, combined heat and power system, which could meet approximately ninety-four percent of MIT's electricity needs. The new unit was expected to reduce MIT's energy bills by $5.4 million. MIT also agreed to continue to pay its utility company $1 million annually for supplemental power. The utility company, however, was not happy and demanded a "customer transition charge" of $3,500 per day, or $1.3 million per year, to cover its loss due to MIT's new cogeneration plant. The Massachusetts public utility commission agreed with the utility company and allowed the utility to charge the fee. MIT took the matter to the courts and the Massachusetts Supreme Judicial Court ultimately found in favor of MIT, holding that no customers "contemplating self-generation should have to pay similar costs." MUNSON, *supra* note 6, at 153–54.

159. *Distributed Generation Interconnection Standards*, INST. FOR LOC. SELF RELIANCE, htt p://www.ilsr.org/rule/2548-2 (last visited Feb. 15, 2014). Many states, however, continue to prevent any entity or individual, other than a utility company, from generating or distributing power. *See* Hannah Wiseman & Sara Bronin, *Community-Scale Renewable Energy*, 4 SAN DIEGO J. CLIMATE & ENERGY L. 165, 190 (2013).

the preeminent authority for establishing and amending national interconnection standards.[160]

In response, many states contemplated interconnection standards, and many enacted regulations that allow interconnections, net metering,[161] and feed-in tariffs. Interconnection rules set forth substantive and procedural requirements for connection to the grid.[162] They outline "the technical requirements, timeframe, fees and process for connecting renewable energy systems to the utility grid."[163] These standards are crucial for the incorporation of distributed generation. If the fees are too high or the procedure is too arduous, customers will tend to shy away from the process.[164]

Net metering policies are another way states have worked to incorporate distributed resources into the grid.[165] While a handful of states have yet to fully embrace net metering, the trend is toward its promotion with greater than forty states enacting net metering standards.[166] Net metering technology allows customers and utilities to keep track of the amount of electricity that flows to and from a customer. Customers can generate electricity for their own use, and any unused electricity can be placed into the grid for use by other customers, especially during peak times. Stated another way, "a customer may generate electricity on his premises for his own use, but may sell any excess electricity to the utility."[167]

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160. *See* 16 U.S.C. § 2621(15). This Act provides in part, "[i]nterconnection services shall be offered based upon the standards developed by the Institute of Electrical and Electronics Engineers: IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems, as they may be amended from time to time." *Id.*

161. *See* Carley, *supra* note 20, at 1657.

162. *Interconnection Standards*, DSIRESOLAR, http://www.dsireusa.org/solar/solarpolicyguide/?id=18 (last visited Feb. 14, 2014).

163. INTERSTATE RENEWABLE ENERGY COUNS., INTERCONNECTION PROCEDURES ADVANCE OR IMPEDE CLEAN ENERGY GROWTH, INTERCONNECTION, http://www.irecusa.org/regulatory-reform/interconnection (last visited Feb. 14, 2014).

164. *See id.* ("As a result, restrictive, costly procedures can significantly impede a state's renewable energy growth by discouraging otherwise feasible projects.").

165. Carley, *supra* note 20, at 1657. In fact, an empirical study that looked at general motivating factors for adoption of distributed generation found that "net metering protocols are one of the only factors that has a positive and statistically significant marginal effect on overall DG adoption." *Id.*

166. Hanna Conger, *Opening the Loop: A Proposal to Allow the Installation of Distributed Renewable Generation Technology in Downtown Chicago* 14 (Loyola U. Chicago L. J. Working Paper, 2012), *available at* http://www.papers.ssrn.com/sol3/papers.cfm?abstract_id=2222837.

167. *Id.*

Finally, feed-in tariffs place a nominal value on incorporation of distributed resources. For instance, "[n]et-metering requirements are often accompanied by 'feed-in tariffs,' which require the utility to accept customer-generated electricity at a predetermined price for a long period of time, typically 15 to 20 years."[168] This allows customers to offset their energy usage by their energy production for a set amount, and sometimes even make a profit.[169]

While state regulators were working on standards for the incorporation of small generation, FERC was implementing orders to give all generators access to transmission of that energy. In 1996, FERC adopted Order 888, its major rule regarding electric power transmission.[170] Order 888 essentially turned all transmission line owners into common carriers and allowed open access of the transmission grid to all. Utility companies that owned transmission lines were to "functionally unbundle" their services and file tariffs with FERC with fair and reasonable rates that would be charged to all customers, including itself, for use of the transmission line.[171] Utilities were allowed to recover their "legitimate, prudent and verifiable stranded costs associated with requiring open access tariffs."[172] The purpose of Order 888 is "to remove impediments to competition in the wholesale bulk power marketplace and to bring more efficient, lower cost power to the Nation's electricity customers."[173] In promulgating the Order, FERC estimated the saving to consumers of approximately $3.8 to $5.4 billion per year.[174] In addition, FERC stated that opening transmission up to access for all results in "non-quantifiable benefits that include better use of existing assets and institutions, new market mechanisms, technical innovation, and less rate distortion."[175]

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168. *Id.*

169. *Id. See also* Deborah Behles, *An Integrated Green Urban Electrical Grid*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 671, 707 (2012) ("Feed-in tariffs can help assure small energy generators dependable compensation for electricity generated, and allow small generators to compete with larger generators.").

170. 75 F.E.R.C. 61080 (1996).

171. *Id.* at 4.

172. *Id.* at 5.

173. *Id.* at 1.

174. *Id.* at 3.

175. *Id.*

While all of these are first steps in the right direction, policymakers should continue to make strides to provide open access to the energy delivery system—for the small independent power producers or for individual customers who desire to generate their own energy. Energy distribution systems should be updated with smart grid technology so as to accommodate distributed generation and the flow of electricity both to and from the grid. In a recent interview, Jon Wellinghof, former Chairman of FERC, worried that the United States will "have problems with grid reliability and overall grid costs" if we fail to focus on incorporating distributed generation into the energy mix.[176]

Other countries, including Spain and Germany, have recently integrated large amounts of distributed generation into their energy delivery system. A December 2011 report prepared for the California Energy Commission, outlines some of the lessons learned by those countries.[177] California commissioned the report because it has a goal to incorporate 12,000 MW of "localized distributed electricity generation" by 2020.[178] The report sets forth technical recommendations for various changes and upgrades to California's energy delivery system for accomplishing its goal.[179] For example, California may need to "replac[e] substation relaying to accommodate back-feed, reconfigure[] voltage control apparatus and controls on distribution feeders, and deploy[] appropriate smart-grid technologies on distribution and transmission grids."[180] Other regulatory agencies should follow California's lead and commission studies to determine how best to develop an energy

176. Herman K. Trabish, *FERC Chair Jon Wellinghoff: Solar 'Is Going to Overtake Everything,'* GREEN TECH MEDIA (Aug. 21, 2013), http://www.greentechmedia.com/articles/read/ferc-chair-wellinghoff-sees-a-solar-future-and-a-utility-of-the-future.

177. *See* KEMA INC., EUROPEAN RENEWABLE DISTRIBUTED GENERATION INFRASTRUCTURE STUDY—LESSONS LEARNED FROM ELECTRICITY MARKETS IN GERMANY AND SPAIN 74–76 (Dec. 2011), *available at* http://www.energy.ca.gov/2011publications/CEC-400-2011-011/CEC-400-2011-011.pdf (summarizing the "key lessons learned from Germany and Spain"). Of note, "Germany has gone further to promote distributed generation than any other industrialized nation, and its experience provides a cautionary tale." *See* David B. Raskin, *The Regulatory Challenge of Distributed Generation*, HARV. BUSI. L. REV. ONLINE, 38, *available at* http://www.hblr.org/2013/12/the-regulatory-challenge-of-distributed-generation. Residential rates have skyrocketed, and the country is working to stabilize the industry. *Id.*

178. *Id.* at ii.

179. *Id.* at iii.

180. *Id.*

delivery system that is climate-resilient, utilizes smart-grid technologies, and can easily incorporate renewable distributed generation resources.

B. Reevaluate Existing Policies and Standards That Have Had Unintended Negative Consequences on a Sustainable Energy Delivery System

As noted by the USDOE: "Actions to build resilience do not need to wait for a complete understanding of climate change and extreme weather impacts, as there will always be uncertainty."[181] That uncertainty, however, should caution stakeholders and policymakers to fully consider whether short-term gains will result in a sustainable energy delivery system.[182] Certain laws and policies have been enacted over the last several years in a seemingly noble attempt to incorporate renewables and to facilitate a reliable electricity grid. Unfortunately, those same laws and policies have resulted in unintended negative consequences that should be undone, or at the very least mitigated. If the United States is to proceed with a "no regrets" approach to development, regulatory agencies should take painstaking efforts to ensure billions of dollars are not spent on building and rebuilding systems that will not be sustainable. Absent guidance to the contrary, utilities will continue to seek approval of billion-dollar infrastructure projects to "harden" their existing central-distribution systems or to build new ones to incorporate large-scale power supplies. Historically, there has been little regulatory or financial incentive to do otherwise.

For example, during Hurricane Sandy, Consolidated Edison Company of New York, Inc.'s electric system was severely damaged.[183] Service was interrupted for approximately 1.4 million customers for several days, and Con Edison, one of the biggest electricity providers in the Northeast, incurred millions in costs as a result of the storm.[184] In January 2013, Con Edison filed a rate

181. VULNERABILITIES TO CLIMATE CHANGE, *supra* note 52.

182. *Id.*

183. Letter from Craig S. Ivey, President, Consol. Edison Co. of N.Y., Inc., to Jeffrey C. Cohen, Acting Sec'y, N.Y. State Pub. Serv. Comm'n (Jan. 25, 2013), *available at* http://www.coned.com/documents/2013-rate-filings/filing-letter-and-attachments.pdf.

184. William Pentland, *Superstorm Sandy was Super Expensive for Con Edison*, FORBES (May 9, 2013, 10:27 PM), http://www.forbes.com/sites/williampentland/2013/05/09/superstorm-sandy-was-super-expensive-for-con-edison.

case with the New York Public Service Commission seeking an increase in customer rates so that it could begin a billion dollar project to harden its transmission system that was partially destroyed by Superstorm Sandy.[185] In its electric rate filing, Craig S. Ivey, President of Con Edison stated that Con Edison specifically requested:

> $1 billion in potential storm hardening structural improvements over the next four years that are intended to reduce the size and scope of service outages from major storms, as well as to improve responsiveness and expedite the recovery process to better serve our customers. The $1 billion includes a Con Edison commitment to spend $250 million on storm protection measures over the next two years.[186]

In written response testimony filed by Jackson Morris, the Senior Policy Advisor for Pace University, Mr. Morris pointed out that Con Edison's plan only included traditional grid hardening and rebuilding and did not look to incorporate distributed generation or combined heat and power units, which were seemingly some of the only facilities to keep the lights on during Superstorm Sandy. Mr. Morris testified, in part:

> Instead of an innovative, forward-looking approach that reflects the latest thinking about available technology and measures to improve the long-term resiliency and function of the utility system, the main exclusive focus in this case, as presented by Con Ed, seems to be on the measures necessary to meet the challenges of the next major storm based on what we learned from the last one.[187]

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185. *See* CONSOL. EDISON CO. OF N.Y, SCHEDULE FOR ELECTRICITY SERVICE 362–66 (Feb. 16, 2012), *available at* https://www2.dps.ny.gov/ETS/jobs/display/download/5427076.pdf.

186. Ivey, *supra* note 183.

187. Prefiled Direct Testimony of Jackson Morris on Behalf of Pace Energy and Climate Center, May 31, 2013, at 6 (citing Case 13-E-0030, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison

Indeed, Con Edison's plan seemed little more than a knee-jerk reaction to the storm and the need to build a better fortress. It is an antiquated way of thinking that does not look to the future of technology and a changing environment. Mr. Morris stated, "[w]e should take advantage of this billion-dollar investment to create a utility of the future."[188] This is not to say that certain parts of the electric distribution system should not be upgraded or repaired, but

> a growing number of engineers argue that the power cascade should provoke a dramatically new approach to delivering electricity. They draw a comparison to computers and their evolution from centralized mainframes of the 1960s to today's decentralized web of networked laptops. These engineers foresee a radical new power network—one that's adaptive, self-healing, and compatible with distributed, on-site energy sources.[189]

After a year of negotiations, and the intervention by the Columbia Law School Center for Climate Change Law, Natural Resources Defense Council, Environmental Defense Fund, and the Pace Energy and Climate Center, the New York Public Service Commission approved a settlement of the rate case on February

Company of New York, Inc. for Electric Service, *Electric Infrastructure and Operations Panel Testimony*, filed Jan. 1, 2013, at 22).

188. *Id.* at 6.

189. MUNSON, *supra* note 6, at 147–48.

> We'll also work to modernize our energy infrastructure by incentivizing large buildings and hospitals to invest in co-generation systems—which allow them to generate their own heat and power. That has worked to a great extent. We will work with Governor Cuomo to explore how we can accelerate investments in distributed energy, micro-grids, energy storage, and smart grid technologies.

Press Release, Mayor Michael Bloomberg, Mayor Bloomberg Delivers Address on Shaping New York City's Future After Hurricane Sandy 8 (Dec. 6, 2012), *available at* http://www.nyc.gov/portal/site/nycgov/menuitem.c0935b9a57bb4ef3daf2f1c701c789a0/index.jsp?pageID=mayor_press_release&catID=1194&doc_name=http://www.nyc.gov/html/om/html/2012b/pr45912.html&cc=unused1978&rc=1194&ndi=1.

20, 2014.[190] The settlement granted Con Edison the one billion dollars it requested for storm hardening and resiliency plans, but required a collaborative of rate case parties to assess how the funds should be utilized.[191] The collaborative consists of four working groups addressing 1) storm hardening design standards; 2) alternative resiliency strategies; 3) natural gas resiliency strategies; and 4) risk assessment/cost benefit analysis.[192] As part of the settlement, Con Edison also committed to conducting a "Climate Change Vulnerability Study" in 2014.[193] The study will look at "how weather and climate are changing and what potential risk[s] and impact[s] are to [Con Edison's] infrastructure."[194]

This rate case illustrates the difference in allowing the status quo verses promoting innovating thinking to build a smarter energy delivery system. State regulatory agencies can and should be proactive in ensuring that utilities are investing wisely. Going forward, U.S. policies and laws will need to be flexible and promote low-cost actions so as to allow adaptation as we develop a greater understanding of the effects of climate change and changing weather patterns.[195] "This 'no regrets' approach can ensure appropriate action in the face of uncertainty."[196]

Likewise, regulatory agencies should revisit policies that have resulted in "unintended negative consequences."[197] Two policies in particular necessitate review: state renewable portfolio standards and FERC policies to promote Multi Value Projects. Both fall into the category of "do no harm" violators with potentially billion dollar consequences.

190. Order Approving Electric, Gas and Steam Rate Plans in Accord with Joint Proposal, Feb. 21, 2014, *available at* http://www.documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={1714A09D-088F-4343-BF91-8DEA3685A614}.

191. *Id.* at 2–4.

192. *Id.* at Joint Proposal 50, n.35.

193. *Id.* at 67.

194. CONSOLIDATED EDISON, STORM HARDENING AND RESILIENCY COLLABORATIVE REPORT 33 (Dec. 4, 2013), *available at* http://www.documents.ny.gov/public/Common/ViewDoc.aspx?DocRefId={E6D76530-61DB-4A71-AFE2-17737A49D124}. These factors could include "temperature, humidity, duration and frequency of heat waves, wind, ice, and snow." *Id.*

195. VULNERABILITIES TO CLIMATE CHANGE, *supra* note 52, at 46.

196. *Id.*

197. *Id.*

i. States Should Revise Their Renewable Portfolio Standards that Have Indavertently Encouraged Unsustainable Energy Development

Renewable portfolio standards ("RPS") have had an inadvertent negative impact of focusing utilities on development of large-scale wind farms and solar plants instead of distributed generation. Utilities with mandatory renewable energy requirements "prioritize their investments in renewables over their investment in DG [distributed generation]. After all, it would take a large number of renewable DG units to produce an equivalent amount of power to that which a wind farm can produce."[198]

RPS essentially require utilities to provide a certain amount of energy from renewable sources by a certain date.[199] The mandates generally increase exponentially over the years with the highest at forty percent by 2030.[200] As a result, utility companies have looked to large-scale renewable energy sources, such as wind and solar farms (with wind taking a significant advantage) to meet their renewable requirements.[201] Further, instead of utilizing a new, more sustainable, model for renewable generation, utilities have continued to use the existing central generation model and simply substituted wind or solar farms for fossil fuel generators. A recent case illustrates this point.

In response to state mandates to incorporate more renewables, MISO, a regional transmission organization, is proposing to begin a billion dollar expansion of its transmission

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198. Carley, *supra* note 20, at 1657; *see also* Behles, *supra* note 54, at 679 ("A study by the National Renewable Energy Lab concluded that 'two external factors [that] have the most impact on what an RPS [Renewable Portfolio Standard] can accomplish on a large scale . . . [are] available resources (e.g., wind, solar radiation, geothermal potential, or biomass stocks) . . . and available transmission capacity.' Other studies have similarly found that renewable development results depend on transmission policy.").

199. *See generally Congressional Testimony of Judi Greenwald on the Clean Energy Standard Act of 2012*, CTR. FOR CLIMATE & ENERGY SOLUTIONS (May 17, 2012), http://www.c2es.org /newsroom/congressional-testimony/clean-energy-standad-act-2012-hearing.

200. *See, e.g.*, D.C. CODE § 34-1432(c)(10) (2001) (mandating 20% of utility sales from renewable sources by 2020); HAW. REV. STAT. § 269-92(a)(1) to (4) (2012) (increasing the renewable energy source requirement from 10% in 2010, to 15% by 2015, 25% by 2020, and 40% by 2030).

201. *See generally* RESNICK, GRID 2020, *supra* note 143 (describing the various ways to increase renewable energy source use).

system to incorporate large-scale wind farms and "replace" local wind.[202] Regional transmission organizations ("RTO") are "voluntary associations of utilities that own electrical transmission lines interconnected to form a regional grid and that agree to delegate operational control of the grid to the association."[203] The RTO must file a tariff with FERC for a just and reasonable (and nondiscriminatory) price for wholesale transmission of electricity on the grid and must allow open access to everyone desiring to transmit on the grid.[204] In addition, the "RTO is responsible for planning and directing expansions and upgrades of its grid."[205] To pay for these activities, the RTO is allowed to add a fee to its tariff, so long as it is just and reasonably calculated to be "proportionate to the anticipated benefits to a utility of being able to use the grid."[206]

In 2002, MISO began operation of portions of the transmission grid in the Midwest and Great Plains areas of the country. In 2010, MISO requested FERC approve a series of multi value projects ("MVPs") intended to transmit a large amount of electricity generated by large remote wind farms, mostly located in the Great Plains.[207] MVPs are projects that "have an expected cost of at least $20 million, must consist of high-voltage transmission lines (at least 100kV), and must help MISO members meet state renewable energy requirements, fix reliability problems, or provide economic benefits in multiple pricing zones."[208] MISO's seventeen MVP projects are projected to cost approximately $5.2 billion.[209] MISO justified the viability of its projects by claiming

202. *Ill. Commerce Comm'n II*, 721 F.3d 764, 774–75 (7th Cir. 2013).

203. *Id.* at 769.

204. *Id.* at 770–71; *see also* 16 U.S.C. § 824d(a) (2012) ("All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.").

205. *Ill. Commerce Comm'n II*, 721 F.3d at 770.

206. *Id.* (citing Ill. Commerce Comm'n v. FERC, 576 F.3d 470, 476 (7th Cir. 2009)).

207. *Id.* at 770–71; *see also id.* at 771 ("Most are in the Great Plains, because electricity produced by wind farms there is cheaper despite the longer transmission distance; the wind flow is stronger and steadier and the land is cheaper because population density is low (wind farms require significant amounts of land).").

208. *Id.* at 774.

209. Letter from Susan M. Stewart, Managing Senior Attorney, MidAmerican Energy Co. to Honorable Kimberly D. Bose, Sec'y of Fed. Energy Regulatory Comm'n n.4 (Oct.

that they would help member utilities meet their state renewable energy requirements, that the costs associated with the construction of the transmission line would be offset by an ultimate decrease in electricity rates, that the new lines would increase reliability and decrease occurrences of brownouts and outages, and that it would increase efficiency.[210] The projects would help the utilities to meet their renewable energy requirements by supplying renewable energy from large wind farms.[211] The cost, MISO claims, will be offset by a savings of between "$297 million to $423 million annually because western wind power is cheaper than power from existing sources."[212] And, reliability and efficiency will increase by way of constructing additional lines and adding additional energy sources.[213]

FERC approved MISO's pilot projects, as well as its proposed fee on associated utilities, with the MVP costs allocated "among all utilities drawing power from the grid according to the amount of electrical energy used, thus placing most of those costs on urban centers, where demand for energy is greatest."[214] The Seventh Circuit agreed with FERC's approval.[215]

In its opinion, the court notes that MISO is relying on the premise that remote large-scale wind farms will develop quickly and that they will actually *replace* "more expensive local wind

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28, 2011), *available at* https://www.misoenergy.org/Library/Repository/Tariff/FERC%2-Filings/2011-10-28%20Docket%20No.%20ER12-242-000.pdf.

210. *Ill. Commerce Comm'n II*, 721 F.3d at 772.

211. *Id.* at 771. Judge Posner pointed out that all of the states within MISO's service territory, except Kentucky, have renewable portfolio requirements or goals. *See id.* (noting that "Indiana, North Dakota, and South Dakota have aspirational goals; [while] the rest have mandates" that require anywhere from ten to twenty-five percent of their electricity sales to be from renewable energy resources by 2025).

212. *Id.* at 774.

213. *Id.* at 772.

214. *Id.*

215. *Id.* at 776. Michigan utilities and their utility commission argued that the project would "cause Michigan utilities to pay a share of the MVP tariff greatly disproportionate to the benefits they [sic] [would have] derive[d] from the multi-value projects" and that FERC should have held an evidentiary hearing. *Id.* at 775. *But see id.* at 776. Judge Posner responded to the Michigan petitioners claim that under Michigan law, Michigan utilities are prohibited from including renewable energy generated outside the state to satisfy the renewable portfolio stand requirements, and as a result, Michigan utilities would have less benefit than other states that did allow it to count. Judge Posner is quick to point out that this argument "trips over an insurmountable constitutional objection" in that the state cannot "discriminate against out-of-state renewable energy." *Id.*

power, and power plants that burn oil or coal."[216] It is unclear from the court's opinion as to what it is referring to as "local wind power." In a news article on the subject, however, on the Wind Energy Coalition's website, Hannah Northley reports that she received an email from Steven Transeth, an attorney and former member of the Michigan Public Service Commission, who said that "the court wrongfully accepted the assumption that wind 'is the future and western wind will be cheaper than local wind.'"[217]

While generally speaking, it can be argued that any form of renewable energy development is better for the climate than relying on traditional fossil fuels, the MISO case illustrates how significant the transmission infrastructure must be to bring it from its remote locations to the end user, potentially negating any advantage. The U.S. electric transmission grid is already antiquated, prone to blackouts, and is inefficient. The utilization of this same model to incorporate large-scale renewables is costly and fails to take into account innovative technology and vulnerabilities associated with changing weather patterns.

These inefficient billion-dollar projects could potentially be avoided if all RPS included carve-outs and multipliers for small or distributed generation. Utilities would receive credit for smaller renewable distributed generation projects and less focus would be on developing large-scale renewable resources. Currently, twenty-nine states, the District of Columbia, and two U.S. territories have RPS and an additional eight states and two territories have renewable portfolio goals.[218] In most states, to comply with the RPS, a utility has three options. It can own and generate its own power from a qualifying renewable energy facility, purchase

216. *Id.* at 775.

217. Hannah Northey, *Court Ruling Called a Game Changer for Renewable Power*, GOVERNORS' WIND ENERGY COAL. (June 12, 2013), http://www.governorswindenergycoalition.org/?p=5883. Transeth also "faulted the court for basing its decision on MISO reports that he said fail to show how certain transmission projects economically benefit the Great Lakes region and that solar is lapping wind in some areas." *Id.*; *see also Ill. Commerce Comm'n II*, 721 F.3d at 774 (noting the court's reliance on MISO reports that projects would be economically beneficial).

218. MICH. PUB. SERV. COMM'N, READYING MICHIGAN TO MAKE GOOD ENERGY DECISIONS: RENEWABLE ENERGY 2 (Draft, Sept. 20, 2013), *available at* http://www.michigan.gov/documents/energy/re-report-draft_434477_7.pdf [hereinafter READYING MICHIGAN].

electricity from a qualifying facility, or, in states that allow it, purchase renewable energy certificates.[219]

A few states include "carve-outs" or "multipliers" in their RPS as a way to promote small on-site distribution.[220] Carve-outs require utilities to provide a certain amount of electricity from qualifying distributed renewable energy.[221] Multipliers give a form of extra credit to utilities for incorporating distributed generation. A few states at the forefront of change have revised their RPS to either give credit for renewable energy from distributed generation, or to require a certain percentage of the utility's generation come from distributed generation. For example, New Mexico requires 3% of the 20% total renewable energy requirement to be from distributed generation by 2020[222] and Illinois requires 1% of annual requirement by 2016 and .25% of

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219. FRED BOSSELMAN ET AL., ENERGY ECONOMICS AND THE ENVIRONMENT 694–99 (Robert C. Clark et al. eds., Foun. Press 2010). RECs may be bought, sold, traded, and bartered like any other non-tangible commodity, with credits based on how much electricity was generated from a renewable energy resource. *Id.*

220. *See* Melissa Powers, *Small is (Still) Beautiful: Designing U.S. Energy Policies to Increase Localized Renewable Energy Generation*, 30 WIS. INT'L L.J. 595, 662 (2012) ("To enhance development of distributed generation, states could set aggressive, but attainable, targets that increase over time.").

221. *Id.* State RPS and regulatory policies intended to assist with interconnection "significantly increase the likelihood that a consumer will adopt DG capacity." Carley, *supra* note 20, at 1656. Carley also points out that:

> It can be inferred that a trend toward more integrated and standard protocols for electricity interconnection—including connecting equipment, standard tariff payment schemes, and power quality characteristics—reduces costs and bureaucratic hassles associated with consumer DG hook-ups. In the case of RPS policies, it appears as though utilities that face RPS mandates are more included to accept, or perhaps even support, their customers' adoption of alternative energy-based DG capacity so that utilities can obtain credit for these units.

Id. Note, however, that it does not necessarily increase a utility's desire to incorporate DG into its portfolio. *Id.* at 1657.

222. N.M. STAT. ANN. § 17-9-572.7(G) (2013), *available at* http://www.nmcpr.state.nm.us/nmac/parts/title17/17.009.0572.htm. In New Mexico, investor-owned utilities must account for 0.6% (3% of the 20% total renewable energy requirement) of their sales from renewable distributed generation. *New Mexico Incentives/Policies for Renewable Energy*, DSIRESOLAR (Sept. 27, 2010), *available at* http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NM05R&re=1&ee=0. "Distributed generation" is defined as "electric generation sited at a customer's premises, providing electric energy to the customer load at that site or providing electric energy to a public utility or a rural electric distribution cooperative for use by multiple customers in one or more contiguous distribution substation service areas." N.M. STAT. ANN. § 17-9-572.7(I).

sales by 2025.[223] Colorado and Washington State are the most aggressive, however, with Colorado requiring 3% retail distributed generation by 2020, of which 1.5% must be customer-sited,[224] and Washington providing double credit for renewables produced through distributed generation.[225]

While these multipliers and carve outs work to place small generation on equal footing with large projects, they have recently been criticized as unconstitutional. For example, current litigation

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223. *Illinois Incentives/Policies for Renewable Energy*, DSIRESOLAR (Sept. 27, 2010), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R& re=1&ee=0.

224. *Id.* In Colorado, investor-owned utilities must sell 3% from retail distributed generation, of which half must be customer-sited, serving on-site load. Cooperatives, depending on their size, must generate between .75% and 1% of their retail sales from distributed generation, with half serving on-site load. COLO. REV. STAT. § 40-2-124(1)(c)(I)(D) (2012). "Retail distributed generation" is defined as:

> [A] renewable energy resource that is located on the site of a customer's facilities and is interconnected on the customer's side of the utility meter. In addition, retail distributed generation shall provide electric energy primarily to serve the customer's load and shall be sized to supply no more than one hundred twenty percent of the average annual consumption of electricity by the customer at that site. For purposes of this subparagraph (VIII), the customer's "site" includes all contiguous property owned or leased by the customer without regard to interruptions in contiguity caused by easements, public thoroughfares, transportation rights-of-way, or utility rights-of-way.

COLO. REV. STAT. § 40-2-124(a)(I)(A)(VIII).

225. *See* WASH. REV. CODE § 194-37-110(1)(c)(iii) ("Any resource that meets the definition of distributed generation and that the utility owns or contracts for the associated REC [will earn] a 2.0 multiplier credit on the electricity output."). In Washington, "distributed generation," is defined as a:

> "[G]eneration facility or any integrated cluster of such facilities" with a capacity of five megawatts (MW) or less, [and] may be counted as double the facility's electrical output if the utility owns the facility, has contracted for the distributed generation and the associated RECs, or has contracted to purchase only the associated RECs.

Renewable Energy Standard, DSIRESOLAR, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA15R (last visited Feb. 14, 2014) (quoting WASH. REV. CODE ANN. § 19.285.030 (West)). Distributed generation is defined under the statute as:

> [a]n eligible renewable resource where the facility or any integrated cluster of generating units has a generating capacity of not more than five megawatts. If several five-megawatt or smaller projects are located in the same immediate area but are owned or controlled by different developers, each qualifies as a separate, independent distributed generation project. For the purposes of this rule, an eligible renewable resource or group of similar eligible renewable resources cannot be subdivided into amounts less than five megawatts solely to be considered distributed generation.

WASH. REV. CODE § 194-37-040(12).

brought by the American Tradition Institute ("ATI")[226] against the state of Colorado and its officials claims that the state's RPS violates the dormant Commerce Clause.[227] ATI alleges that

226. Formerly known as American Tradition Institute, Energy and Environment Legal Institute "is a 501(c)(3) organization engaged in strategic litigation, policy research, and public education on important energy and environmental issues. Primarily through its strategic litigation efforts, E&E Legal seeks to address and correct onerous federal and state governmental actions that negatively impact energy and the environment." ENERGY & ENVT. LEGAL INST. (2013), http://www.eelegal.org/?page_id=1657.

227. Am. Tradition Inst. v. Colorado, 876 F. Supp. 2d 1222, 1227 (2012). ATI challenged the following provisions:

• The Electric Resource Standards Program, COLO. REV. STAT. § 40-2-124(1)(c), and the Municipally Owned Electric Utility Program, COLO. REV. STAT. § 40-2-124(3) & (4). These Programs, inter alia, require qualifying retail electric utilities to generate, or cause to be generated, electricity from recycled energy and-or renewable energy resources in certain minimum amounts by certain years. *See* COLO. REV. STAT. § 40-2-124(1)(c)(I), (1)(c)(V), (3) & (4). Plaintiffs allege that these Programs violate the dormant Commerce Clause by limiting the sales of electricity generated from sources that participate in the interstate retail electricity market and by discriminating in favor of Colorado energy generators.

• The Tradable Renewable Energy Credits Limitation Program, COLO. REV. STAT. § 40-2-124(1)(d). This Program creates a system of tradable renewable energy credits that may be used by a qualifying retail electric utility to comply with the renewable energy standards. *See* COLO. REV.STAT. § 40-2-124(1)(d). Plaintiffs allege that this Program violates the dormant Commerce Clause by effectively prohibiting out-of-state regional trading systems from participating in the interstate credit trading market.

• The Standard Rebate Offer Program, COLO. REV. STAT. § 40-2-124(1)(e). Under this Program qualifying retail electric utilities provide rebates to customers who install solar electric generation on their premises. *See* COLO. REV. STAT. § 40-2-124(1)(e). Plaintiffs allege that this Program violates the dormant Commerce Clause by imposing a cost on qualifying retail electric utilities that is not imposed on other domestic and foreign utilities, thereby burdening the affected utilities' participation in the interstate electricity market.

• The Recovery of Costs Incentives Program, COLO. REV. STAT. § 40-2-124(1)(f)(I). This Program, *inter alia*, exempts certain eligible retail electric utilities from having to comply with the PUC's competitive bidding requirements. *See* COLO. REV. STAT. § 40-2-124(1)(f)(I). Plaintiffs allege that this Program violates the dormant Commerce Clause by imposing costs on non-eligible utilities that are not imposed on the eligible utilities, thereby burdening the non-eligible utilities' participation in the interstate electricity market.

• The Retail Rate Impact Rule, COLO. REV. STAT. § 40-2-124(1)(g). This Rule, *inter alia*, allows eligible utilities to acquire more than the minimum amount of eligible energy resources and renewable energy credits. See COLO. REV. STAT. § 40-2-124(1)(g). Plaintiffs allege, *inter alia*, that the Program violates the dormant requiring thirty percent of Colorado's energy to be derived from renewables[228] is in itself a violation of the Commerce Clause because it restricts and inhibits the sale of electricity over the grid and across state lines.[229] ATI further alleges that Colorado's distributed generation requirement is facially discriminatory because "[l]ower cost, more reliable interstate electricity generating sources supplying the interstate grid may not compete for the exclusively Colorado-based distributed generation set-aside portion of the interstate retail electricity market in Colorado due to this mandate."[230] The clear target of ATI's case, however, is wind energy development in general.[231] ATI claims that Colorado's statute favors in-state renewable energy development and discriminates against traditional generating sources.[232] If RPS

> Commerce Clause by limiting the amount of renewable resources and renewable energy credits that can be acquired by foreign companies.

Id. at 1227–28.

228. COLO. REV. STAT. ANN. § 40-2-124(1)(c)(I)(E) (2013). Colorado's provisions on distributed generation require, in relevant part:

> [E]ach qualifying retail utility to generate, or cause to be generated, electricity from eligible energy resources in the following minimum amounts:
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> . . . .
>
> (C) Twelve percent of its retail electricity sales in Colorado for the years 2011 through 2014, with distributed generation equaling at least one percent of its retail electricity sales in 2011 and 2012 and one and one-fourth percent of its retail electricity sales in 2013 and 2014;
>
> (D) Twenty percent of its retail electricity sales in Colorado for the years 2015 through 2019, with distributed generation equaling at least one and three- fourths percent of its retail electricity sales in 2015 and 2016 and two percent of its retail electricity sales in 2017, 2018, and 2019; and
>
> (E) Thirty percent of its retail electricity sales in Colorado for the years 2020 and thereafter, with distributed generation equaling at least three percent of its retail electricity sales.

§ 40–2–124(1)(c)(I).

229. *See generally* Amended Complaint For Injunctive and Declaratory Relief, Am. Tradition Inst. v. Colorado, 876 F. Supp. 2d 1222 (2012) (No. 1:11-cv-00859-WJM-KLM), *available at* http://www.atinstitute.org/wp-content/uploads/2011/04/ATI-RPS-Lawsuit-Amended-Complaint.pdf.

230. *Id.* at 18.

231. *See generally* Paul Cheeser, *What's Wind Got to Do With It?*, THE AMERICAN SPECTATOR (Apr. 13, 2011), http://www.spectator.org/archives/2011/04/13/whats-wind-got-to-do-with-it.

232. *See* Amended Complaint, *supra* note 229, at 29–34. ATI also claims that wind-generated energy is uneconomical, environmentally damaging, and results in more pollution than traditional fossil fuel generation, because it still requires coal or natural gas as backup generation. *Id.*

fall to these types of challenges, Congress will need to step in and either enact legislation that will delegate to the states the ability to fully regulate renewable energy and distributed generation or create a national RPS with state implementation plans.[233] Either way these RPS will need to be revised to shift the focus from large, transmission intensive projects to more local, distributed energy projects.

ii. FERC Should Reevaluate the Viability of Multi-Value Projects and Carefully Implement Order 1000 to Ensure Proper Analysis of Alternatives to Big Transmission

Large transmission lines and centrally located facilities are susceptible to destruction due to a changing climate and more frequent and severe storms, floods, and fires.[234] It therefore seems counterintuitive to invest billions of dollars into infrastructure with such vulnerability. Nevertheless, as noted in the above section, FERC recently did just that when it approved seventeen MVPs designed to transmit wind power from large wind farms in the middle of the country hundreds of miles away to more populated areas.[235] What is more, FERC allowed the transmission operator to allocate costs of the project to individual member utility companies without a showing that the project's benefits outweighed its costs for each utility.[236] The Seventh Circuit affirmed FERC's order and in so doing made a resounding deviation from its previously established standard in *Illinois Commerce Commission I* of requiring a showing of more than a statement of "generalized benefits."[237]

233. *See* Lincoln L. Davies, *Power Forward: The Argument for a National RPS*, 42 CONN. L. REV. 1339, 1364–75 (2010) (discussing the benefits and problems with promulgating a federal renewable portfolio standard); Daniel K. Lee & Timothy P. Duane, *Putting the Dormant Commerce Clause Back to Sleep: Adapting the Doctrine to Support State Renewable Portfolio Standards*, 43 ENVTL. L. 295, 354–60 (2013) (setting forth various ways the judiciary can address these problems such as utilizing intermediate scrutiny instead of strict scrutiny and extending the applicability of the market-participant exception); Jim Rossi, *The Limits of a National Renewable Portfolio Standard*, 42 CONN. L. REV. 1425, 1441–49 (2010).

234. *See, e.g.*, VULNERABILITIES TO CLIMATE CHANGE, *supra* note 52.

235. *Ill. Commerce Comm'n II*, 721 F.3d 764 (7th Cir. 2013).

236. *Id.* at 772.

237. Ill. Commerce Comm'n v. FERC (*Ill Commerce Comm'n I*), 576 F.3d 470, 476 (7th Cir. 2009).

Historically, a utility company (and its customers) was not required to pay for transmission facilities for which it (and they) did not derive a specific benefit.[238] In the first *Illinois Commerce Commission* case, Judge Posner stated that a claim of "generalized benefits" of these large projects was not enough to allocate costs to a utility that would derive one million in benefits from a project that would cost some $480 million.[239] The evidence, according to Judge Posner, did not even allow for "the roughest of ballpark estimates of th[e] benefits."[240] And, while the court believed the project would create "*some*" general benefits, the court required that the transmission operator show that those benefits be enough to justify the costs.[241]

Fast forward four years to the second *Illinois Commerce Commission* case, and Judge Posner upholds FERC's blanket assessment that MISO's MVPs "will benefit all members of MISO and so the projects' costs should be shared among all members."[242] In addition, the court appears to shift the burden of proof to the utility and customer to prove the project's benefits do not outweigh its costs.[243] Illinois petitioners argued that MISO, the transmission operator, failed to show an overall benefit greater than the cost.[244] In denying its argument, the court states that Illinois did not make any "estimates of costs and benefits either, whether for the MISO region as a whole or for particular sub regions or particular utilities."[245] Instead, it accepts MISO's crude estimates of cost savings.[246] The court states: "[i]t's not enough for Illinois to point out that MISO's and FERC's attempt to match the costs and the benefits of the MVP program is crude; if crude is all that is possible, it will have to suffice."[247] Instead, the allocation of costs for MVPs is to be in proportion to the utility's share of

238. *Id.*

239. *Id.*

240. *Id.*

241. *Id.* at 477.

242. *Ill. Commerce Comm'n II*, 721 F.3d at 773.

243. *Id.* at 774.

244. *Id.*

245. *Id.*

246. *Id.* MISO claims the cost savings would be roughly $297–423 million annually, with a reduction in losses of electricity in transmission by another $68–104 million and reduction in reserve margin losses of another $217–271 million. *Id.*

247. *Id.* at 775.

wholesale consumption in the region—regardless of whether it receives individualized benefits.[248]

While many aspects of this case are troubling, an area of concern is the lack of recourse for utilities and customers who are saddled with the high costs of these transmission facilities without receiving proof of the benefits. If the presumption is that these projects benefit everyone, and the burden is on the utility to prove otherwise, it will be hard to litigate against the project once it is approved. Transmission operators will have the green light to build billion-dollar projects knowing that they can easily transfer those costs to the utility and its customers. Seemingly, the only recourse for an unhappy utility company is to withdraw its membership from the Regional Transmission Organization. Judge Posner noted several times throughout his most recent opinion that membership is voluntary, and "there is nothing to prevent a member of MISO from withdrawing from the association and joining another Regional Transmission Organization."[249] While withdrawal is technically feasible, it is not that simple. The withdrawing utility is generally required to pay a "departure fee."[250] Departure fees are "designed to prevent a departing member from reaping a windfall by leaving costs for which it is properly liable to be borne by the remaining members."[251] FirstEnergy and Duke Energy found this out firsthand when FERC held that they must pay a departure fee even though they withdrew their membership before MISO announced its MVP tariff.[252]

Given the seemingly uphill battle of fighting the allocation of costs after an MVP has been approved, it will be important that FERC utilize safeguards to ensure that the MVP is indeed the most beneficial way to meet the transmission needs. One avenue for this assessment is through the hotly contested FERC Order 1000 and succeeding orders.[253] FERC issued Order 1000 in 2011 and

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248. *Id.* at 772.

249. *Id.* at 773.

250. *Id.* at 776.

251. *Id.*

252. Midwest Indep. Transmission Sys. Operating, Inc., 133 F.E.R.C. 61,221, ¶ 472 (2010).

253. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,824 (Aug. 11, 2011) (to be codified at 18 C.F.R. pt. 35).

subsequent Orders 1000-A and -B in 2012.[254] In general, Order 1000 requires, for the first time, transmission providers to coordinate development and maintenance of energy delivery infrastructure on a regional level.[255] Historically, transmission planning occurred through a bottom-up approach with states and local governments and planning agencies deciding whether and how to develop. Order 1000's top-down approach is currently playing out before the District of Columbia Court of Appeals, with critics alleging that FERC exceeded its statutory authority in issuing the Order because the Order would trump local and state planning.[256]

It will be interesting to see how this case proceeds through the judicial system. In the meantime, however, FERC should take the opportunity to place more attention on other portions of Order 1000 that could focus stakeholders on small, sustainable smart grid technologies as viable alternatives to large-scale transmission. Order 1000 "mandates that local and regional planning incorporate currently enacted 'state or federal laws or regulations that drive transmission needs,' including local laws and regulations."[257] In addition, Order 1000 gives transmission providers the ability to include "public policy objectives not specifically required by state or federal laws or regulations."[258] FERC notes that the purpose of this provision is to allow transmission providers, in consultation with stakeholders, to look at long-term planning policies and goals even if they have not yet been codified as law.[259] This is an important provision, especially

254. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 77 Fed. Reg. 32,184 (May 31, 2012) (to be codified at 18 C.F.R. pt. 35); Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 77 Fed. Reg. 64,890 (Oct. 24, 2012) (to be codified at 18 C.F.R. pt. 35).

255. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. at 49,842.

256. *See, e.g.*, S.C. Publ. Serv. Auth. v. Fed. Energy Regulatory Comm'n, 850 F.2d 788 (1988) (holding that the Federal Energy Regulatory Commission did not have authority to displace South Carolina tort law with a previous FERC order).

257. Shelley Welton et al., *FERC Order 1000 As a New Tool for Promoting Energy Efficiency and Demand Response*, 42 ENVTL. L. REP. NEWS & ANALYSIS 11025, 11026 (2012) (citing Order 1000).

258. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. at 49,878–79.

259. *Id.* at 49,879.

in the face of a changing climate and growing customer demand for distributed generation technology.

Order 1000 further requires transmission operators to consider the most "efficient or cost-effective solutions" to meet transmission needs.[260] Simply because a new transmission line could be developed in a given area, does not mean it is the most cost-efficient and energy-efficient means of meeting customer demand. If other alternatives are available, such as utilization of distributed generation or smart-grid technology, Order 1000 requires the transmission provider to "evaluat[e] the merits of such alternative transmission solutions."[261] These "non-transmission alternatives"[262] are to be evaluated on a "comparable basis" to transmission proposals.[263] If looked at on a comparable basis, the analysis would need to include an evaluation of not only construction costs, but also of the potential for significant maintenance and repair costs due to predicted storm events. As

260. *Id.* at 49,913. Order 1000 amends a previous FERC order that had no affirmative duty to develop in the most cost-efficient or effective manner:

> Through this Final Rule, we conclude that the existing requirements of Order No. 890 are inadequate. Public utility transmission providers are currently under no affirmative obligation to develop a regional transmission plan that reflects the evaluation of whether alternative regional solutions may be more efficient or cost-effective than solutions identified in local transmission planning processes. Similarly, there is no requirement that public utility transmission providers consider transmission needs at the local or regional level driven by Public Policy Requirements.

Id. at 49,845.

261. *Id.* at 49,868.

262. *Id.* Order 1000 does not define "non-transmission alternative." By the very words, however, the phrase indicates an alternative that does not involve transmission. This alternative would feasibly include such things as energy efficiency and conservation measures, distributed generation, storage technologies, and technology improvements to existing transmission systems. *See* THE NAT'L COUNCIL ON ELECTRICITY POL'Y, UPDATING THE ELECTRIC GRID: AN INTRODUCTION TO NON-TRANSMISSION ALTERNATIVES FOR POLICYMAKERS 1 (2009) *available at* http://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/Updating_the_Electric_Grid_Sept09.pdf.

263. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. at 49,868 ("When evaluating the merits of such alternative transmission solutions, public utility transmission providers in the transmission planning region also must consider proposed non-transmission alternatives on a comparable basis. If the public utility transmission providers in the transmission planning region, in consultation with stakeholders, determine that an alternative transmission solution is more efficient or cost-effective than transmission facilities in one or more local transmission plans, then the transmission facilities associated with that more efficient or cost-effective transmission solution can be selected in the regional transmission plan for purposes of cost allocation.").

previously discussed, the costs of repair to infrastructure damaged by storm-related events costs the U.S. economy between $20–$55 billion annually.[264] If these storms increase in frequency and intensity, repair costs will surely grow proportionately.

Pursuant to Order 1000, the "more efficient or cost-effective" proposal should win out.[265] Unfortunately, the Order is not written in a way to explicitly ensure this is the case. First, the Order provides that if the non-transmission alternative is found to be the most efficient or cost effective proposal, the alternative "*can* be selected in the regional transmission plan for purposes of cost allocation."[266] It does not mandate that it be selected.

Another significant problem is that Order 1000 only requires the evaluation of non-transmission alternatives if a "participant" sets forth the proposed alternative.[267] It does not require that the transmission provider independently research and propose alternatives.[268] Instead, the Order "requires the regions to create an opportunity for NTAs [non-transmission alternatives] to be considered, but imposes no obligation that anyone consider NTAs that are not presented. If no one presents an NTA, no NTA gets considered—even if an NTA exists."[269]

Given these shortfalls, FERC should implement Order 1000 in a manner so as to ensure stakeholders are educated on the options and can engage in thorough analysis as to whether these MVPs or large-scale transmission lines are really the most efficient and sustainable way to develop the grid. If properly applied, this provision could meet the goals of the USDOE's July report by promoting flexible, low cost actions for more sustainable and resilient energy delivery system. As Professor Gerrard and Director Welton noted in a recent article, Order 1000 could result in more "strategically located transmission" or even in "reducing or . . . negating the need for new or enhanced transmission in some

264. VULNERABILITIES TO CLIMATE CHANGE, *supra* note 52, at 35.

265. *See generally* Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. at 49,868.

266. *Id.* at 49,868 (emphasis added).

267. SCOTT HEMPLING, 'NON-TRANSMISSION ALTERNATIVES': FERC'S 'COMPARABLE CONSIDERATION' NEEDS CORRECTION 3 (May 2013), *available at* http://www.scotthemplinglaw.com/files/pdf/ppr_nta_comparable_consideration_0513.pdf.

268. *Id.*

269. *Id.* at 17.

areas."[270] Unless or until some of the language is revised, it will be up to FERC to ensure stakeholders abide by the spirit of the Order.

VI. OPPORTUNITIES FOR UTILITIES AT THE FOREFRONT OF CHANGE

Utilities have historically had, and will continue to have, an important role to play in the delivery of safe and reliable energy in the United States. Even if customers begin to utilize more distributed generation, and therefore take less electricity from the utility companies, those utility companies (or their regional transmission organizations) must still maintain and operate an interconnected transmission grid for backup power and for those customers who remain.[271] However, utilities should prepare for distributed generation as a disruption and should look for ways to become full-service companies offering a better, more innovative product at a competitive price.[272]

Utilities should take this as an opportunity to expand in new areas and to become full-service companies that will provide on-site customer service such as the sale, rental, installation, and maintenance of on-site power generation. Smart meters and energy efficient appliances already provide customers with significant information and control over their electricity consumption and costs, and that efficiency can increase if utilities educate their customers on options for on-site generation.[273] Some utilities in the United States are already embracing this change.[274] "From Arizona to North Carolina, creative utilities are running programs that install and maintain smart-grid-ready solar panel arrays on customers' roofs." [275]

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270. Welton et al., *supra* note 257, at 11027.

271. *See* Raskin, *supra* note 177, at 42 (providing a thorough analysis of the regulatory challenges utilities will face due to increased utilization of distributed generation).

272. KIND, *supra* note 58, at 7.

273. MUNSON, *supra* note 6, at 149. "Improved customer information can provide enormous benefits. When customers better understand their power usage and the varying cost of electricity over time, they make more efficient and cost-saving decisions." *Id.*

274. *Id.* at 154 (see examples at pages 154–56).

275. Yates, *supra* note 2.

> A handful of the most progressive utilities – Sempra, Duke, PGE, SMUD, Integrys – are already embracing the change and finding ways to make a profit from generating their own electricity through their

In July 2013, former U.S. Secretary of Energy Steven Chu gave a short interview with National Public Radio recommending a new utility business model.[276] He recommended utilities start new

> unregulated subsidiaries. No longer mandated passive players, solar gives them chance to compete. Those utilities, unfortunately, are the anomaly. The majority of utilities we've spoken with seem to be in denial, akin to deer caught in the headlights.

Haresh Patel, *Utility Solar is Dead; Long Live Distributed Generation*, GREENTECHMEDIA (June 17, 2013), http://www.greentechmedia.com/articles/read/utility-solar-is-dead-long-live-distributed-generation.

276. *Former Energy Secretary Wants Power Generation Decentralized*, NPR (July 2, 2013), *available at* http://www.m.npr.org/news/Business/197868020?start=25. A portion of the interview is transcribed as follows:

> STEVEN CHU: Well, it goes back to an old business model that the old AT&T used to have. They sold you phone service. They would supply you with the phone. They owned the phone. They maintained the phone.
>
> MONTAGNE: Similarly, Chu would like utilities to start installing solar panels and batteries, storage units in people's homes. The idea hasn't gained much traction yet, but Steven Chu remains hopeful, and discussed with us how he sees utility companies making this work.
>
> CHU: They will say, allow us to use your roof, allow us to use a little corner of your garage, and we will equip you with solar power. We own it. We maintain it. We're responsible for it. You don't have any out-of-pocket expenses. You just buy electricity at the same rate, or maybe even a lower rate. In addition to that, you have, you know, like five kilowatts of energy storage in your home. And five kilowatts—when you're in a blackout situation and you want to keep your refrigerator going, you want to keep a couple of energy-efficient light bulbs lit at night—that goes a long way.
>
> MONTAGNE: Well, how do you expect to get utilities though, to go for this transformation—given that they have huge investments in their system that they already work with?
>
> CHU: Well, I think it's going to become increasingly attractive for a couple of reasons. First, the utility companies can put energy storage in a benign environment—inside, away from the wind or rain, the hot and the cold, and they can use that energy storage in a distributed way to level out the load, take care of the little balancing that they do all the time today, by simply overloading their lines slightly and letting the energy dribble out.
>
> MONTAGNE: Well, have you talked to utilities about this yourself?
>
> CHU: I have. In the last year while I was secretary, I began to raise this as a possibility. Because right now you realize that as solar becomes less and less expensive, as more homeowners on their own do this, where they get to sell you back electricity at essentially retail price until it zeros their energy bill out. Well, this is not good for a utility company because they still have to maintain the wires, the billing, the reliability and all these other things, so when it's half a percent of the customers or a quarter percent of the customers, they don't care. When it's five, 10, 15 percent of customers, it's a big deal. And so you definitely need a new business model.

programs whereby the utility will own the solar panels, or the wind turbines, or micro-hydro turbines to be placed at, near, or inside a customer's home or business.[277] The utility will install the generating device, service it and maintain it, and potentially utilize it to meet energy storage[278] needs. The customer would have little to no out of pocket expense.[279] While many details would need to be worked out, this opportunity could provide an avenue for customers, who would not otherwise be able to afford it, to utilize the new technology. Utilities should take this opportunity to position themselves as full service providers and facilitators of sustainable energy delivery.[280]

VII. CONCLUSION

In the coming decades, changing weather patterns and the availability of cost-efficient distributed generation technology will reshape the current energy distribution model. Distributed generation will make up a larger portion of the energy mix. Policymakers should continue to develop sound regulatory standards for the incorporation of renewable distributed generation. But more than that, a new focus should be placed on revising damaging policies and laws that—while enacted with good intentions—have resulted in negative and costly consequences.

> MONTAGNE: It sounds little like maybe a comparison would be how the adoption of the Internet disrupted old media and really forced it to get on board with the Internet.
>
> CHU: Well, during this last year when I talked to utility companies—and the regulators—I'd say, this is going to come, so let's start thinking about it now. Form a new business model so that you have a growth industry. You're still supplying electricity, you're just doing it slightly differently. You're still going to need smart meters and smart grids and all these other things, but you can do it much more sensibly and it will lead to, actually, a more stable grid.

Id.

277. *Id.*

278. Decision Adopting Energy Storage Procurement Framework and Design Program, Cal. Pub. Util. Comm'n, Decision 13-10-040, Oct. 17, 2013, *available at* http://www.docs.cpuc.ca.gov/PublishedDocs/Published/G000/M079/K533/79533378.PDF. In October 2013, the California Public Utilities Commission entered a final rule requiring all investor-owned utilities operating within the state to obtain 1325 megawatts of energy storage by 2020. *Id.*

279. *Id.*

280. *See generally* MUNSON, *supra* note 6, at 154–56 (providing examples of some providers being hindrances, and some being helpful).

Utilities should likewise revisit their energy delivery model to plan for the disruptive forces of innovative technological advances and a changing climate.