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The Smart Grid: A Smart Solution to a Complicated Problem

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THE SMART GRID: A SMART SOLUTION TO A COMPLICATED PROBLEM

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INTRODUCTION

On August 14, 2003, several power lines in northern Ohio shut down, causing the "largest power loss in North American history."[1] Normally, the loss of several lines would not be disastrous because operators at local utilities would be notified and would reroute the electricity.[2] This time, however, the local utility company was not notified of the failure and the functioning power lines became overtaxed.[3] Eventually, multiple power plants shut down and "[w]ithin eight minutes 50 million people across eight states and two Canadian provinces had been blacked out."[4]

Unfortunately, the Midwest's 2003 blackout (Midwestern Blackout) is indicative of a nationwide problem that continues to worsen.[5] The United States delivers electricity to consumers over a transmission system[6] that has not been updated since the 1970s.[7] In addition, present "electricity flows ... are greater in size and in different directions than those that were anticipated when the transmission system was first designed, causing added strain on an outdated system."[8]

In response, Congress has authorized federal agencies to improve the electricity grid's reliability by modernizing the transmission system.[9] This modernization is referred to as the Smart Grid.[10] The

1. Massoud Amin & Phillip F. Schewe, *Preventing Blackouts*, SCI. AM., May 2007, at 61.
2. *Id.*
3. *Id.*
4. *Id.*
5. *See* AMY ABEL, CONG. RESEARCH SERV., ELECTRIC RELIABILITY: OPTIONS FOR ELECTRIC TRANSMISSION INFRASTRUCTURE IMPROVEMENTS 1, 13 (2006), *available at* http://ncseonline.org/NLE/CRSreports/06Oct/RL32075.pdf; *see also* U.S. DEP'T OF ENERGY, NATIONAL TRANSMISSION GRID STUDY, at xi-xiii (2002) [hereinafter TRANSMISSION GRID STUDY] (explaining the status of the U.S. transmission system and its weaknesses).
6. TRANSMISSION GRID STUDY, *supra* note 5, at xi ("The U.S. electricity transmission system is an extensive, interconnected network of high-voltage power lines that transport electricity from generators to consumers.").
7. Amin & Schewe, *supra* note 1, at 61.
8. TRANSMISSION GRID STUDY, *supra* note 5, at 5-6.
9. *See* ABEL, *supra* note 5, at 1, 13.
10. *See* Energy Independence and Security Act (EISA) of 2007 § 1301, 42 U.S.C. § 17381 (Supp. I 2009) (describing the "Smart Grid" as a "modernization of the Nation's electricity transmission and distribution system [designed] to maintain a reliable and secure electricity infrastructure that can meet future demand growth").

Smart Grid utilizes computer technology to prevent blackouts and provide more reliable electricity.[11] Congress delegated authority to federal agencies to implement the Smart Grid in the Energy Independence and Security Act of 2007 (EISA).[12]

This Note argues that, based on the language of the EISA, the history of U.S. energy policy, and statements made by testifiers before Congress and the Chairman of the Committee on Foreign Relations, Congress did not intend for the Smart Grid to address solely the reliability of the grid. Rather, Congress intended for the Smart Grid to provide a solution to the nation's growing energy concerns, particularly regarding oil consumption.[13] In effect, Congress had dual goals for the Smart Grid: create a more reliable, efficient transmission system and assist with decreasing the nation's oil consumption.[14] So far, the grid's reliability has significantly improved and considerable attention has been given to addressing the nation's oil dependence.[15] This Note argues that the Smart Grid's ability to reduce U.S. oil consumption should continue to be a key priority of federal policymaking because decreasing the nation's dependence on oil was one of Congress's principal goals in enacting the EISA.

Part I of this Note defines the Smart Grid and explains its development. Part II discusses the history of the EISA, as well as Congress's intent in passing the Act. Part III describes the current status of the Smart Grid's implementation. This Note concludes by reiterating the importance of using the Smart Grid to decrease U.S. dependence on oil and suggests that encouraging greater investment in Smart Grid technologies that accommodate renewable energy sources and electric vehicles would further the dual goals of Title XIII—the section of the EISA that defines the Smart Grid and sets forth guidelines for modernization of the electricity grid.

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11. *See* STAN MARK KAPLAN, CONG. RESEARCH SERV., ELECTRIC POWER TRANSMISSION: BACKGROUND AND POLICY ISSUES 22-24 (2009), *available at* http://fpc.state.gov/documents/organization/122949.pdf.

12. EISA §§ 1301-1308 (to be codified in scattered titles of the U.S.C.).

13. *See infra* Part II.B.

14. *See infra* Part II.

15. *See infra* Part III.

I. SMART GRID

A. What Is the Smart Grid?

In Title XIII of the EISA, Congress called for modernization of the electricity grid to address some of the grid's systemic problems.[16] This modernization of the transmission system is referred to as the Smart Grid.[17] The Smart Grid is a transmission grid that integrates "sophisticated sensing and monitoring technology" and "cutting-edge power engineering,"[18] essentially superimposing the Internet on the grid.[19] As a result of these technological changes, the Smart Grid differs in several ways from the current transmission grid. The Smart Grid wastes less electricity because it quickly alleviates problems like congestion and other disturbances, which prevents electricity loss.[20] The Smart Grid also is capable of connecting new generators to the transmission system, which allows greater incorporation of renewable energy sources.[21] In fact, the Smart Grid even has the potential to accommodate homeowners who want to sell

16. EISA § 1301, 42 U.S.C. § 17381 (Supp. I 2009) ("[Congress] support[s] the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth.").

17. *See generally* Press Release, U.S. Dep't of Energy, Vice President Biden Outlines Funding for Smart Grid Initiatives (Apr. 16, 2009), *available at* http://www.energy.gov/7282.htm (explaining why the United States is developing "a smart, strong and secure electrical grid"); Posting of Keith Johnson to Wall Street Journal Environmental Capital Blog, http://blogs.wsj.com/environmentalcapital/2009/04/20/get-smart-ge-fpl-announce-biggest-smart-grid-deal-in-miami/ (Apr. 20, 2009, 13:59 EST) (discussing the Energy Smart Miami Project, "'one of the biggest' such efforts to turn the old-fashioned, one-way power grid into a creature of the Internet age" (quoting Bob Gilligan, Vice President for Transmission and Distribution, General Electric Company)).

18. ENERGY FUTURE COALITION, CHALLENGE AND OPPORTUNITY: CHARTERING A NEW ENERGY FUTURE 24 (2003).

19. *See* KAPLAN, *supra* note 11, at 22 ("[T]he smart grid can be viewed as a suite of technologies that give the grid the characteristics of a computer network, in which information and control flows between and is shared by individual customers and utility control centers.").

20. *See, e.g.*, ABEL, *supra* note 5, at 7.

21. *See* KAPLAN, *supra* note 11, at 23 (explaining that the Smart Grid can "connect new generating plants to the grid" and "manage large amounts of wind and solar power").

energy that they produce from renewable energy sources to utilities.[22]

1. Reliability

The EISA called for the Smart Grid to improve the transmission system's reliability.[23] Increased reliability refers to preventing blackouts and transmission failures like those that initiated the Midwestern Blackout.[24] There are two main causes of blackouts—disruptions in the grid and congestion[25]—and the Smart Grid incorporates technology that mitigates both.[26] First, the Smart Grid decreases the negative effects of disruptions in the grid by instantaneously identifying problems and rerouting electricity until the problems are resolved.[27] This feature of the Smart Grid is referred

22. *See infra* text accompanying notes 49-50; *see also* FRED SISSINE, MARK GUREVITZ & LYNN J. CUNNINGHAM, CONG. RESEARCH SERV., ENERGY EFFICIENCY AND RENEWABLE ENERGY LEGISLATION IN THE 110TH CONGRESS 9 n.23 (2009), *available at* http://www.henrywaxman.house.gov/UploadedFiles/Energy_Efficiency_and_Renewable_Energy_Legislation_in_the_110th_Congress.pdf (explaining that "[n]et metering is an arrangement wherein the occupant may generate power on the premises and sell it to the utility company"). For a further explanation of net metering and how it may "improve the economic viability of wind, biopower, geothermal, solar and other renewable and distributed energy projects," see U.S. Department of Energy, About the Office of EERE, Testimony of David K. Garman before the Subcommittee on Economic Development, Public Buildings, and Emergency Management of the House Committee on Transportation and Infrastructure, http://www1.eere.energy.gov/office_eere/congressional_test_080101.html (last visited Mar. 14, 2011).

23. EISA § 1301, 42 U.S.C. § 17381 (Supp. I 2009).

24. *See generally* TRANSMISSION GRID STUDY, *supra* note 5, at 5-7 (describing the impact of congestion on the transmission grid and the causes of blackouts).

25. Blackouts and power failures such as the Midwestern Blackout are often due to congestion or an excessive demand for electricity. Congestion prevents electricity from being delivered to consumers because "electricity ... cannot be easily stored and ... must be produced at virtually the same instant that it is consumed." U.S. ENERGY INFO. ADMIN., DERIVATIVES IN THE ELECTRICITY INDUSTRY (2002), http://www.eia.doe.gov/oiaf/servicerpt/derivative/chapter4.html (last visited Mar. 14, 2011).

26. Transmission congestion or bottlenecks result when there is not enough transmission capability to accommodate all requests to ship power over existing lines and to maintain adequate safety margins for reliability. Because electricity cannot yet be stored economically, transmission system operators must deny requests for transmission service when they receive too many requests in order to prevent lines from becoming overloaded. In other words, transmission congestion does not refer to deliveries that are merely held up or delayed (as in traffic congestion), but instead refers to transactions that cannot be executed. *See* TRANSMISSION GRID STUDY, *supra* note 5, at 6.

27. The Smart Grid allows operators to prevent blackouts and system failures because of improved monitoring and repair techniques and because the Smart Grid enables generators

to as "self healing."[28] To identify disruptions more quickly, the Smart Grid utilizes technology that allows generators, consumers, and grid controllers to communicate with one another.[29] With improved communication, grid controllers are able to monitor the flow of electricity in real time, spot disturbances in the transmission of electricity, isolate problem areas, and prevent problem areas from disabling the entire grid.[30]

The Smart Grid also alleviates congestion by "allow[ing] customers and the utility to better manage electricity demand."[31] With the Smart Grid, consumers can monitor their electricity consumption using a "smart meter."[32] Smart meters are similar to meters currently used by electric companies to track consumers' electricity use, and are installed on the outside of a home or apartment complex.[33] Smart meters are more advanced than traditional meters, however, because they "can track energy use daily, hourly, monthly and even instantaneously, and send that data to power companies."[34] When demand is particularly high, smart meters allow utility companies to communicate with consumers—likely via e-mail or another form of electronic notification—so that customers can reduce their electricity use and help decrease overall congestion.[35] To benefit their customers, some utilities even offer consumers online access to their power consumption, allowing them to view their electricity use instantaneously.[36]

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to speak to consumers when there is too much demand for electricity. Fed. Energy Regulatory Comm'n, Smart Grid, http://www.ferc.gov/industries/electric/indus-act/smart-grid.asp (last visited Mar. 14, 2011). Consumers could respond to such high demand by decreasing their electricity usage during peak times, which could eliminate congestion. *Id.*

28. ENERGY FUTURE COALITION, *supra* note 18, at 25.

29. KAPLAN, *supra* note 11, at 22, 31-32.

30. *Id.* at 31-32.

31. *Id.* at 22.

32. *Id.* at 23 (explaining that "[a]n essential part of [consumer energy management] is the installation of smart meters").

33. *See* Elizabeth Shogren, *All Things Considered: Smart Meter Saves Big Bucks for Pa. Family* (NPR radio broadcast Apr. 28, 2009), *available at* http://www.npr.org/templates/story/story.php?storyId=103437607.

34. *Id.*

35. KAPLAN, *supra* note 11, at 23.

36. *Id.* ("[Smart meters have] the ability to signal homeowners and businesses that power is expensive and/or in tight supply. This can be done, for instance, via special indicators or displayed through web browsers or other personal computer software. The expectation is that the customer will respond by reducing its power on demand."); *see also* SDGE, The More You

Reducing congestion and conserving energy may provide additional benefits to consumers. General Electric estimates that increased consumer awareness of electricity costs could result in savings of 10 to 20 percent for consumers, simply due to decreases in consumption.[37] Some officials, however, hope to reinforce this behavior by allowing "the utility to automatically reduce the customer's electricity consumption when power is expensive or scarce."[38] More likely, the structure of electricity rates will change, and the fixed electricity prices that most consumers currently pay will be replaced by rates that vary depending on consumer demand.[39] As a result, as electricity demand increases, consumer rates will also increase.[40] Ideally, consumers would respond to increased prices by decreasing their electricity use, which would lower demand and consequently lower prices.[41]

2. Oil Dependence

In addition to improving the transmission system's reliability, this Note argues that Congress also intended for the Smart Grid to decrease the country's oil consumption.[42] The Smart Grid is capable of reducing U.S. dependence on oil in two ways. First, the

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Know, the More You Can Save with Google Power Meter, http://www.sdge.com/myaccount/energynetwork/ (last visited Mar. 14, 2011) (noting that the San Diego Gas & Electric Company has "teamed up with Google" to offer consumers the ability to view their electricity use in real time).

37. Johnson, *supra* note 17.

38. KAPLAN, *supra* note 11, at 23.

39. *Id.* at 26 ("In typical utility rate structures, consumers pay a rate for power that reflects annual average costs. The consumer's rate does not vary from day to day or hour to hour. But if the consumer's rates do not reflect real-time power costs, then the consumer has no immediate economic incentive to respond to utility price signals. For this reason, the smart grid concept is accompanied by new rate structures, such as 'dynamic' pricing in which charges to consumers reflect actual market prices (or marginal production costs) for electricity.... Dynamic rates mean that the price of power would be much higher in the afternoon of a hot summer day when demand peaks and the most expensive generating plants are on-line, than in evening of the same day or on the weekend. With dynamic rates, consumers would have an incentive to respond to utility price signals by reducing demand by turning down the air conditioner or delaying the laundry. If the capability exists, the consumer might sign-up for direct utility control of appliances.").

40. *Id.*

41. *See id.*

42. *See infra* Part II.B.

Smart Grid can provide infrastructure for electric vehicles so that the transportation sector can transition away from using oil as its primary source of fuel.[43] In 2008, the Energy Information Administration found that "71 percent of all petroleum consumed in the United States was used to meet transportation requirements,"[44] and another study showed that "passenger cars and light trucks" constituted 60 percent of the transportation sector's oil consumption.[45] Thus, powering passenger cars and light trucks with batteries charged by the grid instead of petroleum could significantly decrease U.S. oil consumption.

Second, the Smart Grid has the ability to decrease oil consumption by replacing electricity generated from oil with electricity generated from alternative energy sources.[46] Even though only 1 percent of all petroleum consumed by the United States in 2008 was used to generate electricity,[47] the Smart Grid can replace this 1 percent with other generation methods such as wind or solar energy.[48] The Smart Grid might even replace the 1 percent of petroleum used to generate electricity with electric vehicles: "[E]lectric cars will not only be able to draw on electricity to run their motors, they will also be able to do the reverse: send electricity stored in their batteries back into the grid when it is needed."[49] A professor at the University of Delaware estimated that by returning stored energy from car

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43. *See infra* notes 67, 133-34 and accompanying text. This Note is not arguing that electric vehicles are the solution to the nation's dependence on oil. Instead, the point of Part I.A.2 is to discuss the ways in which the Smart Grid can accomplish Congress's additional goal of decreasing dependence on oil through the EISA. As technology improves, better methods of utilizing the Smart Grid in order to decrease oil consumption may develop.

44. ENERGY INFO. ADMIN., ANN. ENERGY REV. 2008, at v (2009), *available at* http://www.eia.gov/FTPROOT/multifuel/038408.pdf [hereinafter ANNUAL ENERGY REVIEW].

45. ENERGY FUTURE COALITION, *supra* note 18, at 45.

46. KAPLAN, *supra* note 11, at 23.

47. ANNUAL ENERGY REVIEW, *supra* note 44, at v.

48. *See* KAPLAN, *supra* note 11, at 23; *see also High Costs of Crude: The New Currency of Foreign Policy: Hearing Before the S. Comm. on Foreign Relations*, 109th Cong. 11-12 (2005) [hereinafter *High Costs of Crude*] (statement of Hon. R. James Woolsey, Vice President, Booz Allen Hamilton) ("In the 1970s about 20 percent of our electricity came from oil, so if one introduced nuclear power, or wind power, one was substituting them to some extent for oil use. Today, that's essentially not true anymore. Only 2 to 3 percent of our electricity comes from oil.").

49. Posting of Kate Galbraith to New York Times Green Blog, http://greeninc.blogs.nytimes.com/2009/02/17/electric-cars-and-a-smarter-grid/ (Feb. 17, 2009, 5:33 EST).

batteries to the grid, "[e]lectrifying the entire vehicle fleet would provide more than three times the U.S.'s power generation."[50]

B. Delegation of Authority To Implement the Smart Grid

Significant coordination and leadership is essential to increase the reliability of the transmission system and decrease oil dependence. Therefore, to implement the Smart Grid and manage its multifaceted applications, Congress delegated control of the Smart Grid to several federal agencies.

Title XIII of the EISA established a Smart Grid Task Force, which is authorized to coordinate implementation of the Smart Grid.[51] The Task Force consists of representatives from the Office of Electricity Delivery and Energy Reliability, Office of Energy Efficiency and Renewable Energy, National Institute of Standards and Technology (NIST), Federal Energy Regulatory Commission (FERC), Department of Commerce, Environmental Protection Agency, Department of Homeland Security, Department of Agriculture, Department of Defense, and others.[52] The key actors in implementing the Smart Grid are the Department of Energy (DOE), NIST, and FERC.[53] The DOE is responsible primarily for "awarding grants for Smart Grid projects and developing a Smart Grid information clearinghouse,"[54] and the NIST is charged with coordinating the "development of an 'interoperability framework' allowing Smart Grid technologies to communicate and work together."[55] The FERC, according to the authority granted to it by the Federal Power Act,[56] may "provide rate incentives for appropri-

50. *Id.*

51. EISA § 1303, 42 U.S.C. § 17383(b) (Supp. I 2009).

52. *See id.*; U.S. Dep't of Energy, Federal Smart Grid Task Force, http://www.oe.energy.gov/smartgrid_taskforce.htm (last visited Mar. 14, 2011) (explaining that the Department of Energy is represented on the Task Force by three of its sub-offices).

53. *Smart Grid Initiatives and Technologies: Hearing Before the S. Comm. on Energy and Natural Resources*, 111th Cong. 7 (2009) [hereinafter *Smart Grid Initiatives and Technologies*] (prepared statement of Suedeen G. Kelly, Comm'r, Federal Energy Regulatory Commission).

54. *Id.*

55. *Id.* Interoperability refers to "the ability of diverse systems and their components to work together." National Institute of Standards and Technology, Smart Grid FAQs, http://www.nist.gov/smartgrid/faq.cfm (last visited Mar. 14, 2011).

56. Federal Power Act, 16 U.S.C. §§ 792-814 (2006).

ate Smart Grid projects, and can provide guidance on cost recovery for such projects."[57]

II. INTERPRETING THE PURPOSE OF THE ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

A. Reliability

Title XIII of the EISA expresses Congress's intent that the Smart Grid improve the transmission system's reliability.[58] Title XIII begins by stating that "[i]t is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure."[59] Congress reiterated this point in section 1303 by charging the Smart Grid Task Force to further "the relationship of smart-grid technologies and practices to infrastructure development, system reliability and security."[60]

To ensure that reliability is not ignored, the EISA creates two programs that support the development of reliability technology. First, section 1304 charges the Secretary of the DOE and the FERC to develop a program that would "test new reliability technologies."[61] Second, section 1306 establishes a federal matching fund that compensates companies for the cost of technology used to improve the reliability of the transmission system.[62] This section lists specific investments that qualify for reimbursement,[63] including, for example, the reimbursement of 20 percent of cost for devices or technology that have "the ability to ... respond to, or recover from system security threats" and decrease congestion.[64]

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57. *Smart Grid Initiatives and Technologies*, *supra* note 53, at 7 (prepared statement of Suedeen G. Kelly, Comm'r, Federal Energy Regulatory Commission).

58. EISA §§ 1301-1306, 42 U.S.C. §§ 17381-17386 (Supp. I 2009).

59. *Id.* § 1301.

60. *Id.* § 1303.

61. *Id.* § 1304.

62. *Id.* § 1306.

63. *Id.*

64. *Id.*

B. Oil Dependence

1. Statutory Interpretation of the EISA

In addition to Congress's reliability instructions, the EISA, and specifically Title XIII, states that Congress intended the Smart Grid to decrease U.S. oil consumption. The most direct expression of the relationship between decreasing oil consumption and the Smart Grid is the introduction of the EISA, which states that the overall purpose of the statute is "to move the United States toward greater energy independence and security,"[65] indicating that each subsequent part of the Act, including Title XIII, should further this general goal. Within Title XIII, Congress also references the issue of oil dependence by discussing alternative energy sources. For instance, section 1301 lists as one of the characteristics of a Smart Grid the "[d]eployment and integration of distributed resources and generation, including renewable resources."[66] Furthermore, section 1304 requires the DOE to support research, development, and demonstration of the Smart Grid, which, in part, is supposed "to promote the use of underutilized electricity generation capacity in any substitution of electricity for liquid fuels in the transportation system of the United States."[67]

A comparison of the frequency of Title XIII's reliability language with Title XIII's references to oil dependence suggests that Congress considered both goals, but focused less on the Smart Grid's potential to reduce U.S. dependence on liquid fuels. This Note, however, refers to the history of the nation's energy consumption and congressional records to show that Congress nevertheless intended for reduction of oil consumption to be a goal of Title XIII, a goal that is equally important to reliability.[68]

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65. *Id.* at Introduction.

66. *Id.* § 1301. As explained in Part I, connecting renewable energy sources to the grid is one way to reduce oil consumption.

67. *Id.* § 1304; *see also Energy Bar Association Panel Discussing the Smart Grid*, 31 ENERGY L.J. 81, 90 (2010).

68. *See infra* Part II.B.2-3.

2. Evolution of the Nation's Energy Policy

Though Title XIII briefly mentions liquid fuels,[69] it fails to convey fully Congress's intent that the Smart Grid alleviate U.S. dependence on oil. The history behind the EISA, however, illustrates Congress's long-standing struggle with oil consumption[70] and suggests that when Congress passed the EISA, it intended for the entire Act, including Title XIII, to finally absolve the nation of its dependence on oil.

For decades, Congress has attempted to implement a U.S. energy policy that would successfully decrease U.S. reliance on oil. After World War II, the United States became a net importer of oil for the first time in history, bringing attention to the issue of oil dependence.[71] Even in 1942, there was concern over the significance of importing oil from foreign countries.[72] Sumner Pike, an employee of the Securities and Exchange Commission, stated that "[w]e might just as well get started ... and effect the transition from an exporting to an importing nation gradually in the meantime not trying to find all our domestic oil at once."[73]

In the 1950s, oil consumption only increased.[74] The 1956 extension of the U.S. interstate highway system to include an additional 47,000 miles of highways "encouraged the expansion of commercial trucking, family vacations, [and] daily commutes."[75] In response to the increase in demand for gasoline and diesel fuel, President Eisenhower implemented quotas on foreign petroleum in order to protect national security interests and American oil producers.[76] As

69. *See, e.g.*, EISA § 1304.

70. Nancy I. Potter, Note, *How Brazil Achieved Energy Independence and the Lessons the United States Should Learn from Brazil's Experience*, 7 WASH. U. GLOB. STUD. L. REV. 331, 333 (2008) (noting that energy independence is "a goal that the United States has been chasing without success since the energy crisis of the 1970s").

71. JAY HAKES, A DECLARATION OF ENERGY INDEPENDENCE 13 (2008); *see also* VITO A. STAGLIANO, A POLICY OF DISCONTENT: THE MAKING OF A NATIONAL ENERGY STRATEGY 2-69 (2001) (describing the rise of natural resources planning during the presidencies of Franklin Delano Roosevelt and Harry Truman).

72. *See* HAKES, *supra* note 71, at 14.

73. *Id.*

74. *See id.* at 14-15.

75. *Id.*

76. *Id.* at 15; *see also* CONG. Q., ENERGY POLICY 17 (2d ed. 1981) [hereinafter ENERGY POLICY] ("The Eisenhower administration asked the suppliers of foreign oil to limit their

explained by Jay Hakes, former head of the Energy Information Administration, these quotas "prove[d] far from temporary and [had] significant impacts on later vulnerability to foreign pressure."[77] Throughout the 1960s, these quotas stabilized gasoline prices, encouraged domestic production, and insulated the United States from the Persian Gulf's attempt to create an oil crisis during the Six Day War in 1967.[78]

In 1970, "[d]eclining U.S. oil production, exploding demand, import caps, and new requirements for clean air were creating an almost perfect storm."[79] Exacerbating the country's consumption problem, President Nixon announced a price freeze in 1971, which led to "rapid growth in energy demand."[80] Eventually, demand for energy increased enough that President Nixon removed the quotas on foreign oil.[81] At the same time, President Nixon asked the American public to conserve energy by "turning out lights, tuning up automobiles, reducing the use of air conditioning and heating, and purchasing products which use energy efficiently."[82] But despite these appeals to the public, "net oil imports passed six million barrels a day for the first time," which constituted "36 percent of [the country's oil] consumption,"[83] making the country particularly vulnerable to an oil crisis.[84]

In light of the oil embargo in 1973-1974, "the emphasis of federal energy policy [shifted] toward the recognition of conservation as an explicit policy goal."[85] In the years following the oil embargo, Congress passed several bills addressing energy consumption,

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imports voluntarily to about 12 percent. But that didn't work, and Eisenhower decided in 1959 to impose mandatory quotas.").

77. HAKES, *supra* note 71, at 15.

78. *Id.* at 15-16.

79. *Id.* at 17.

80. *Id.* at 20.

81. *Id.* at 21.

82. *Id.* at 22. President Nixon also tried to reduce oil consumption by using speeches to educate the public regarding the country's oil dependence. ENERGY POLICY, *supra* note 76, at 3.

83. HAKES, *supra* note 71, at 23.

84. *See* ENERGY POLICY, *supra* note 76, at 7.

85. John M. Quigley, *Residential Energy Conservation: Standards, Subsidies, and Public Programs*, *in* REGULATORY CHOICES: A PERSPECTIVE ON DEVELOPMENTS IN ENERGY POLICY 290, 291 (Richard J. Gilbert ed., 1991).

including the Energy Policy and Conservation Act of 1975.[86] The Act had several provisions, including a provision that created "a strategic petroleum reserve with a capacity of one billion barrels," which was supposed to help insulate the United States from the effects of another oil embargo.[87] The Act also authorized the federal government to force electric generators to use coal instead of liquid fuels, required states to institute plans to decrease oil consumption by 5 percent by 1980, and implemented fuel efficiency standards for vehicles.[88] Though the Act promoted energy independence,[89] some members of Congress felt that the bill did not go far enough, calling it "an absolute and total disaster," "worse than nothing," and an "energy cop-out."[90]

When Jimmy Carter became President, he announced that fighting the nation's dependence on foreign oil was "the moral equivalent of war," and he submitted an energy plan to Congress that focused on energy conservation.[91] In 1978, Congress passed President Carter's energy plan, called the National Energy Act, which President Carter signed into law on November 9, 1978.[92] Although the President hoped Congress would pass a second version of the National Energy Act (NEA II), Congress ratified only the

86. *See* HAKES, *supra* note 71, at 42.

87. *Id.* at 43.

88. *Id.*

89. *Id.*

90. *Id.*

91. *Id.* at 46.

92. STAGLIANO, *supra* note 71, at 37. For a description of the mood leading up to the passage of the bill, see ENERGY POLICY, *supra* note 76, at 3-4, and Quigley, *supra* note 85, at 291-92. The National Energy Act had five components: (1) the National Energy Conservation Policy Act (NECPA), (2) the Powerplant and Industrial Fuel Use Act (PIFUA), (3) the Public Utilities Regulatory Policy Act (PURPA), (4) the Energy Tax Act, and (5) the Natural Gas Policy Act (NGPA). *Id.* At the time of the bill's passage, President Carter's Energy Secretary, James Schlesinger, said that the bill would "be deemed a success if it achieved seven quantitative goals," such as "[u]se of solar energy in more than 2.5 million homes" and "[r]eduction of gasoline consumption by ten percent below 1977 levels." *Id.* at 35; *see also* HAKES, *supra* note 71, at 46-47 (describing President Carter's energy initiative); Alan J. Cox, Carl J. Blumstein & Richard J. Gilbert, *Wind Power in California: A Case Study of Targeted Tax Subsidies*, *in* REGULATORY CHOICES: A PERSPECTIVE ON DEVELOPMENTS IN ENERGY POLICY 347, 348 (Richard J. Gilbert ed., 1991) ("When Congress passed the National Energy Act in 1978, it hoped to achieve several objectives. These objectives included the enhancement of energy security after the 1973 oil embargo by reducing the share of imported oil used in U.S. energy production. Congress also wanted to encourage the development of cleaner, less environmentally damaging sources of energy.").

"windfall profits tax" and the Synthetic Fuels Corporation.[93] The windfall profits tax used revenues from taxes on the oil industry to offer incentives to homeowners and businesses to switch to renewable energy sources.[94] In addition, windfall profits tax revenues were used to give financial support to low income families impacted by high energy prices.[95] The Synthetic Fuels Corporation, also created by Congress, allocated loans to private industries for developing alternatives "for natural gas and oil from coal, oil shale, tar sands, and water (hydrogen)."[96]

After President Reagan removed many of the federal government's regulations pertaining to petroleum, Congress responded to the Persian Gulf War by enacting another national energy policy.[97] In 1992, Congress succeeded in passing the Energy Policy Act, which primarily reformed the electric industry in an effort to increase competition.[98] Although environmentalists had lobbied Congress to pass a bill that would raise "auto efficiency standards 40 percent by 2001," Congress refrained from doing so, and instead passed a bill that "failed to contribute any measures that had much effect on U.S. energy independence."[99] One supporter of the bill was Energy Secretary James Watkins, who believed that this bill represented a significant achievement by the Bush administration; the administration, on the other hand, appeared to believe that the bill lacked substantive reform, and President George H.W. Bush attempted to distance himself from the legislation even before signing it.[100]

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93. *See* STAGLIANO, *supra* note 71, at 42.

94. HAKES, *supra* note 71, at 64.

95. *Id.*

96. *Id.* at 64-65; *accord* STAGLIANO, *supra* note 71, at 42. The Synthetic Fuels Corporation operated for seven years but "produced not a single cost-effective barrel of fuel" and "managed to rack up federal debt obligations of over $2 billion." STAGLIANO, *supra* note 71, at 42; *cf.* HAKES, *supra* note 71, at 64 (explaining that "[t]urmoil in the Persian Gulf provided the final impetus to passage of most of Carter's second wave of energy proposals").

97. HAKES, *supra* note 71, at 71-77.

98. Michael Coyn Mateer, Case Note, *When the Lights Go Out: The Impact of House Bill 6 on Regional Transmission Organizations and the Reliability of the Power Grid*, 12 GEO. MASON L. REV. 775, 788 (2004).

99. HAKES, *supra* note 71, at 81.

100. *See* STAGLIANO, *supra* note 71, at 408.

In 2001, the United States began to feel some of the impacts of importing large amounts of oil at high prices.[101] The U.S. energy trade deficit for 2001 was approximately $110 billion, and by 2006, the deficit rose to approximately $300 billion.[102] In response to concern over oil prices and consumption, President George W. Bush signed the Energy Policy Act of 2005 (EPAct of 2005).[103] The EPAct of 2005 promoted renewable fuels by creating the Renewable Fuels Standards, which required the country to use a certain amount of renewable fuels[104] and encouraged consumers to install efficient energy systems in their homes and businesses.[105] According to one scholar, however, the overall impact of the EPAct of 2005 was "rather inconsequential."[106]

In 2007, Congress appeared ready to implement a comprehensive energy policy and passed the EISA.[107] Congress designed this new energy policy to be comprehensive in the hope that it would solve the nation's systemic energy problems.[108] One particular achievement of the bill was that it implemented stricter automobile efficiency standards, requiring new vehicles to get thirty-five miles per gallon by 2020.[109] Overall, the EISA was different from past energy policies in a variety of ways, but it was particularly unique because it was "an energy package with real teeth."[110]

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101. *See* HAKES, *supra* note 71, at 86.

102. *Id.*

103. *Id.* at 86-87.

104. FRED SISSINE, CONG. RESEARCH SERV., ENERGY INDEPENDENCE AND SECURITY ACT OF 2007: A SUMMARY OF MAJOR PROVISIONS 1-2 (2007), *available at* http://energy.senate.gov/public/_files/RL342941.pdf.

105. *Id.*

106. HAKES, *supra* note 71, at 87.

107. EISA, Pub. L. No. 110-140, 121 Stat. 1492 (codified as amended in scattered titles of the U.S.C.); *see also* HAKES, *supra* note 71, at 87.

108. *See* HAKES, *supra* note 71, at 88.

109. EISA § 102, 49 U.S.C. § 32902 (Supp. II 2009); HAKES, *supra* note 71, at 87-88.

110. HAKES, *supra* note 71, at 87. *Compare* Energy Policy Act of 2005, Pub. L. No. 109-58, § 1252, 119 Stat. 594, 963-64 (encouraging public utilities to implement smart metering), *with* EISA § 1301, 42 U.S.C. § 17381 (Supp. I 2009) (calling for federal agencies "to support the modernization of the Nation's electricity transmission and distribution system").

3. Congressional Records for the EPAct of 2005 and the EISA of 2007

In addition to the history leading up to the passage of the EISA, congressional testimony surrounding the passage of the EPAct of 2005 provides insight into the possible influences and considerations of some members of Congress leading up to the EISA's passage. In committee hearings that took place between 2005 and 2007, individuals expressed concern that Congress had failed to pass an energy policy that would decrease the country's dependence on oil.[111] They were concerned with decreasing oil consumption primarily for two reasons:[112] complications caused by competing with China and India for oil,[113] and political instability caused by the power wielded by energy-rich nations.[114]

a. Competition

In 2005, the Committee on Foreign Relations held a hearing called "Energy Trends in China and India."[115] The hearing began

111. *See, e.g.*, *The Hidden Cost of Oil: Hearing Before the S. Comm. on Foreign Relations*, 109th Cong. 1-2 (2006) [hereinafter *Hidden Cost of Oil*] (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations) (noting the "six basic threats" associated with the country's continued dependence on foreign oil); *High Costs of Crude*, *supra* note 48, at 27-28 (statement of James Schlesinger, Senior Advisor, Lehman Brothers) ("The energy bill was quite useful. But it dealt essentially with shorter term problems: The failure to build our infrastructure; the difficulty in stringing out transmission lines or pipe lines; it eased a number of those problems and that was desirable. But it doesn't ... deal with this longer term problem that for two centuries we have been dependent on the growth of our economies and on the rise of living standards of the exploitation of a finite resource which is oil.").

112. Lawmakers actually referred to six different threats that they believed the United States would face if the country continued to rely on foreign oil, but this Note addresses only two of those threats. To read more about the six threats mentioned, see *Hidden Cost of Oil*, *supra* note 111, at 2-3 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

113. *Id.*

114. *Id.*

115. *Energy Trends in China and India: Implications for the United States: Hearing Before the S. Comm. on Foreign Relations*, 109th Cong. 1-5 (2005) [hereinafter *Energy Trends in China and India*] (statements of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations and E. Anthony Wayne, Assistant Secretary for Economics and Business Affairs, Department of State) (presenting the forecasts and predictions for China and India's growth in energy consumption); *see also Hidden Cost of Oil, supra* note 111, at 2 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations) (reiterating the concern that

with the Chairman of the Committee on Foreign Relations, Senator Richard Lugar, summarizing the results of the December 2004 National Intelligence Council Report.[116] The Report indicated that "the single most important factor affecting the demand for energy will be global economic growth, especially that of China and India."[117] Senator Lugar also noted that the two countries' booming economic growth was responsible for this increased demand: "China reportedly will need to boost its energy consumption over the next 15 years by about 150 percent" and "India will need to nearly double its energy consumption to maintain its growth rates."[118] In light of these statistics, some members of Congress feared that the United States would have difficulty competing for resources.[119]

In the same committee hearing, Mikkal Herberg, the Director of the Globalization and Asian Energy Security Program, described the effect of increased energy demand on U.S.-China relations.[120] China, he said, considered the United States to be its predominant rival in the fight to secure energy resources, which had led to a "sense of ... antagonism" between China and the United States.[121] As the competition between the United States and China for oil supplies increased, Director Herberg said it was unclear whether China would have a competitive or collaborative attitude.[122] These concerns about competition for oil and political instability led Senator

China's and India's growth will place stress on fossil fuel reserves); *High Costs of Crude, supra* note 48, at 1 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations) (explaining the concern that there will not be enough fossil fuels in the near future to support the growth in the West, China, and India).

116. *Energy Trends in China and India*, *supra* note 115, at 1 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

117. *Id.*

118. *Id.*

119. *See, e.g.*, *Energy Trends in China and India, supra* note 115, at 20-21 (statement of Sen. George Allen).

120. *Id.* at 28-30 (statement of Mikkal Herberg, Director, Globalization and Asian Energy Security Program, National Bureau of Asian Research).

121. *Id.* at 28.

122. *Id.* at 34 ("Through its search for energy security China also is on the way to becoming a major geopolitical player ... with a growing capability to complement or complicate U.S. interests in these regions.").

Lugar to recommend that oil consumption be the focus of the U.S. energy policy, as opposed to energy consumption in general.[123]

b. Political Instability

During a different hearing, called "The Hidden Cost of Oil," individuals expressed concern that the concentration of oil supplies in a few countries gave these energy-rich nations significant control over other states.[124] In fact, Senator Lugar had noted in a previous hearing that Iran had already attempted to exert control over the United States by threatening to "use oil as a weapon to protect its nuclear ambitions."[125] In addition to political power, Senator Lugar was concerned about the economic threat that energy-rich nations posed to the United States.[126] To illustrate the control that oil prices had on the U.S. economy, Dr. Hillard Huntington, Executive Director of the Energy Modeling Forum at Stanford University, showed a graph indicating that "oil price shocks preceded 9 out of the last 10 recessions in the United States."[127] Milton Copulos, President of the National Defense Council, explained that oil price shocks were likely to continue due to the instability of some of the main oil providers, namely Saudi Arabia, Venezuela, Nigeria, and Iraq, which supply 38.2 percent of U.S. imports.[128] Implicit in this conversation was the fact that the United States would have to

123. *Id.* at 3 (statement of E. Anthony Wayne, Assistant Secretary for Economics and Business Affairs, Department of State) ("Although coal still comprises over 50 percent of each of these two countries' primary energy consumption, it's been the growing share of oil—and particularly imported oil—in each country's energy mix that has captured the attention of the world.").

124. *Hidden Cost of Oil, supra* note 111, at 2 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

125. *High Costs of Crude*, *supra* note 48, at 2 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

126. *Hidden Cost of Oil, supra* note 111, at 2 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

127. *Id.* at 13 (statement of Dr. Hillard Huntington, Executive Director, Energy Modeling Forum, Stanford University).

128. *Id.* at 4 (statement of Milton R. Copulos, President, National Defensive Council Foundation) ("Out of our top six suppliers, four—Saudi Arabia, Venezuala, Nigeria, and Iraq—which supply 38.2 percent of our imports, 22.6 percent of total production, are of, at least, questionable reliability.").

decrease its dependence on foreign oil in order to override the influence of energy-rich nations on the U.S. economy.

Near the end of the hearing, however, Dr. Huntington pointed out that solely decreasing foreign oil consumption would not be enough to overcome the threats of energy-rich nations.[129] Dr. Huntington explained that as long as the United States remained dependent on oil, whether produced domestically or abroad, the nation would be tied to the global oil markets.[130] A spike in oil prices in one part of the world would increase prices in the United States even if the country produced all of its oil domestically.[131] In order to achieve true independence from foreign oil producers, Dr. Huntington elaborated, the United States would have to fuel its markets with energy sources other than oil.[132] Simply decreasing the nation's consumption of foreign oil would not be enough.

In a different hearing, Senator Lugar suggested that the solution to oil dependence was to give American consumers a choice of automotive fuel.[133] Even in 2005, the transportation sector accounted for 60 percent of U.S. oil consumption, and Senator Lugar suggested that America power its vehicles with biofuels or ethanol.[134] Regardless of how Congress chose to decrease oil consumption, Senator Lugar and his committee were aware that U.S. oil dependence must be addressed and that converting the transportation sector to an alternative fuel was a viable way to achieve this goal.

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129. *Id.* at 14 (statement of Dr. Hillard Huntington, Executive Director, Energy Modeling Forum, Stanford University).

130. *See id.*

131. *Id.* ("One should view the world oil market as one giant pool, rather than a series of disconnected puddles. When events happen overseas anywhere in the market, they will raise prices not only there, wherever the disruption is, but also everywhere that connect[s] to that larger pool. And since reducing our imports with our own production does not sever this link to the giant pool, disruptions will cause prices to rise for all production, including that originating in the United States.").

132. *Id.* ("So, more domestic supplies, by themselves, do not really protect us from these price shocks. Reduction in our use tends to be more effective.").

133. *High Costs of Crude*, *supra* note 48, at 2-3 (statement of Sen. Richard G. Lugar, Chairman, S. Comm. on Foreign Relations).

134. *Id.*

4. Controversy Surrounding the EISA of 2007

The EISA of 2007[135] was an omnibus energy bill.[136] In its final version, the bill encouraged energy efficiency and renewable energy sources by increasing the corporate average fuel economy standards, renewable fuel standards, and appliance and lighting efficiency standards.[137] But the version of the EISA that Congress ultimately passed differed significantly from the bill's original text.[138] Through a series of negotiations, the House of Representatives and the Senate agreed on an energy bill, which included a renewable energy portfolio standard (RPS) and repealed oil and gas subsidies,[139] indicating Congress's intent that the EISA decrease dependence on oil. But before Congress could pass the bill, the White House threatened to veto the Act if these provisions were not removed;[140] consequently, Congress amended the bill to eliminate the most controversial provisions.[141]

Although Congress removed the RPS and the repeal of oil and gas subsidies from the EISA,[142] Congress's intent in passing the Act remained the same. Before voting on the final version of the legislation, House Representative Lois Capps, a co-sponsor to the EISA, said, "We are taking a major step toward ending our dependence on foreign oil."[143] Representative Peter Welch, also a co-sponsor of the bill, explained that "this is historic legislation. Today, we will move from a policy of dependence on foreign oil ... to a policy of independ-

135. EISA, Pub. L. No. 110-140, 121 Stat. 1492 (codified as amended in scattered titles of the U.S.C.).

136. SISSINE, *supra* note 104, at 1.

137. *Id.*

138. *See id.* at 3-4.

139. An RPS requires public utilities to generate a certain amount of electricity from renewable energy sources. The House of Representatives originally passed House Bill 6 with an RPS of 15 percent, meaning that by 2020, 15 percent of total electricity sales would come from renewable energy sources. *See id.* at 3. "Energy tax subsidies" refer to a portion of the original bill passed by the House of Representatives whereby renewable energy electricity production would have received four years of tax credits. *See id.*

140. *Id.* at 4.

141. *Id.*

142. *Id.* at 3-4.

143. 153 CONG. REC. H16,650 (daily ed. Dec. 18, 2007) (statement of Rep. Lois Capps).

ence and efficiency."[144] By passing the EISA, Congress communicated its approval of this overarching, national goal.

III. IMPLEMENTING THE SMART GRID

A. Current Implementation of the Smart Grid

As explained in Part I, the EISA placed the Office of Electricity Delivery and Energy Reliability in charge of coordinating the Smart Grid Task Force and reporting on the Smart Grid's progress to Congress.[145] Additionally, the DOE was responsible for developing a Smart Grid Advisory Committee and allocating grants for Smart Grid projects.[146] In fulfillment of its new role, the DOE awarded grants and worked on critical infrastructure issues. In 2009, the American Recovery and Reinvestment Act significantly increased the DOE's spending power by allocating $4.5 billion for investment in the Smart Grid and "funding for smart grid activities."[147] Some notable Smart Grid grants stemming from the stimulus bill include a $47 million grant for eight Smart Grid demonstration projects in seven states[148] and $3.9 billion for projects that incorporate renewable resources into the transmission system.[149] In May 2009, the DOE, in connection with other federal agencies, also created the first set of interoperability standards for the Smart Grid and allocated $10 million to the NIST, which was meant to aid the agency in its continued development of interoperability standards.[150]

144. 153 CONG. REC. H16,651 (daily ed. Dec. 18, 2007) (statement of Rep. Peter Welch).

145. EISA §§ 1302-1303, 42 U.S.C. §§ 17382-17383 (Supp. II 2009).

146. *Smart Grid Initiatives and Technologies*, *supra* note 53, at 7 (prepared statement of Suedeen G. Kelly, Comm'r, Federal Energy Regulatory Commission).

147. *Id.* at 3 (statement of Sen. Lisa Murkowski).

148. Press Release, U.S. Dep't of Energy, Secretary Chu Announces More than $57 Million in Recovery Act Funding To Advance Smart Grid Development (July 20, 2009), *available at* http://www.energy.gov/news/7670.htm.

149. Press Release, U.S. Dep't of Energy, Obama Administration Announces Availability of $3.9 Billion To Invest in Smart Grid Technologies and Electric Transmission Infrastructure (June 25, 2009), *available at* http://www.energy.gov/news/7503.htm.

150. Press Release, U.S. Dep't of Energy, Locke, Chu Announce Significant Steps in Smart Grid Development (May 18, 2009), *available at* http://www.energy.gov/news/7408.htm.

B. The Smart Grid System Report

As required by section 1302 of the EISA, the Office of Electricity Delivery and Energy Reliability reported on the progress of the Smart Grid in the Smart Grid System Report.[151] The report stated that there had been high growth with respect to connecting renewable resources and generators to the grid, but that "other concepts associated with [the] smart grid [were] in a nascent phase of deployment."[152] The "other concepts" referred to technology such as grid-sensitive appliances and electric vehicles.[153] Advancements in smart meters proved promising; they were gaining increased attention from businesses and policymakers, even though "penetration of [the] systems [was] still low."[154]

Of course, implementing the Smart Grid and better understanding its progress will take time: "Initial efforts to use Smart Grid technologies are still being implemented and analyzed. Even comprehensive pilot projects ... are in the early stages of development and data gathering."[155] In the meantime, reflecting on the purpose of the Smart Grid can help ensure that it continues to develop in a way that satisfies the dual goals of the EISA.

CONCLUSION

The relationship between Title XIII of the EISA and the U.S. dependence on oil should be considered with respect to the Smart Grid for two reasons. First, the EISA was intended "[t]o move the United States toward greater energy independence and security," and the Smart Grid has the potential to help the United States achieve this goal.[156] Second, there are high costs associated with

151. EISA § 1302, 42 U.S.C. § 17382 (Supp. II 2009). Section 1302 requires the Office of Electricity Delivery and Reliability, an office within the Department of Energy, to "report to Congress concerning the status of smart grid deployments nationwide and any regulatory or government barriers to continued deployment." *Id.*

152. U.S. DEP'T OF ENERGY, SMART GRID SYSTEM REPORT, at iii (2009).

153. *Id.*

154. *Id.*

155. *Smart Grid Initiatives and Technologies*, *supra* note 53, at 9 (prepared statement of Suedeen G. Kelly, Comm'r, Federal Energy Regulatory Commission).

156. EISA, Pub. L. No. 110-140, Introduction, 121 Stat. 1492, 1492; *see also* U.S. DEP'T OF ENERGY, *supra* note 152, at 1.

implementing the Smart Grid, and therefore, the United States should derive as much benefit from the grid as possible.

Estimates projecting the total cost of the Smart Grid range between $100 billion and $2 trillion,[157] and even small projects will cost millions of dollars to implement. For instance, a small scale smart grid project in Miami, Florida, estimated to provide smart meter service to 1 million homes and businesses, will cost approximately $200 million.[158] With so many dollars at stake, it is important for the Smart Grid to generate as many benefits as possible for the United States.

Indeed, current proposals for the next steps of Smart Grid implementation indicate that the Smart Grid may be on its way to providing additional benefits for consumers by integrating alternative energy sources and electric vehicles. In Commissioner Suedeen Kelly's statement before the Committee on Energy and Natural Resources, she reported on the status of Smart Grid implementation and explained that "the next set of targets for prioritization could be standards needed to enable key Smart Grid functionalities."[159] Commissioner Kelly listed examples of such targets, which included addressing "challenges associated with integrating variable renewable resources into the generation mix and reliably accommodating any new electric vehicle fleets."[160] Addressing these sorts of challenges would ensure that implementing the Smart Grid not only improves reliability of the nation's grid but also decreases the United States' dependence on oil.

Perhaps one way to further effectuate Congress's intent—and encourage the deployment of technology that integrates renewable resources or accommodates electric vehicle fleets—would be to use rates to further incentivize specific behavior with respect to the Smart Grid. Since Congress passed the EISA, the Commission already has used the authority granted to it by the Federal Power

157. Jenny Gold, *Putting a Price on Smart Power* (NPR radio broadcast Apr. 27, 2009), *available at* http://www.npr.org/templates/story/story.php?storyId=103545351.

158. Katie Fehrenbacher, *Smart Grid Miami: FPL, GE, Cisco, Silver Spring Rolling Out 1M Smart Meters*, SALON, Apr. 20, 2009, http://www.salon.com/tech/giga_om/clean_tech/2009/04/20/smart_grid_miami_fpl_ge_cisco_silver_spring_rolling_out_1m_smart_meters.

159. *Smart Grid Initiatives and Technologies*, *supra* note 53, at 10 (prepared statement of Suedeen G. Kelly, Comm'r, Federal Energy Regulatory Commission).

160. *Id.*

Act to establish interim rates.[161] Under the Federal Power Act, the Commission has authority to regulate the electricity industry and ensure that public utilities charge rates that are "just and reasonable."[162] These interim rates allow utilities to recover the costs of Smart Grid investments through customer rates.[163] Currently, the interim rate policy defines recoverable Smart Grid equipment as "Smart Grid devices and equipment, including those used in a Smart Grid pilot program or demonstration project."[164]

Another possibility, which scholars have explored in other contexts, is that performance based rates could be used to "provide[] targeted incentives to regulated firms to achieve specific objectives."[165] Performance-based rates are regulations that "encourage a regulated firm to achieve certain performance goals, while affording the firm significant discretion in how the goals are achieved."[166] Theoretically, firms and utilities perform more efficiently under performance-based rates because companies have the potential to earn higher profits than under cost-of-service rates—rate schedules that allow utilities to "recover only the cost of providing the service"[167]—by decreasing their administrative costs.[168] In the United Kingdom, performance-based mechanisms were successful in "stimulating efficient transmission operation, including investment in innovative transmission technologies."[169] In context of the Smart Grid, perhaps performance-based rates would offer an even greater incentive for utilities to accommodate electric vehicles and integrate renewable energy sources.

Regardless of the techniques used, implementation of the Smart Grid should address the dual goals of Title XIII—increase reliability

161. *See* Smart Grid Policy, 74 Fed. Reg. 37,098, 37,109-17 (July 27, 2009).

162. 16 U.S.C. § 824a-3(c)(1) (2006); *see also* Smart Grid Policy, 74 Fed. Reg. at 37,109 (articulating the pertinence of the Federal Power Act to the implementation of the Smart Grid).

163. *See* Smart Grid Policy, 74 Fed. Reg. at 37,109.

164. *Id*.

165. TRANSMISSION GRID STUDY, *supra* note 5, at 32.

166. David E.M. Sappington et al., *The State of Performance-Based Regulation in the U.S. Electric Utility Industry*, 14 ELECTRICITY J. 71, 72 (2001).

167. Federal Energy Regulatory Commission, Glossary, http://www.ferc.gov/help/glossary.asp#C (last visited Mar. 14, 2011).

168. *See* Sappington et al., *supra* note 166, at 72; *see also* TRANSMISSION GRID STUDY, *supra* note 5, at 32.

169. TRANSMISSION GRID STUDY, *supra* note 5, at 32.

of the grid and decrease U.S. dependence on oil—equally. And although the reliability of the Smart Grid must be improved before other advances can be made, it is important to focus on the fact that while a more reliable, efficient transmission system is being developed, emphasis can also be placed on using the Smart Grid to decrease the nation's oil consumption in order to better effectuate Congress's intent and maximize the nation's return on investment in the Smart Grid.

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