PRACTICAL, LEGAL, AND ECONOMIC BARRIERS TO OPTIMIZATION IN ENERGY TRANSMISSION AND DISTRIBUTION

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I. INTRODUCTION

The President has stated that the country that harnesses the power of clean, renewable energy will lead the 21st century. Expanding and modernizing the transmission grid by

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> siting proposed electric transmission facilities will help to accommodate additional electricity generation capacity over the next several decades, including new renewable generation as well as improve reliability and reduce congestion.[1]

Electricity transmission and distribution face practical, legal, and economic barriers to optimization, including conflicting sources of law and regulation, pressure from trends toward renewable energy generation, uncertainty in estimating cost of new transmission and distribution infrastructure, and disagreement over who should bear the cost of new transmission lines to accommodate clean energy. For the purpose of this Comment, transmission and distribution optimization is defined as maximum electricity delivery reliability at the lowest marginal cost. As energy demands increase and electric sources shift to renewable and clean energy sources, transmission lines must accommodate greater loads and adapt to transport power from different geographic areas and new generation facilities.

II. TRANSMISSION MATTERS

Adequate electricity transmission and distribution facilities are a necessary element of a competitive energy market. As electricity demand increases and the rise of renewable energy puts additional strain on the existing transmission grid, practical and legal barriers to transmission investment must come down. This Comment discusses the current legal and practical barriers to transmission optimization and suggests opportunities for improvement. The first part of this Comment defines electricity transmission and transmission reliability and describes current transmission projects proposed in Florida. The Comment next describes the current regulatory structure, from the state-centered approach as it functions in Florida, to the Federal regulation of interstate transmission lines. I then suggest areas of focus for regulators, beginning with Load Pockets. Additionally, renewable energy presents both opportunities and challenges, and I use its entrance into the transmission grid in the Western United States as an example of

1. Memorandum of Understanding Among the U.S. Dep't of Agric., Dep't of Commerce, Dep't of Def., Dep't of Energy, Envtl. Prot. Agency, the Council on Envtl. Quality, the Fed. Energy Regulatory Comm'n, the Advisory Council on Historic Preservation, & Dep't of the Interior, Regarding Coordination in Fed. Agency Review of Elec. Transmission Facilities on Fed. Land 2 (Oct. 23, 2009) [hereinafter Memorandum of Understanding], *available at* http://www.ferc.gov/legal/maj-ord-reg/mou/mou-transmission-siting.pdf.

the information asymmetry problem in transmission citing, planning, and regulatory approval. After laying this uncertain framework, I discuss overall investment in transmission and distribution, negative pressures on transmission investment, and federal stimulus for transmission and distribution investment. Finally, I conclude by suggesting that policymakers must focus on load pockets and congested areas while accommodating the peculiar demands of newly-added renewable energy sources. To do this, regulators must move away from control-driven transmission regulation to proactive and at times creative decision-making, whereby policymakers may overcome even the most difficult barriers to transmission and distribution optimization.

III. TRANSMISSION AND RELIABILITY

Electric power transmission is the transfer of large blocks of power over high voltage (138 to 765 kV) long-distance power lines.[2] High voltage lines have superior conductivity powers as compared to other electric lines, thereby minimizing energy lost through heat and resistance or "line loss."[3]

From the high-voltage transmission line, the electricity flows through a transformer which steps down its voltage for distribution on lower voltage distribution networks.[4] Because electricity cannot be stored in great quantities, electricity flows through this entire process at about the speed of light.[5]

The Energy Information Administration defines reliability as "adequacy of supply and security of operations."[6] According to the EIA, "customers have power when they want it more tha[n] 99 percent of the time. When they do not, weather (ice

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2. *The U.S. Electric Power Industry Infrastructure: Functions and Components*, *in* U.S. ENERGY INFORMATION ADMINISTRATION, THE CHANGING STRUCTURE OF THE ELECTRIC POWER INDUSTRY 2000: AN UPDATE [hereinafter EIA Independent Statistics], http://www.eia.doe.gov/cneaf/electricity/chg_stru_update/chapter3.html (last visited May 9, 2011).

3. *Id.* Some studies have suggested that over 7% of electric power is lost in transmission, and of that loss, 60% is over lines and 40% is over transformers. U.S. CLIMATE CHANGE TECH. PROGRAM, TECHNOLOGY OPTIONS FOR THE NEAR AND LONG TERM 34 (2003), *available at* http://climatetechnology.gov/library/2003/tech-options/tech-options-1-3-2.pdf. *See also* Jim Rossi, The Trojan Horse of Electric Power Transmission Line Siting Authority, 39 ENVTL. LAW 1015, 1019 n.13 (2009), *available at* http://ssrn.com/abstract=1472102.

4. EIA Independent Statistics, *supra* note 2.

5. *Electricity Transmission Fact Sheet*, U.S. ENERGY INFO. ADMIN. INDEP. STATISTICS & ANALYSIS, http://www.eia.doe.gov/cneaf/electricity/page/fact_sheets/transmission.html (last visited May 9, 2011).

6. *Id.*

storms, lightning, and natural disasters like floods) is the primary factor for 70 percent of those outages, followed by animals damaging equipment."[7]

Broader electricity reliability problems due to insufficient transmission capacity are rarely felt yet pose a serious and imminent problem for transmission regulators. Additionally, the stability of the electric power transmission grid and the cascading effect of small-scale power transmission failure has long been a source of national security concern.[8] The blackout of 1965 cut power to New York, Boston, and Toronto.[9] The August 2003 blackout affected New York; Cleveland, Ohio; Detroit, Michigan; and Toronto and Ottawa, Canada.[10] Some experts warn that the next blackout could be even more catastrophic.[11] Clearly, reliability is a major concern for transmission regulators and ratepayers.

IV. NEW TRANSMISSION PROJECTS AFFECTING FLORIDA

Several electric power transmission projects are currently under construction in Florida. Recently the Edison Electric Institute ("EEI") compiled data on transmission investments of its member companies to be completed by or after 2009.[12] EEI reported transmission and non-transmission line investment projects costing at least $50 million and Smart Grid and renewable-energy supporting projects of at least $20 million.[13]

A. Progress Energy

The Dundee–Intercession City project proposes to build twenty miles of 230 kV line from Dundee to Intercession City in central Florida and adds a second circuit 230 kV line using

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7. *Id.*

8. John Markoff & David Barboza, *Academic Paper in China Sets Off Alarms in U.S.,* N.Y. TIMES, Mar. 20, 2010, at A10, *available at* http://www.nytimes.com/2010/03/21/world/asia/21grid.html.

9. Lori A. Burkhart, *Blackouts? Never Again! (But? . . .),* PUB. UTIL. FORTNIGHTLY, Oct. 1, 2003, at 29, 31.

10. *Major Power Outage Hits New York, Other Large Cities,* CNN.COM (Aug. 14, 2003), http://www.cnn.com/2003/US/08/14/power.outage.

11. Burkhart, *supra* note 9, at 31.

12. EDISON ELECTRIC INSTITUTE, TRANSMISSION PROJECTS: AT A GLANCE v (2010), *available at* http://www.eei.org/ourissues/ElectricityTransmission/Pages/TransmissionProjectsAt.aspx.

13. *Id.* at vii.

existing right of way.[14] The cost of the project is estimated at around $50 million.[15]

The Morgan Road–Zephyrhills North project, expected to be in service by December 2013, will build twenty-three miles of new 230 kV line from Zephyrhills North Substation to the new Morgan Road Substation in the greater Tampa Bay area.[16] This project is estimated to cost approximately $74 million.[17]

B. The Southern Company

Smart Grid technology investments of $140 million by the Southern Company will benefit customers in the panhandle region of Florida.[18]

The Holmes Creek–Miller's Ferry project, scheduled to be in service by the summer of 2015, will build forty-five miles of new 230 kV line between Holmes Creek and a new Miller's Ferry 230 kV Switching Station.[19] The project, estimated to cost $82 million, is expected to benefit the central Panhandle, Panama City, and Destin areas of Florida.[20]

The Shoal River–Santa Rosa project, scheduled to be in service the summer of 2015, will construct seventy-three miles of 230 kV line between Shoal River and Santa Rosa and construct a new Santa Rosa 230 kV substation with two 400 MVA transformer banks.[21] The project will cost an estimated $126 million and will benefit Panama City and Destin.[22]

Each of these projects was initiated by the line-owning utility and will eventually be funded by ratepayers.[23] Florida's utility-driven transmission investment approval process provides a useful framework for analyzing regulatory inefficiencies in electric transmission and generation.

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14. *Id.* at 73.
15. *Id.*
16. *Id.* at 74.
17. *Id.*
18. *Id.* at 82.
19. *Id.* at 85.
20. *Id.*
21. *Id.* at 87.
22. *Id.*
23. *Id.* at v.

V. FLORIDA'S TRANSMISSION REGULATORS

According to Edison Electric Institute's State Generation & Siting Directory, there are three regulatory processes governing transmission line siting within Florida: Lines built in conjunction with new generating facilities, lines of 230 kV or higher which cross county lines and are greater than fifteen miles long, and all other lines.[24] Under the Florida Electrical Power Siting Act, all lines built in conjunction with new or modified generation facilities must be approved by the Governor and Cabinet, which act as the Siting Board.[25] The utility must "prepare a comprehensive application document."[26] The Department of Environmental Protection acts as a lead coordinator of an extensive multi-agency review process, including electric and magnetic field reviews.[27]

The process is similar yet separate for 230 kV or higher lines spanning multiple counties and which are longer than fifteen miles.[28] New lines on existing right of ways are exempt from the review process.[29] All other lines are reviewed for environmental impact.[30] For this reason and because of the many wetlands and other protected natural habitats within Florida, additional investment on existing right of ways presents fewer regulatory hurdles as compared to new overland transmission pathways.[31]

Although projects in existing right of ways may be attractive because no permitting is required, investing in additional transmission along existing right of ways may not always be practical or beneficial. Additionally, regulators require that the utility be able to demonstrate the benefit of additional transmission investment to the ratepayers who will ultimately bear the cost of the investment.[32] Any transmission project which duplicates existing "ade-

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24. EDISON ELECTRIC INSTITUTE, STATE GENERATION & TRANSMISSION SITING DIRECTORY: AGENCIES, CONTACTS, AND REGULATIONS 22 (2004) [hereinafter EDISON INSTITUTE SITING DIRECTORY], *available at* http://www.eei.org/ourissues/ElectricityTransmission/Documents/State_Generation_Transmission_Siting_Directory.pdf.

25. FLA. STAT. §§ 403.501 – 403.539 (2010). *See also* EDISON INSTITUTE SITING DIRECTORY, *supra* note 24, at 22.

26. EDISON INSTITUTE SITING DIRECTORY, *supra* note 24, at 22.

27. *Id.*

28. *Id.*

29. *Id.*

30. *Id.* at 23.

31. *See id.*

32. *See* Phillip S. Cross, *Florida Halts Competitive Electric Transmission Project*, PUB. UTIL. FORTNIGHTLY, Aug. 1, 1994, at 44.

quate and reliable" service to a market area is susceptible to rejection by the Florida Public Service Commission.[33]

In order to streamline siting of new transmission lines, one proposal utilizes federal lands to accommodate new renewable energy facilities. On October 23, 2009, the Obama Administration issued a memorandum of understanding among federal transmission regulating authorities regarding review of electric transmission facilities on federal land.[34] The memorandum allows for coordination between agencies and establishment of a lead agency for high voltage transmission projects on federal lands which affect more than one agency.[35] The stated purpose of the memorandum is to coordinate the various regulatory and licensing authorities for such projects and to provide "a single federal point-of-contact."[36]

Over 6,000 miles of transmission line routes called the "West-Wide Energy Corridors" were established over federal lands by the second Bush administration.[37] The corridors have been criticized by environmental groups because of alleged environmental impact to protected lands and because the transmission lines serve mostly coal fired power plants and non-renewable energy sources.[38] Because federal lands may not always be convenient to renewable energy sources such as off-shore wind and biomass, federal land transmission siting provides only a partial solution to the transmission challenge.[39]

Economists tend to agree that regulated markets produce suboptimal service levels.[40] While regulation is inherently costly to tax payers, price control itself raises notable barriers to efficiency and reliability. In order to protect ratepayers from drastic price swings, regulators often freeze rates or enforce price caps. Price caps on regulated utilities create strong incentives for regulated utility firms to cut costs. However, price caps may also create incentives

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33. *Id.*

34. Memorandum of Understanding, *supra* note 1.

35. *Id.* at 3.

36. *Id.* at 2.

37. Kate Galbraith, *Environmentalists Sue Over Energy Transmission Across Federal Lands,* N.Y. TIMES GREEN: BLOG ABOUT ENERGY & ENV'T (July 8, 2009, 2:22 PM), http://green.blogs.nytimes.com/2009/07/08/environmentalists-sue-over-energy-transmission-across-federal-lands/?scp=1&sq=%22federal%20lands%22%20transmission&st=cse.

38. *Id.*

39. *See* Corina Rivera, *ISO New England Study Finds Transmission Must Be Expanded to Integrate Wind,* SNL FINANCIAL (Mar. 9, 2010), http://www.capewind.org/modules.php?op=modload&name=News&file=article&sid=1082.

40. *See* Kevin M. Currier, *Quality-Adjusted Laspeyres Price Caps: A Graphical Analysis,* 34 ATLANTIC ECON. J. 481, 481 (2006).

for such firms to reduce service quality levels to customers.[41] Thus, the utility seeking to optimize profits invests just enough in transmission to support its case for a sufficient return on investment but constantly leverages its position by cutting service levels to customers. Regulators attempt to overcome this tendency by imposing reliability requirements on transmission providers.

VI. MODERN REGULATORY FRAMEWORK

The federal government has passed many regulations aimed at increasing efficiency of electricity delivery to consumers. The recent regulatory strategy has been to separate the elements of the electricity generation and delivery process which may be organized in a free market—such as electricity generation—from the elements of the process which are naturally monopolistic—such as transmission.[42] The goal of this strategy is to use free market competition as much as possible to lower prices and increase service quality.[43]

As a major step in this direction, Congress passed the Energy Policy Act in 1992, giving the Federal Energy Regulatory Commission ("FERC") the power to force a utility owning transmission lines to "wheel" a competing generator's power across or into the utility's grid.[44] This legislation forced transmission grid owners to allow their competitors access to energy grids and allowed generators to compete for wholesale customers.[45] The grid-owning utility was required to sell transmission at a rate which did not unduly discriminate against the competing electricity supplier.[46]

In transmission, electricity flows from its source to a distribution center at approximately the speed of light.[47] The distribution network then transports the electricity to the end consumer.[48] Because electricity flows freely along available pathways and cannot easily be stored or directed, marshalling supply and demand

41. *Id*
42. *Electricity Transmission Fact Sheet*, *supra* note 5.
43. *Id*.
44. Energy Policy Act of 1992, Pub. L. No. 102-486, §§ 721-722, 106 Stat. 2776 (amending Pub. L. No. 101-218) (codified at 42 U.S.C. §§ 12001-12007 and §§ 13201-13556 (1992)).
45. *Id*.
46. *Id.*
47. *Electricity Transmission Fact Sheet*, *supra* note 5.
48. *Id.*

is a complex and highly coordinated process.[49] Ten Energy Reliability Counsels manage the three separate electric power grids in the United States.[50]

In order to distinguish generation and transmission functions more clearly and allow for competition in generation, in 1996, through Order No. 888, the FERC required utilities to separate generation and transmission functions without formal divesture or company spinoffs, a move called "functional unbundling."[51] Order No. 888 required utilities with interstate transmission lines to allow competitors access to transmission under nondiscriminatory terms and conditions.[52] The order allowed transmission companies to charge fees that recovered "legitimate, prudent and verifiable stranded costs associated with providing open access[.]"[53] The FERC found that Independent System Operators (ISOs) could potentially "remedy undue discrimination and mitigate market power[.]"[54] Following the promulgation of Order 888, several ISOs were established. However, the FERC recognized that vertically integrated utilities could still wield significant market power.[55] In Order 2000, the Commission sought to remedy discriminatory behavior by encouraging the voluntary creation of Regional Transmission Organizations (RTOs).[56] The RTOs are commissioned with providing one region-wide transmission rate and a cohesive tariff.[57]

An RTO is a Regional Transmission Organization with the purpose of opening up regional "tight power pools" to allow access for nondiscriminatory transmission.[58] Tampa Electric, Florida Power Corporation, and Florida Power & Light sponsored the application for an intrastate (or single-state) RTO called Grid-

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49. *Id. See also About NERC: Understanding the Grid*, N. AM. ELECTRIC RELIABILITY CORP., http://www.nerc.com/page.php?cid=1|15 (last visited May 9, 2011).

50. *Electricity Transmission Fact Sheet*, *supra* note 47.

51. Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities, 61 Fed. Reg. 21,540, 21,551 (May 10, 1996) (codified at 18 C.F.R. pts. 35 & 385) [hereinafter Promoting Wholesale Competition]. *See also* Preventing Undue Discrimination and Preference in Transmission Service, 73 Fed. Reg. 39,092 (July 8, 2008) (codified at 18 C.F.R. pt. 37); Ray S. Bolze, *Utility Restructuring Drawing Back the Regulatory Curtain: Antitrust Issues and Hypothetical Problems,* 1274 PRACTISING L. INST. CORP. 23 (2001).

52. Promoting Wholesale Competition, 61 Fed. Reg. at 21,540.

53. *Id.*

54. *Id.* at 21,552.

55. Long-Term Firm Transmission Rights in Organized Electricity Markets, 71 Fed. Reg. 43,564, 43,565 (Aug. 1, 2006) (codified at 18 C.F.R. pt. 42).

56. *Id.*

57. *Id.*

58. *Regional Transmission Organizations (RTO)/Independent Systems Operators (ISO)*, FED. ENERGY REG. COMMISSION, http://www.ferc.gov/industries/electric/indus-act/rto.asp (last visited May 9, 2011).

Florida.[59] Some critics of GridFlorida saw its development as an intra-state organization as a power grab by the Florida Public Service Commission.[60] GridFlorida was never recognized as an RTO by FERC.[61]

Some stabilizing projects are too small to fall within the typical ambit of RTO regulation. Such projects are now only initiated by line owners, not RTOs. However, while RTOs do not *recommend* projects to utilities, RTOs typically *approve* these projects.[62] This raises the question of whether RTOs really provide adequate oversight for reliability in a world where transmission improvement and expansion is necessary at multiple levels.[63] It is worth considering whether RTOs should assume the role of proactive planners and advisers with the authority to recommend large and small transmission projects to line owners.[64] Since Florida is not organized as an RTO, Florida has a unique opportunity to establish proactive transmission planning and oversight beyond the typical passive governance of the RTO model.

At the FERC, three offices—the Office of Energy Market Regulation, the Office of Electric Reliability, and Office of Energy Policy and Innovation—oversee transmission and reliability issues.[65] The Director of the Office of Energy Projects approves new line transmission licenses.[66] The Director of the Office of Enforcement manages the various reports transmission utilities must make to the FERC.[67]

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59. Bruce W. Radford, *GridFlorida: The "Island" Transco,* PUB. UTIL. FORTNIGHTLY, Jan. 15, 2001, at 21, *available at* http://www.pur.com/pubs/3646.cfm.

60. *Id.*

61. For a map of the seven RTOs currently in existence or proposed in the United States see *RTO/ISO Map,* FED. ENERGY REG. COMMISSION, http://www.ferc.gov/industries/electric/indus-act/rto/rto-map.asp (last visited May 9, 2011).

62. *See* Camden L. Collins, *Transmission Expansion: Risk and Reward in an RTO World,* PUB. UTIL. FORTNIGHTLY, Aug. 2002, at 46, 48 *available at* http://www.fortnightly.com/result.cfm?i=/3996.cfm.

63. *Id*. at 47.

64. *Id*. at 47-48 ("For example, an RTO finds an automated switch would improve ATC (available transmission capacity) and reduce congestion during enough hours to be cost effective. . . . Should FERC encourage such investments? How would their benefits be measured? Will such investments continue to take place, or will they simply have to wait until the RTO's planning staff and the organization are more mature, and more pressing facilities all have been built?").

65. *See* FED. ENERGY REGULATORY COMM'N, FY 2010 PERFORMANCE AND ACCOUNTABILITY REPORT 4 (2010), *available at* http://www.ferc.gov/about/strat-docs/2010-audit.pdf.

66. *See id.* at 4-6.

67. *What FERC Does*, FEDERAL ENERGY REGULATORY COM'N, http://www.ferc.gov/about/ferc-does.asp (last updated Dec. 3, 2010); *see also* FY 2010 REPORT, *supra* note 65, at 5. For example, FERC reviews Reports of Transmission Investment Activity, FERC-730. FERC Order 730 is available at http://www.ferc.gov/whats-new/comm-meet/2009/121709/E-6.pdf.

The Electricity Modernization Act of 2005 was enacted August 8, 2005, as Title XII, Subtitle A, of the Energy Policy Act of 2005 (EPAct 2005).[68] This section empowered an Electric Reliability Organization, certified by FERC, to "develop mandatory and enforceable Reliability Standards" in order to "facilitate the reliable operation of the Bulk-Power System[,]" "subject to Commission review and approval."[69] The FERC certified the North American Electric Reliability Council (NERC) as the ERO.[70] Although the NERC was in existence since 1965,[71] this certification gave it additional authority to establish specific standards of transmission reliability. The FERC was commissioned to approve reliability standards developed by NERC which are "just, reasonable, not unduly discriminatory or preferential, and in the public interest."[72] Once approved, either the NERC or the Commission may directly enforce such provisions.[73]

VII. REGULATORY BARRIERS TO OPTIMIZATION

As a result of legislation requiring utilities to allow access to competitors, transmission lines have become goods in public service. Under the Takings Clause of the Constitution, transmission–line–owning utilities are entitled to earn a reasonable rate of return on assets surrendered to public service.[74] Utilities often assert that a regulatory taking has occurred where state regulators set rates which the utility claims are unreasonably low. The Fifth Amendment, as applied to states through the Fourteenth Amendment, bars such a taking without due process of law.[75] Thus, rate-

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68. Electricity Modernization Act of 2005, Pub. L. No. 109-58, § 215, 119 Stat. 941 (2005). EPAct 2005 amended the Federal Power Act to include section 215.

69. Revised Mandatory Reliability Standards for Interchange Scheduling and Coordination, 74 Fed. Reg. 68,372, 68,372 (Dec. 24, 2009) (codified at 18 C.F.R. pt. 40).

70. *Id.* (citing Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval and Enforcement of Electric Reliability Standards, Order No. 672, FERC Stats. & Regs. ¶ 31,204, *order on reh'g*, Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006)).

71. *See infra* text accompanying note 85.

72. Revised Mandatory Reliability Standards for Interchange Scheduling and Coordination, 74 Fed. Reg. at 68,372 (citing 16 U.S.C. 824o(d)(2)).

73. *Id.* (citing 16 U.S.C. 824o(e)(3)).

74. James M. Van Nostrand, *Constitutional Limitations on the Ability of States to Rehabilitate Their Failed Electric Utility Restructuring Plans,* 31 SEATTLE U. L. REV. 593, 594 (2008) (citing Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n, 262 U.S. 679, 692-93 (1923)).

75. *Id.* (citing Duquesne Light Co. v. Barasch, 488 U.S. 299, 307-08 (1989), Mich. Bell Tel. Co. v. Engler, No. 00-73207, 2000 U.S. Dist. LEXIS 20875, at *5 (E.D. Mich. Sept. 14, 2000)).

setting involves a hearing process whereby regulated utilities are given the opportunity to present evidence and the opportunity to be heard before the regulatory body. This right is present even if the regulatory body is merely extending a rate freeze.[76] Although the hearing process is designed to protect ratepayers while allowing a reasonable rate of return for utilities, the constant necessity for such hearings is a costly barrier to optimization.

The tension between state and federal regulation poses an additional barrier to transmission optimization. Historically, siting and permitting of electric transmission facilities has been discretely under the jurisdiction of state government.[77] For that reason, the national transmission networks are a "patchwork" of individual, state-approved facilities.[78] However, transmission lines which span states are subject to federal regulations. In 1997, regulatory authority over such systems was given to the FERC.[79] FERC's authority covers approximately 73% of all power transmission in the United States.[80] FERC has jurisdiction over interstate transmission of electricity by investor-owned private utilities.[81] It also has jurisdiction over marketers, pools, exchanges of power, as well as independent system operators (ISOs).[82] FERC approves wholesale electricity rates and reviews Federal Power Marketing Administrations (PMAs) rates.[83]

The North American Electric Reliability Council (NERC) is not a direct arm of the federal government. It was instead established as a not-for-profit private corporation dedicated to enhancing reliability of the power supply.[84] A severe blackout in 1965 originally prompted the creation of the NERC.[85] As a corporation, NERC is comprised of, and owned by, ten regional councils, who collectively are responsible for the coordination, planning, and provision of the North American electricity supply.[86] The Florida Reliability Coor-

76. *Id.* at 595 (citing *Mich. Bell Tel. Co.*, 2000 U.S. Dist. LEXIS 20875, at *47-48).

77. Piedmont Envtl. Council v. Fed. Energy Regulatory Comm'n, 558 F.3d 304, 310 (4th Cir. 2009).

78. *Id.*

79. *See* EIA Independent Statistics, *supra* note 2.

80. *See id.* The EIA notes that the remaining 27% of power transmission is "[f]ederally owned, municipally owned, or owned by cooperative utilities, and is [therefore] not under FERC's jurisdiction." *Id.*

81. *Id.*

82. *Id.*

83. *Id.*

84. *Id.*

85. *Id.*

86. *Id. See also* NORTH AMERICAN ELECTRIC RELIABILITY COMMISSION, http://www.nerc.com/ (last visited May 9, 2011) ("[NERC's] mission is to ensure the reliability of the North American bulk power system. NERC is the electric reliability organization

dinating Council covers "peninsular Florida"—the part of the state east of the Apalachicola River.[87]

Although states are chiefly responsible for intrastate transmission projects, the Federal government has the power to intervene when states fail to act in the public interest. The Federal Power Act (FPA) § 216(b) gives FERC authority to permit transmission facilities in national interest electric transmission corridors if a state has failed to do so for more than a year after the filing of an application.[88] National interest electric transmission corridors are designated by the Secretary of Energy, as authorized by FPA § 216, as having transmission constraints which affect consumers.[89] However, federal permitting under FPA § 216 is still in response to action initiated by a utility and is only triggered if the state fails to issue a permit.[90] Thus, the Federal government has no power under FPA § 216 or otherwise, to initiate transmission investment.[91] Florida does not have any transmission areas currently classified as National Interest Corridors.[92]

The FERC passed Order No. 681, Long-Term Firm Transmission Rights in Organized Electricity Markets in 2006.[93] This order allows transmission-operating utilities to enter into long-term transmission purchase agreements with energy suppliers.[94] On the one hand, this move could be said to encourage transmission

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(ERO) certified by the Federal Energy Regulatory Commission to establish and enforce reliability standards for the bulk-power system. NERC develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast, and summer and winter forecasts; monitors the bulk power system; and educates, trains and certifies industry personnel. ERO activities in Canada related to the reliability of the bulk-power system are recognized and overseen by the appropriate governmental authorities in that country.").

87. FLORIDA RELIABILITY COORDINATING COUNCIL, https://www.frcc.com/default.aspx (last visited May 9, 2011).

88. Piedmont Envtl. Counsel v. Fed. Energy Regulatory Comm'n, 558 F.3d 304, 310 (4th Cir. 2009) (citing Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005)). This section of the FPA was enacted by, and is also referred in this paper as, the Energy Policy Act of 2005 (EPAct 2005).

89. *Id. See also* U.S. DEP'T ENERGY, NATIONAL ELECTRIC TRANSMISSION CORRIDOR REPORT AND THE ORDERED CORRIDOR DESIGNATIONS [hereinafter NATIONAL ELECTRIC TRANSMISSION CORRIDOR REPORT], *available at* http://nietc.anl.gov/nationalcorridor/index.cfm (last visited May 9, 2011).

90. U.S. DEP'T OF ENERGY, NATIONAL ELECTRIC TRANSMISSION CONGESTION REPORT AND FINAL NATIONAL CORRIDOR DESIGNATIONS: FREQUENTLY ASKED QUESTIONS 1 (2007), *available at* http://nietc.anl.gov/documents/docs/FAQs_re_National_Corridors_10_02_07.pdf.

91. *Id.*

92. NATIONAL ELECTRIC TRANSMISSION CORRIDOR REPORT, *supra* note 89.

93. Long-Term Firm Transmission Rights in Organized Electricity Markets, 71 Fed. Reg. 43,564, (Aug. 1, 2006).

94. Fed. Energy Regulatory Comm'n, *FERC Acts on Long-Term Transmission Rights in Midwest ISO and PJM Territories,* TRANSMISSION & DISTRIB. WORLD (May 18, 2007, 2:33 PM), http://tdworld.com/overhead_transmission/ferc-miso-pjm-transmission-rights/.

investment. That is, longer contracts mean more stability and less risk for transmission line owners considering whether to invest in shoring up transmission lines or invest in other less-risky, state-regulated endeavors such as distribution.[95] On the other hand, the move may not be influential at all, since FERC has already historically favored lengthy transmission contracts[96] and longer-term transmission rights imply barriers to entry and less competition in the market.

VIII. RECENT FEDERAL LEGISLATION

Senate Bill 1462, the American Clean Energy Leadership Act, would further increase FERC's authority over transmission lines by expanding upon EPAct 2005.[97] This proposed legislation would give the FERC authority over any proposed transmission project which is part of an interconnection-wide transmission plan and is 345 kV or higher.[98] As part of its new authority, FERC would "condition applications for certificates, right of eminent domain, judicial review, and [would establish] a lead agency role for FERC in conducting environmental reviews under applicable Federal laws."[99] The bill would also give FERC planning and cost-allocation authority.[100] According to the current draft of the bill, FERC will designate Regional Planning Entities (RPEs), which upon designation have one year to submit an Interconnection-wide Transmission Plan.[101] If the RPE fails to submit a plan, FERC would assume the role of planning coordinator, and will accept state or sub-region plans for consideration.[102] The bill would give FERC authority to impose a surcharge (notably not termed a *tax*) for the activities of the RPEs.[103]

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95. *Id.*

96. *See* Richard R. Bradley, *Over the River and (Around) the Woods to Grandma's House We Go: Long-Term Firm Transmission Rights, Transmission Market Power, & Gaming Strategies in a Deregulated Energy Market—An International Comparison*, 30 HOUS. J. INT'L L. 327, 330 n.6 (2008) (noting that FERC has approved contracts spanning twenty to forty years); Joseph T. Kelliher, *Pushing the Envelope: Development of Federal Electric Transmission Access Policy,* 42 AM. U. L. REV. 543, 582 (1993).

97. S. 1462, 111th Cong. § 216(c) (2009).

98. *Id.* § 216(b)(1)(A)(i)(I).

99. Press Release, U.S. Senate Comm. On Energy & Natural Res., Majority Draft on Transmission Siting, (Mar. 10, 2009), *available at* http://energy.senate.gov/public/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=3a67a5ff-4186-4cc0-a636-31528249f746&Month=3&Year=2009&Party=0.

100. *Id.*

101. *Id.*

102. *Id.*

103. *Id.*

Also under the bill, RPEs may file cost-allocation plans (or cost-recovery rates) with FERC, and approval of these rates would be based on a new analysis.[104] The bill seems to include the "just and reasonable" concept, often called the *Mobile-Sierra* presumption, used in prior rate-setting legislation and FERC orders,[105] but adds a provision for renewable energy concerns.[106] Rates will not be approved if they are "not just and reasonable and unduly discriminatory or preferential, *would unduly inhibit the development of renewable generation projects*, would not allow the transmission provider the opportunity to recover prudently incurred costs, including a reasonable return on investment."[107]

Critics of the bill argue that it would result in FERC passing transmission expansion costs to citizens who do not benefit from the new transmission lines.[108] The Coalition for Fair Transmission Policy (CFTP), an organization formed by ten large energy companies[109] in response to the legislation, "supports language in S. 1462 that precludes the allocation of transmission expansion costs to electric consumers unless there are *measurable economic* or *reliability* benefits for those consumers."[110] A provision for societal benefit-allocation from reduced greenhouse gas emissions and energy independence is missing from this standard. Additionally, the proposed legislation would only impact interstate transmission currently under FERC jurisdiction. For projects such as Cape Wind, this bill gives FERC the ability to engage in cost-allocation for any new or proposed *inter*state transmission facilities.[111] However, *intra*state transmission for such projects, for example intrastate transmission of Cape Wind power in Massachusetts, is governed

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104. *Id.*

105. *See generally* Maine Pub. Util. Comm'n v. Fed. Energy Regulatory Comm'n, 520 F.3d 464, 477 (D.C. Cir. 2008) (citing United Gas Pipe Line Co. v. Mobile Gas Serv. Corp., 350 U.S. 332 (1956); FPC v. Sierra Pac. Power Co., 350 U.S. 348 (1956)).

106. Press Release, U.S. Senate Comm. On Energy & Natural Res., *supra* note 99.

107. *Id*. (emphasis added).

108. Jeff St. John, *Utilities Push Back on FERC's Transmission Authority*, EARTH2TECH (Mar. 1, 2010, 11:00 AM), http://earth2tech.com/2010/03/01/utilities-push-back-on-ferc%E2%80%99s-transmission-authority/.

109. *Membership,* COALITION FOR FAIR TRANSMISSION POLICY, http://thecftp.org/Membership.html (last visited May 9, 2011) (listing among its members: CMS Energy Corporation, Consolidated Edison, Inc., DTE Energy Company, Northeast Utilities, PPL Corporation, Progress Energy, Inc., Public Service Enterprise Group, SCANA Company, Southern Company, and the United Illuminating Company).

110. COALITION FOR FAIR TRANSMISSION POLICY, http://thecftp.org/Home_Page.html (last visited May 9, 2011) (emphasis added).

111. *See* Rivera*, supra* note 39.

by state transmission authorities and any relevant regional transmission organization.[112]

IX. RECENT FLORIDA LEGISLATION

The 2008 Energy and Economic Development Legislation was recently enacted with the stated goals of: "Consolidating state energy policy within the Florida Energy and Climate Commission . . . [and] [c]reating a Renewable Portfolio Standard for utilities . . . ."[113] This legislation, if effective, should impact Florida's electricity transmission grid so as to provide access to renewable electricity generation as mandated by the proposed renewable energy portfolio.

Regulatory strategies typically incentivize or penalize to achieve desired results. Incentives are currently in place for renewable energy generation at new or expanded Florida energy production facilities.[114] However, it is unclear how this will impact existing transmission facilities or reliability of the transmission grid. In the current economic environment, it is likely the state will be forced to penalize failure to provide reliability as opposed to providing grants or other incentives to sponsor reliability.

Proposed Florida Senate Bill 1104 would have required the Florida Public Service Commission to adopt rules implementing service standards that utilities must follow in providing reasonable and reliable service.[115] These proposed standards governing investor-owned utilities would be enforced through the Public Service Commission via investigatory and penalty-fee-excising powers.[116] The bill was unsuccessful and eventually died in the Florida Senate Committee on General Government Appropriations on April 30, 2010.[117]

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112. "Cape Wind Associates spokesman Mark Rodgers said March 8 that Cape Wind will pay all of the transmission costs for its proposed Cape Wind Offshore energy project in Massachusetts." *Id.*

113. *2008 Energy and Economic Development Legislation*, DEP'T OF MGMT. SERVICES [hereinafter *2008 Energy and Economic Development Legislation*], http://www.myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/policy_and_resources/2008_energy_and_economic_development_legislation (last visited May 9, 2011).

114. *Id. See also Renewable Energy Tax Incentives,* DEPARTMENT MGMT. SERVICES, http://www.myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/state_energy_initiatives/renewable_energy_tax_incentives (last visited May 9, 2011).

115. Fla. SB 1104 (2010).

116. *Id.*

117. Senate *1104: Relating to Investor-owned Utilities/Service Reliability,* FLA. SENATE, http://archive.flsenate.gov/Session/index.cfm?Mode=Bills&Submenu=1&Tab=session

Although Senate Bill 1104 was unsuccessful, regulators must continue to pursue the aim of increased utility accountability for energy transmission reliability. Although incentive-based programs may be untenable in the current budgetary environment, the state should establish a proactive as opposed to reactionary transmission policy. In order to achieve the best results, policymakers must move toward recommending transmission projects to utilities which are targeted to address congestion, as opposed to retroactively punishing utilities for costly lapses in reliability.

X. TARGET LOAD POCKETS

Typically, many different electricity generators compete to serve one market area. Free-market competition among generators depends upon adequate transmission capacity so that all relevant competitors have access to the market. It is the obligation of regulators to minimize the types of inefficiencies which unnecessarily drive up consumer prices and lower reliability. When transmission capacity to an area is insufficient to meet demand, the free market equilibrium among providers of energy to that area is disrupted, and a "load pocket" is created.[118] A load pocket market maxing out its transmission capacity must rely on local generators to supply electricity during load pocket conditions.[119] These local generators or "must-run" plants have market power during load pocket conditions and therefore often behave monopolistically. [120]

For load pocket markets, an investment in transmission capacity would reduce reliance on must-run local generators and allow distant energy generators or generators locked out by lack of capacity to compete at peak market times. Additional transmission investment with the goal of optimization should focus first on eliminating load pockets and then on improving power quality and accommodating renewable energy. However, new transmission investment is utility-driven; federal regulators do not recommend investments to utilities and are limited to approval power over transmission investment only when states fail to timely exercise their approval power. Because utilities are profit-driven and be-

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(select "2010" as year, then select "1100-1198" in the "jump to" menu on the side, and finally select "1104.") (last visited May 9, 2011).

118. Michael Schmidt, *Some Thoughts About Load Pockets: Thinking Locally, Acting Hopefully,* PUB. UTIL. FORTNIGHTLY, Mar. 1, 1998, at 22, 22.

119. *Id.*

120. *Id. See also* Robert F. Cope III et al., *Modeling Regional Electric Power Markets and Market Power*, 22 MANAGERIAL & DECISION ECON. 411 (2001).

cause utilities seeking rate increases must demonstrate the reasonableness of requiring a higher return on investment, the driving force behind transmission investment is the utility's need to demonstrate reliability. Therefore, if load pockets and other congestion problems driving up consumer prices are to be addressed, regulators must require utilities to invest the most transmission efforts in areas of congestion.

XI. ACCOMMODATING RENEWABLE ENERGY AND THE CHALLENGE OF ESTIMATING TRANSMISSION CONSTRUCTION COSTS

An additional major challenge facing transmission operators and regulators is the trend toward reliance upon renewable energy. Unlike traditional generation facilities, renewable energy generation facilities are necessarily located near the renewable resource.[121] Existing transmission grids are often inconvenient to these facilities or unable to accommodate the additional capacity.[122]

The addition of transmission lines to alternating current networks generally poses integration costs when, as is oftentimes the case, the existing network must be updated to accommodate additional flow.[123] Lines integrating certain renewable energy sources in particular pose integration problems because some renewable sources provide only intermittent or cyclical electricity flow. For example, photovoltaic and wind power are only generating electricity when the wind is blowing or the sun is shining. To accommodate these unpredictable electricity flows, existing transmission lines must be updated and modified. It is difficult enough to predict the weather—the most complex supercomputers are still unable to predict, let alone explain, seasonal occurrences.[124] Predicting the impact of weather-driven electricity flows

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121. EDISON ELECTRIC INSTITUTE, *supra* note 12, at v.

122. Matthew L. Wald, *Wind Energy Bumps into Power Grid's Limits*, N.Y. TIMES, Aug. 27, 2008, at 1.

123. CHRISTENSEN ASSOCIATES ENERGY CONSULTING, ASSESSMENT OF NATIONAL EHV TRANSMISSION GRID OVERLAY PROPOSALS: COST-BENEFIT METHODOLOGIES AND CLAIMS 36 (2010) [hereinafter ASSESSMENT], *available at* http://thecftp.org/uploads/christensen-report-3-2010.pdf.

124. Cheryl Dybas, *Predicting Seasonal Weather,* NAT'L SCI. FOUND., http://www.nsf.gov/news/special_reports/autumnwinter/intro.jsp (last visited May 9, 2011) ("Reliable and accurate weather prediction is vitally important in numerous areas of society, particularly agriculture and water management and weather risks are evaluated by a wide range of businesses, including power distributors who make fewer sales during cool sum-

necessarily requires complex engineering analysis which is still oftentimes unreliable.[125]

XII. THE TRANSMISSION COST ESTIMATE PROBLEM

The problem of accommodating renewable energy is not only an additional pressure on efficient transmission; it also illustrates the problem of information asymmetry in the transmission investment approval and cost estimation process. Utilities exhibit wide variations in per-mile estimated and actual transmission costs even within individual projects. Additionally, transmission-owning utilities and cost estimators disagree about the relevant estimation method, including who should bear the cost of transmission and how benefits should be allocated to ratepayers. Because the regulatory process requires utilities to submit cost estimates to the relevant regulatory agency and for regulators to rely on the accuracy of this information, regulators are faced with an information asymmetry problem. All transmission projects, not just those accommodating renewable energy, are affected by this cost-estimation debate and the resulting information asymmetry problem. Thus, the transmission investment cost estimation debate is worth considering in some detail.

To transport electricity from proposed wind power plants in the sparsely populated west to densely populated cities far away, some parties have proposed a new 765 kV high-voltage transmission line overlay.[126] The costs and benefits of the proposed project have been hotly contested by transmission experts. Because these, like all ordinary distribution and transmission costs, would be passed on to ratepayers, the additional cost of the overlay would have a direct impact on efficiency in power transmission and distribution. American Electric Power extrapolated upon a study by Charles River Associates (CRA) to estimate that the proposed project would cost approximately $1.7 to $2.1 million per mile.[127] The CRA study

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mers and more sales during cold winters. The portion of the U.S. economy sensitive to weather conditions is estimated to be at least $3 trillion.").

125. ASSESSMENT, *supra* note 123, at 36 (Necessary integration investments "include new substations (in other parts of the network), capacitor banks, static var compensators ('SVCs'), or static synchronous compensators ('STATCOMs') to maintain voltage . . . , phase shifters to control power flows, or even added lines to satisfy reliability standards. It is not possible to estimate these kinds of integration costs without detailed engineering studies of the effects of specific projects on the existing grid.").

126. *See id.* at 1.

127. *Id.* at 33.

was for a regional two-loop project with Southwest Power Pool.[128] This was a smaller area than is proposed under the national overlay and it had an estimated total transmission cost of between $2.7 and $3.4 billion.[129] AEP used these figures to extrapolate per-mile costs of the proposed nation-wide overlay.[130]

Policymakers disagree about how to properly estimate costs and benefits of a national high voltage overlay. As one study noted, "[m]ethods for evaluating the benefits of a proposed transmission expansion project, especially the high voltage 765 kV overlay type, are considered to be at the heart of the debate about federal policies regarding energy, climate change and infrastructure investment."[131] This debate highlights the information asymmetry problem in transmission line investment. For example, while engineers typically include order of magnitude cost factors in their capital cost forecasts, governmental studies generally fail to employ these factors.[132] Before a transmission construction project begins, an engineer's estimate of the cost of the project typically provides a contingency cost factor of between 50% below the cost estimate to 200% above the cost estimate[133] to account for various factors, including the potential of hold-outs, unforeseen events, and unusually high contracting prices. As the project progresses, as bids are finalized, and as more factors become known, the expected range of values narrows.[134]

A. Per-mile Variations in Cost Estimates

There are huge variations, even within individual line siting utilities, as to expected costs per mile of 765 kV transmission lines. For example, according to the Christensen Associates report, an AEP/Allegheny Energy PATH Project running 290 miles of 765 kV transmission lines through West Virginia, Virginia, and Maryland demonstrated significant increases in cost estimates over as little

128. *Id.* at 5.

129. *Id.* at 8; CRA INTERNATIONAL, FIRST TWO LOOPS OF SPP EHV OVERLAY TRANSMISSION EXPANSION: ANALYSIS OF BENEFITS AND COSTS 18 (2008), http://www.spp.org/publications/Analysis_of_Benefits_Two_Loop_SPPFinal.pdf.

130. ASSESSMENT, *supra* note 123, at 8.

131. *Id.* at 24.

132. *Id.* at 31-32.

133. *Id.* at 32.

134. For example, the Electric Power Research Institute "recommends a 30% to 50% contingency adder which goes down to 5% to 10% as construction bids are received and contracts finalized." *Id.* (citation omitted).

as one to two years.[135] PATH had filed its cost estimates with three states; West Virginia's ranged from $4.4 million to $5.7 million per mile, which is a nearly 70% increase over early-stage order of magnitude estimates of $2.6 million per mile.[136] Indeed, as large-scale projects move from initial planning through permitting and eventual construction, actual costs tend to vary greatly from initial estimates. The tendency to drastically underestimate costs and later revise cost estimates by such high percentages illustrates the information asymmetry problem in the utility-driven transmission investment process. Because regulators are forced to rely on utility-generated cost estimates, which as discussed are prone to vast variation, the utility-driven transmission investment approval process is somewhat suspect. Whether cost estimates are ultimately to be performed by utilities or independently by regulators, it is clear that regulators and utilities should agree upon a standardized cost estimation method.

B. Debating Interconnection Costs

Additionally, cost estimators disagree about what factors the cost estimation matrix should include. The Christensen study noted that various firms' estimates for the overlay project ranged from $2.1 million to $4.8 million per mile.[137] Utilities note that variations in per-mile costs are attributable to various factors including terrain and population density.[138] These studies also fail to include "(1) the costs of interconnecting the high voltage lines into the grid; (2) other integration costs associated with variable generation; (3) planning, regulatory and siting costs; (4) contingency costs; and (5) the costs of improvements needed to the existing grid to maintain reliability or resolve congestion issues."[139]

By one estimate, substation or interconnection costs accounted for a 25% increase in total transmission costs.[140] However, the Christensen study noted that, according to the limited information available, interconnection costs of 25% are probably the lower limit, and such increased costs may actually be as high as 40%.[141] Thus, estimates which exclude interconnectivity costs

135. *Id.* at 34.
136. *Id.*
137. *Id.* at 3.
138. *Id.* at 8.
139. *Id.* at 10.
140. *Id.* at 35.
141. *Id.*

do not provide apples-to-apples comparison with studies including such costs. Cost estimates should be standardized to require all estimates to account for interconnection costs. As opposed to stating this cost as part of per-mile construction, it could be stated as a separate cost, but either way, it should be included in all estimates.

C. Benefit and Cost Allocation

Cost estimators further disagree as to whether Production Tax Credits should be included as a societal benefit, since the effect of such credits must be borne by all taxpayers.[142] However, this criticism—espoused by the Christensen study—is inconsistent with the parallel criticism that costs should follow benefits.[143] In other words, if the costs are being calculated to the parties directly benefited by the project, then the assessment of benefits should be limited to the same parameters. Thus, it is logical that cost estimators must include tax savings passed on to ratepayers in the costs-avoided calculation.

In determining how to charge back for these costs, utilities are bound by the mandate that costs follow benefits. That is, transmission costs may only be charged to the ratepayers who the utility can illustrate are benefited by the transmission investment. The current debate regarding the national grid overlay centers upon how this analysis is framed.[144] The American Electric Power estimate employed a simplified approach whereby costs were allocated as a flat charge per meter, while the Christensen Associates estimate argued costs should be allocated based on benefits.[145] Basically, if the benefits are socialized, costs may be spread over a broader market, but if the benefits are measured in economic savings per household or households served, then the costs must be borne by a relatively small group. In the same vein, the AEP report notes that its purpose is not to advocate a particular cost allocation methodology, but rather to illustrate rather simply that if costs are spread among a wide service area, benefits of the project outweigh capital

142. *Id.* at 3.

143. *Id.* at 3-4.

144. *Analysis of Benefits and Costs for a U.S. Interstate EHV System*, AEP TRANSMISSION 1 (May 2009) [hereinafter *AEP Analysis*], http://www.aep.com/about/transmission/docs/AEPBenefit-CostforEHVInterstateFINAL.pdf.

145. ASSESSMENT, *supra* note 123, at 3; *AEP Analysis, supra* note 144, at 1.

costs.[146] Of course, it is necessarily true that if the rate-paying base can be broadened, per-capita costs will decline.

D. Environmental Costs and Benefits

A final discrepancy among estimators is whether cost calculations of new transmission lines should account for environmental benefits of the renewable energy sources that the new lines serve. In order to account for environmental impacts of energy choices, the Charles River Associates study applied an $18 per-ton cost of CO_2 emissions.[147] The effect of the proposed wind power generator's reduction in CO_2 emissions translated into an estimated $538 million savings through emission reduction.[148] Thus, investment in transmission lines to accommodate renewable power could be said to allow for greater societal savings in terms of CO_2 emissions avoided. When the problem is framed this broadly, an imposition of costs on a wider market seems more reasonable. Regardless of the particular methodology employed, it is clear that the cost-benefit analysis of transmission to accommodate renewable power must include a financial factor illustrating positive environmental impacts.

After accounting for all of the differences between the two estimates, the AEP estimate resulted in a total cost of $60 to $100 billion for the national EHV overlay,[149] while the Christensen Associates estimate forecasted costs within a range of $150 to $250 billion.[150] Given such a wide range of estimated costs, it is no surprise that regulators, planners, and producers find transmission planning a challenging task.

Variability of expected outcomes through regulatory uncertainty necessarily drives up the risk and cost of capital associated with transmission projects. Regulators are faced with the problem of engaging in a cost accounting debate while attempting sound financial decision-making. The first task of regulators should be to establish standards for cost accounting in-line transmission projects, including a factor for positive environmental impacts of renewable energy. Because renewable energy demands costly integration and transmission investment, accommodating renewable energy will likely not be economically superior to traditional exist-

146. *AEP Analysis, supra* note 144, at 1.
147. ASSESSMENT, *supra* note 123, at 7.
148. CRA INTERNATIONAL, *supra* note 129, at 12; ASSESSMENT, *supra* note 123, at 7.
149. ASSESSMENT, *supra* note 123, at 9.
150. *Id.* at 11.

ing power sources in the short-term, however it may still improve overall optimization from a societal standpoint.[151] However, for regulatory and policy-making purposes, it is imperative that the debate regarding renewable energy be clearly framed in terms of societal choice and energy policy as opposed to hidden behind confusing and conflicting opinions regarding proper cost accounting.

XIII. INVESTMENT IN TRANSMISSION AND DISTRIBUTION

Investment in transmission by investor-owned and public utilities, and municipal and rural cooperatives from 1988 to 2002 averaged $3.6 billion annually.[152] From 2003 to 2004, investment increased to $5 billion annually.[153] The NERC tracks planned investment in transmission and reports outcomes in its Electric Supply and Demand database.[154] According to the NERC, investment levels in 2004 were $500 million to $2 billion.[155]

A 2004 study conducted by Energy Security Analysis, Inc. and commissioned by EEI estimated that investment in transmission would average $10 billion per year.[156] The researchers noted that prior to the Public Utilities Regulatory Policy Act of 1978, utilities built generating facilities in tandem with transmission facilities.[157] However, since the enactment of PURPA and the restructuring that followed, generation facilities have been built in areas inconvenient to the transmission utility.[158] This has resulted in generation surpluses "most notably in the Southeast."[159] Energy surpluses are essentially an opposite of load pockets; however transmission investment provides a solution to energy surpluses in much

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151. Some economists have broadened the institutional change model beyond the traditional outcomes of either encouraging rent-seeking behavior or producing economically efficient results. For a discussion of redistribution of economic advantage through regulation, see Daniel W. Bromley, *Institutional Change and Economic Efficiency*, 23 J. ECON. ISSUES 735, 735-737 (1989).

152. ENERGY SEC. ANALYSIS, INC., MEETING U.S. TRANSMISSION NEEDS vi-vii (2005), *available at* http://www.eei.org/ourissues/ElectricityTransmission/Documents/meeting_trans_needs.pdf.

153. *Id.* at vi.

154. *Id.*

155. *Id.* However, NERC investment data presents only a partial picture, as it fails to include transmission investment below the 230 kV level, and relies on voluntary self-reporting by regional reliability councils regarding the investments planned by the council's respective regional suppliers. *Id.* at vi nn.2-3. NERC also fails to account for upgrades along existing lines because it tracks only new line construction. *Id.* at viii.

156. *Id.* at vii.

157. *Id.* at 3.

158. *Id.*

159. *Id.*

the same way as it mitigates load pockets. Additional transmission lines servicing new generation facilities would transmit surplus power from high production areas to high demand areas.

For this reason, in the future, independent transmission projects will tend to share certain characteristics, including an orientation toward load pockets, where energy and capacity prices are high enough to warrant the cost of dedicated transmission lines.[160] Over the recent past, regulators, policymakers, and energy planners have operated under the assumption that excess capacity from the previous generation is sufficient to absorb growth in demand.[161] However, this excess capacity has been gradually depleted.[162] The effects of the outer transmission limits are more hidden from consumers and planners but are felt in market environments.[163] Industry leaders agree that transmission investment is needed even if renewable energy generation were not a factor.[164]

Because Florida is an area not organized as an RTO, "the transmission planning process tends to be owned by the incumbent utilities, rather than subjected to the extensive discussions and public disclosure that tends to occur in RTO areas."[165] Although public disclosure and review creates transparency and accountability, the fact that Florida is not organized as an RTO could be an opportunity for Florida transmission projects to respond more quickly to changing market circumstances.

XIV. NEGATIVE PRESSURE ON TRANSMISSION AND DISTRIBUTION INVESTMENT

A. The Poor Economy

A June 2009 Newton-Evans CAPEX study indicated that transmission and distribution investment was negatively impacted by the most recent economic downturn.[166] According to Federal figures, electric generation is growing four times faster than

160. *Id.* at 8. Additionally, future projects will favor the more easily controlled DC current and will favor underwater routes as compared to overland routes where possible. *Id.*

161. Mark A. Jamison & Paul Sotkiewicz, *Defining the New Policy Conflicts,* PUB. UTIL. FORTNIGHTLY, July 2006, at 36, 39.

162. *Id.*

163. *Id.*

164. *Id.*

165. ENERGY SEC. ANALYSIS, *supra* note 152, at 27.

166. *Report: 2009 Transmission and Distribution Investment Adversely Affected by Economic Downturn*, TRANSMISSION & DISTRIBUTION WORLD, Oct. 21, 2009 [hereinafter *Report: 2009*], http://tdworld.com/business/newton-evans-td-investment-1009/.

transmission.[167] Transmission and distribution grid infrastructure spending was down by between 15% and 25% for the first nine months of 2009, due in part to an overall 4.4% decline in U.S. electricity consumption, falling retail electricity prices, and lowered industrial consumption.[168] Affected categories included "distribution transformers, capacitors, industrial switchgear and even several protection and control categories."[169]

The Newton-Evans researchers noted that firms were likely holding out investment in infrastructure in anticipation of federal grant money aimed at improving and implementing Smart Grid technology.[170] At the time of the report, Newton-Evans forecasted that, in 2009, transmission and distribution investment in the United States would be between $16 and $17 billion.[171]

B. Return on Investment

Utilities deciding between transmission and distribution projects often favor higher-return distribution projects.[172] This is because distribution—often an intrastate activity—is under the jurisdiction of state regulators, while transmission is typically regulated at the federal level by the Federal Energy Regulatory Commission.[173] Because local regulators tend to approve higher rates of return on invested capital, distribution projects tend to be more advantageous investments for utilities than transmission projects.[174]

XV. FEDERAL STIMULUS FOR TRANSMISSION INVESTMENT

Under the American Recovery and Reinvestment Act (ARRA), the federal government is stimulating investment in Smart Grid technology.[175] In October 2009, the Department of Energy awarded $3.4 billion in Smart Grid Investment Grants (SGIGs) to 100 energy projects throughout 49 states.[176] Ten of these grants were transmission related and most of this subset relates to the instal-

167. Wald, *supra* note 122.
168. *Report: 2009*, *supra* note 166.
169. *Id.*
170. *Id.*
171. *Id.*
172. ENERGY SEC. ANALYSIS, *supra* note 152, at v.
173. *Id.*
174. *Id.*
175. EDISON ELECTRIC INSTITUTE, *supra* note 12, at v.
176. *Id.*

lation of phasor measurement units (PMUs), devices used to simultaneously monitor electricity flow in various parts of the grid.[177] PMUs can be used to improve power *reliability*—prevent and quickly respond to power outages—and improve power *quality*—for example, measure flickering or surging of power.[178] This is one example of Federal action to proactively improve the transmission grid outside of FERC's traditional regulatory approval powers. Additionally, such technology may help transmission planners better identify and alleviate transmission congestion.

Although currently the state of Florida is likely unable to financially stimulate transmission investment, the state's regulatory tools of enforcing reliability standards, combined with federal stimulus funds, may provide adequate mechanisms for a proactive Florida transmission policy. Former Florida Governor Charlie Crist suggested a potential source of creative decision-making, a new consortium of state universities, who may collaborate with policymakers to "bolster and share research and scientific discoveries in energy technologies."[179] By adopting standardized cost-allocation methods and utilizing federal grants to update real-time monitoring of the transmission grid, regulators may be able to focus transmission efforts in the areas they are needed most. Regulators must move toward proactive transmission decision-making, suggesting necessary transmission projects to alleviate congestion, optimize free market conditions, and achieve Florida's renewable energy goals.

XVI. CONCLUSION

Electricity transmission and distribution policymakers face the difficult task of decision-making in a rapidly changing environment. In order to facilitate decision-making, regulation must focus first on standardizing cost accounting for new transmission lines so that regulators may accurately evaluate costs and benefits of new transmission projects. Regulators with the authority to recommend transmission projects should focus on load pockets and

177. *Id. See also* Juancarlo Depablos et al., *Comparative Testing of Synchronized Phasor Measurement Units,* IEEE *1* (2004), http://www.arbiter.com/ftp/datasheets/1133_VirginiaTech_PESGM2004-001296.pdf; Krish Narendra et al., *Calibration and Testing of Tesla Phasor Measurement Unit (PMU) Using Doble F6150 Test Instrument* 1 (on file with author).

178. *Power Quality,* TAMPA ELEC. CO., http://www.tampaelectric.com/surgeprotection/residential/powerquality/ (last visited May 9, 2011).

179. *2008 Energy and Economic Development Legislation*, *supra* note 113.

congested areas while accommodating the peculiar demands of newly-added renewable energy sources. Because it is not organized as an RTO, Florida has a unique opportunity to provide a local proactive solution to transmission reliability challenges as opposed to the typical reactionary approval-only model of the RTO. Although somewhat streamlined, building transmission lines in existing right of ways or on federal lands will not always provide a transmission solution, especially to accommodate renewable energy.

Florida regulators may indeed follow the lofty initiative of former Governor Crist's 2008 Energy and Economic Development legislation to "creat[e] a new consortium of state universities to bolster and share research and scientific discoveries in energy technologies."[180] Universities are an excellent source of informed and proactive electricity transmission problem-solving, especially in the current cash-strapped state budgetary climate. Creative problem solving is not new to the transmission approval process; as discussed in this Comment, federal regulation has attempted to streamline approval of transmission projects in the past, with some success. In any event, if Florida regulators and transmission regulators in general are to adapt to increasing demands on the transmission grid and establish a proactive system of recommending transmission projects to utilities while improving reliability and quality, it is clear that the old model of reactive regulatory enforcement will be inadequate.

180. *Id.*