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Paul Vercruyssen

RENEWABLE ENERGY INTEGRATION COSTS: WHO PAYS AND HOW MUCH?

*Paul Vercruyssen**

Abstract: Over the past decade major public policy concerns over the environment, national security, the economy, and climate change have converged, creating significant pressure to reform America's energy system. The result has been a tremendous increase in the use of renewable energy sources with growth only expected to accelerate. This new development represents a radical shift for a nation whose electricity system was built to run on fossil fuels and hydroelectric dams. The electricity grid is a complex interconnected system requiring constant balancing of supply and demand. Using new intermittent technologies like solar and wind requires changes in grid management to maintain a constant energy balance in real-time. This comment analyzes proposed solutions for the integration of renewable resources into the electricity grid, and the legal and regulatory steps required to achieve this integration.

I. RENEWABLE INTEGRATION OVERVIEW

Over the past decade major public policy concerns including air pollution and climate change have converged, creating significant pressure to reform America's energy system.[1] The result has been a tremendous increase in the use of renewable energy sources with growth only expected to accelerate.[2] Looking to the future, President Obama recently set a goal for the United States to derive 85% of its electricity from clean energy sources.[3] These developments represent radical shifts for a nation whose electricity system was built to run on fossil fuels and hydroelectric dams.[4] Incumbent technologies should not be expected to yield ground willingly, and these changes will not come without growing pains. Advocates for renewable technologies have long complained of numerous obstacles that tilt the playing field in favor of conventional technologies. Over

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* J.D., University of Washington School of Law, Class of 2011.

1. *See, e.g.*, Kelsey Jae Nunez, *Gridlock on the Road to Renewable Energy Development: A Discussion About the Opportunities & Risks Presented by the Modernization Requirements of the Electricity Transmission Network*, 1 J. BUS. ENTREPRENEURSHIP & L. 137, 141-154 (2007).

2. U.N. Envtl. Programme, Bloomberg New Energy Finance, *Global Trends in Sustainable Energy Finance*, 22, ISBN 978-92-807-3085-2 (2010) [hereinafter *UNEP Report*], *available at* http://sefi.unep.org/fileadmin/media/sefi/docs/publications/UNEP_GTR_2010.pdf.

3. Address Before a Joint Session of Congress on the State of the Union, DAILY COMP. PRES. DOC. 201100047 (Jan. 25, 2011) *available at* http://www.gpo.gov/fdsys/pkg/DCPD-201100047/pdf/DCPD-201100047.pdf.

4. Darrell Blakeway & Carol Brotman White, *Tapping the Power of Wind: FERC Initiatives to Facilitate Transmission of Wind Power*, 26 ENERGY L.J. 393, 412 (2005).

time different obstacles have been removed and new obstacles have arisen.[5]

This is not the first time that incumbents in the electric power industry have felt pressure from new market participants. Most electric companies in the United States began as private enterprises seeking to monopolize this new market for electricity, focusing the services on dense urban populations. Bringing the power to the people took the intervention of the government. Major federal projects like the Bonneville Power Administration and legislation like the Rural Electrification Act reshaped the face of the nation by bringing electricity to places that the incumbent private utilities were not willing to tread.[6] To build an electric system which includes significant amounts of renewable energy will require comparable changes in our electricity system. Public policies currently being discussed can determine the success or failure of the renewable power industry.

The electricity grid is a complex interconnected system requiring constant balancing of supply and demand.[7] Using new intermittent technologies like solar and wind requires changes in grid management to maintain a constant energy balance in real-time. As more intermittent renewable resources have come onto the electricity grid, transmission operators have struggled to integrate the variability of these resources with existing conventional technologies. This comment analyzes proposed solutions for the integration of renewable variable energy resources (VER) into the electricity grid, and the legal and regulatory steps required to achieve this integration.

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5. *See, e.g.*, James A. Holtkamp & Mark A. Davidson, *Transmission Siting in the Western United States: Getting Green Electrons to Market*, 46 IDAHO L. REV. 379 (2010); *see also* Nunez, *supra* note 1.

6. Bonneville Project Act of 1937, 16 U.S.C. § 832 (2011); Rural Electrification Act of 1936, 7 U.S.C. § 901 et seq. (2011); *see also* Robert M. Greening, Jr., *Bonneville Power Administration's Preference Customers Meet the Northwest Power Act*, 13 ENVTL. L. 809, 823 (1983) (discussing the impact of public preference policies on bringing electric service to customers across the Pacific Northwest).

7. Steven Ferrey, *Restructuring A Green Grid: Legal Challenges to Accommodate New Renewable Energy Infrastructure*, 39 ENVTL. L. 977, 985-987 (2009); *see also* Andrew Howe, *Dynamic Response Could Do Away with Costly Balancing Capacity*, Utility Week, Sept. 24, 2008 *available at* http://www.utilityweek.co.uk/news/ news_story.asp?id=39227&title=Dynamic+demand+response+could+do+away+with+costly+balancing+capacity (discussing the challenges of balancing supply and demand within the energy grid).

Many ideas have been proposed for integrating renewable energy into the grid, and some have been implemented, but the policy debate continues. Most recently, the Federal Energy Regulatory Commission (FERC) proposed a series of rules to level the playing field for renewable energy grid integration.[8] While FERC's proposals are an improvement over the existing state of affairs, they do not go far enough to ensure the long-term success of emerging renewable energy technologies.

This comment begins with the assumption that the various renewable energy goals set out by the federal government and numerous states are essential for achieving a number of environmental, economic, national security, and climate change policy objectives. The changes required to integrate renewable energy into the grid will have costs associated with them. When assessing FERC's Proposed Rule and other renewable integration policy proposals, this comment's primary concern will be how the burdens of integration are distributed. Because growth in renewable energy is an essential part of so many policy goals, the costs of achieving those goals should be distributed equitably. Renewables should be allowed to compete on a level playing field rather than one designed to favor incumbent electricity generation technologies.

To understand the motivation behind renewable energy development, Part II provides an overview of the problems renewable energy is meant to address and the policies encouraging its growth. Part III describes the obstacles faced by renewable energy resources when integrating with the existing electricity grid. Part IV outlines the general legal framework within which the problem of renewable integration must be resolved. Recent developments have focused attention on renewable integration and these events are discussed in Part V. Finally, Part VI offers a critique of the latest Proposed Rule on renewable integration from FERC. The article concludes that many elements of FERC's proposal will address shortcomings in the current energy regulatory structure, but the Proposed Rule fails to take on many of the biggest issues facing renewables and the energy system as a whole.

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8. Integration of Variable Energy Resources, 133 F.E.R.C. ¶ 61,149 (Nov. 18, 2010) [hereinafter *FERC Proposed Rule*].

II. KEY DRIVERS BEHIND THE GROWTH OF RENEWABLE ENERGY

A. *Policy Goals to be Achieved Through Growth in Renewable Energy*

Renewable technologies such as wind and solar account for an ever-increasing portion of our electric power production. From 2004 to 2008, the amount of electricity generated in the United States by wind and solar resources nearly quadrupled.[9] However, this renewable energy mix still makes up only a small percentage of overall U.S. electricity generation.[10] Six policy goals have been outlined as the key drivers of the renewable energy growth over the past decade: 1) growth in energy demand; 2) climate change; 3) environmental benefits; 4) energy costs; 5) economic revitalization and job creation; and 6) energy security.[11]

The demand for electricity in the United States is only expected to increase in the coming decades. Assuming electricity consumption continues to grow at current rates, rising demand will require almost 300 gigawatts of new electricity capacity in the United States by 2030.[12] The impacts from growth in energy demand are not specific to the renewable energy sectors. Absent other factors, growth in energy demand will drive development across the spectrum of different types of generation technologies. Policies encouraging the growth in renewable energy create more ways to meet increasing energy needs.

When discussing the need for renewable energy, most attention focuses on climate change. Most climate scientists

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9. U.S. Energy Info. Admin., *Renewable Energy Consumption for Electricity Generation by Energy Use Sector and Energy Source, 2004 – 2008* (August 2010) *available at* http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/table1_3.pdf (calculating the 2008 output of wind and solar energy for the electric sector (.555 quadrillion Btu) divided by the 2004 output (.148) resulting in a ratio of 3.75).

10. Press Release, U.S. Energy Info. Admin, *Renewable Energy Consumption and Electricity Preliminary Statistics 2009* (Aug. 2010) *available at* http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/rea_prereport.html (stating that renewable energy only made up 8% of overall us electricity consumption in 2009).

11. Nunez, *supra* note 1, at 141.

12. Worldwatch Institute, *The Outlook on Renewable Energy in America* 16 (2007) [hereinafter *Worldwatch Report*], *available at* http://www.acore.org/files/RECAP/docs/OutlookonRenewableEnergy2007.pdf.

are in agreement that increasing levels of greenhouse gases are likely to trigger major climate effects including the disappearance of the Greenland ice cap or even a mass extinction.[13] Further development of renewable energy technologies that generate little or no carbon represent an important path for mitigating the impact of climate change.[14]

Closely related to climate change goals are other environmental benefits derived from renewable energy. Pollution from fossil fuel electricity generation causes smog, particulate pollution, acid precipitation and other air toxins.[15] The need for clean energy alternatives is greatest in populated urban areas where these pollution problems are most acute.[16] Clean technologies can replace power plants near population centers where they are most harmful to humans.

Energy costs have become another significant concern of policy makers. With international energy demand only expected to increase, upward pressure on fossil fuel prices will likely continue.[17] Constraints have hit individual consumers in tangible ways as prices for gasoline and heating oil have seen intense volatility over the past five years.[18] This has translated into significant new investment in the renewable energy sector in search of fuels that are insulated from the volatility of global commodity markets.[19]

Large-scale renewable generation has the potential to

13. Anthony D. Barnosky, *Has the Earth's Sixth Mass Extinction Already Arrived?*, 471 NATURE 51-57, Mar. 3, 2011; *see also* Robert H. Socolow & Stephen W. Pacala, *A Plan to Keep Carbon in Check*, SCIENTIFIC AMERICAN, Sept. 2006, at 50; *see also* Intergovernmental Panel on Climate Change, *Climate Change 2007: The Physical Science Basics-Summary for Policy Makers* (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

14. Daniel M. Kammen, *The Rise of Renewable Energy*, SCIENTIFIC AMERICAN, Sept. 2006 at 85.

15. Karl R. Rabago, *A Strategy for Developing Stationary Biodiesel Generation*, 36 CUMB. L. REV. 461, 463-64 (2006).

16. *Id.*

17. *See generally* U.S. Energy Info. Admin, *World Energy Demand and Economic Outlook 2010* (2010), *available at* http://www.eia.doe.gov/oiaf/ieo/world.html.

18. Jad Mouawad, *Swings in Price of Oil Hobble Forecasting*, N.Y. TIMES, July 5, 2009, at A1, *available at* http://www.nytimes.com/2009/07/06/business/06oil.html?_r=1&hp; *See also* Floyd Norris, *Off the Charts: Weathering Gas Price Volatility*, N.Y. TIMES, March 10, 2006, *available at* http://www.nytimes.com/2006/03/10/business/worldbusiness/10iht-wbmarket11.html?scp=1&sq=natural%20gas%20price%20volatility&st=Search.

19. *UNEP Report, supra* note 2, at 11.

reinvigorate struggling economies across the U.S.[20] Most wind and solar farms are located in remote rural portions of the United States. Increased demand for renewable energy will multiply the number of these farms, which will increase jobs and create value for this rural land. The significance of this potential reinvigoration of rural economies is magnified by findings that renewable energy development creates more jobs per megawatt than fossil fuel energy technologies.[21] This increased economic activity also increases the tax base for local governments at a time when many are in desperate need of new revenue.[22]

Finally, renewable energy policies are driven by the goal of a more secure energy supply for the United States. Energy security has been defined as "having energy services when they are needed, under acceptable terms and conditions, and without fear of unexpected interruption."[23] Of great concern is America's dependence on foreign oil, which ties us to unstable and undemocratic nations around the world.[24] Renewables can address this problem by providing energy to power electric transportation with no fuel costs subject to the fluctuations of international markets. These policy goals have stimulated significant governmental action to encourage renewable energy development with varying degrees of success.

B. Government Programs Encourage Renewable Energy

Over the past decade the renewable energy sector has been

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20. Nunez, *supra* note 1, at 143-144.

21. *See generally* Daniel Kammen, Kamal Kapadia, & Matthias Fripp, *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Create?*, UC BERKELEY: RENEWABLE AND APPROPRIATE ENERGY LABORATORY (RAEL), April 2004 (updated January 2006), *available at* http://rael.berkeley.edu/files/2004/Kammen-Renewable-Jobs-2004.pdf; *see also* Peter Meisen & Trevor Erberich, *Renewable Energy on Tribal Lands*, Global Energy Network Institute 27-28, *available at* http://www.geni.org/globalenergy/research/renewable-energy-on-tribal-lands/Renewable-Energy-on-Tribal-Lands.pdf (explaining the obstacles and potential benefits of renewable energy development on tribal lands in the U.S.).

22. Verne G. Kopytoff, *Amazon Pressured on Sales Tax*, N.Y. TIMES, March 13, 2011, at B1, *available at* http://www.nytimes.com/2011/03/14/technology/14amazon.html ?_r=1&scp=1&sq=state%20government%20revenue&st=cse (explaining that across the country state officials are struggling with budget shortfalls and looking for new sources of revenue).

23. Rabago, *supra* note 15, at 464.

24. *Worldwatch Report, supra* note 12, at 8.

the beneficiary of countless development programs.[25] The policies with the greatest impact fall in two categories: federal tax incentives and state renewable portfolio standards.

Originally, the primary federal tax incentive for large wind energy projects had been a production tax credit.[26] Wind developers received a tax credit of 2.2 cents per kilowatt hour of energy produced.[27] Alternatively, solar technologies were eligible for an investment tax credit worth 30% of project expenditures.[28]

The American Recovery and Reinvestment Act of 2009 (Stimulus) substantially modified the tax incentives adding additional options for developers of large renewable energy projects.[29] The Stimulus gives developers of wind and solar the choice of using an investment tax credit or a production tax credit.[30] In addition, the Stimulus authorized the Treasury to issue cash grants in lieu of the tax credits.[31] The various choices allow each project developer to elect the incentive that best suits the specific circumstances of their project.[32]

To supplement the federal incentives, 29 states have adopted renewable portfolio standards (RPS).[33] Generally, an

25. *See, e.g.*, Database of State Incentives for Renewable Energy, http://www.dsireusa.org/ (last visited Mar. 3, 2011) [hereinafter *DSIRE*]. DSIRE is a comprehensive database compiling all state and federal incentive programs relating to clean energy and energy efficiency administered by North Carolina State University in cooperation with federal energy agencies.

26. 26 U.S.C. § 45 (2011).

27. Internal Revenue Serv., Form 8835 (2010), *available at* http://www.irs.gov/pub/irs-pdf/f8835.pdf; *see also DSIRE*, Renewable Energy Production Tax Credit (last visited Mar. 3, 2011), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F&re=1&ee=1.

28. 26 U.S.C. § 48; see also *DSIRE*, Business Energy Investment Tax Credit, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F (last visited Mar. 3, 2011).

29. 26 U.S.C. §§ 45, 48 (2011).

30. *Id.*

31. *See Id.* § 48(d).

32. *See generally* Mark Bolinger, Ryan Wiser, Karlynn Cory, & Ted James, *PTC, ITC, or Cash Grant? An Analysis of the Choices Facing Power Projects in the United States,* ERNESTO ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY (2009), *available at* http://eetd.lbl.gov/EA/EMP/reports/lbnl-1642e.pdf (discussing the considerations in choosing which incentive structure to elect for renewable energy developers).

33. *See, e.g.*, CAL. PUB. RES. CODE § 25740 et seq. (2011); WASH. REV. CODE § 19.285 (2011); OR. REV. STAT. § 469A; NEV. REV. STAT. § 704.7801 et seq. (2011); ARIZ. ADMIN. CODE § R14-2-1801 et seq. (2011); MONT. CODE ANN. § 69-3-2001 et seq. (2011); COL.

RPS requires utility generation portfolios to be composed of a specified minimum amount of clean energy generation. States have different eligibility requirements and many allow non-renewable technologies such as advanced coal and nuclear generation to account for energy goals.[34] However, wind and solar energy have benefitted greatly from these state policies. For example, Texas has installed more than 9,000 MW of wind capacity since the state RPS was amended in 2005.[35] Likewise, in the second half of 2010 the California Energy Commission licensed over 4,100 MW of large-scale solar power, which will be used to meet the state's Renewables Portfolio Standard.[36]

These primary policies are supplemented by a host of constantly changing federal and state programs that are designed to achieve the various policy goals served by growth in renewable energy.[37]

III. UNDERSTANDING THE OBSTACLES

A. *Renewables Impact the Ability of Regulated Entities to Meet Reliability Requirements*

The characteristics of energy output from renewable resources are fundamentally different from the traditional technologies that energy system operators are accustomed to. Wind and solar energy are classified as VERs because the availability of the fuel source is not as predictable as conventional thermal power plants.[38] FERC has proposed to

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REV. STAT. § 40-2-124 (2011); N.M. STAT. ANN. §§ 62-15-34, 62-16-4 (2011); KAN. STAT. ANN. § 66-1256 et seq. (2011); TEXAS UTILITIES CODE § 39.904; *See generally DSIRE*, *supra* note 25.

34. *See, e.g.*, OHIO REV. CODE ANN. § 4928.64 et seq. (West 2011) (including clean coal, coal bed methane, and advanced nuclear as technologies eligible to meet the Ohio Alternative Energy Resource Standard).

35. Wind Powering America, *Installed Wind Capacity by State, 1999-2009*, *available at* http://www.windpoweringamerica.gov/docs/installed_wind_capacity_by_state.xls (last updated Feb. 4, 2010).

36. Press Release, California Energy Commission, CA Energy Commission Approves 650 MW of Solar Power in California Desert (December 15, 2010), *available at* http://www.energy.ca.gov/releases/2010_releases/2010-12-15_Approval_palen+rice_ NR.html.

37. *See DSIRE, supra* note 25 (providing a comprehensive collection of renewable energy policies).

38. *See* NERC, *Special Report: Accommodating High Levels of Variable Generation* 40 (2009) [hereinafter *NERC Report*], *available at* http://www.nerc.com/files/IVGTF_

define a VER as, ". . .a device for the production of electricity that is characterized by an energy source that: (1) is renewable; (2) cannot be stored by the facility owner or operator; and (3) has variability that is beyond the control of the facility owner or operator."[39] Because the energy from these plants generally cannot be dispatched unless the wind is blowing or the sun is shining, utilities have a more difficult task when conducting resource planning to meet regulatory requirements.[40]

To maintain a reliable electricity grid, FERC adopted a rule incorporating into federal regulation the reliability standards from the North American Electric Reliability Corporation (NERC).[41] NERC is a self-regulating organization striving for a reliable power system through development and enforcement of system reliability standards and assessment of resource adequacy. [42] NERC is also subject to oversight from FERC.[43]

NERC enforces these reliability standards upon balancing authorities (BAs). BAs are the entities responsible for providing the minute-to-minute reliable operation of the power system by continuously matching the supply of electricity with the demand and ensuring sufficient supply capacity for future hours.[44] These reliability requirements are generally applied within defined balancing authority areas of various sizes.[45] Within a given balancing authority area there may be other system operators such as transmission operators or generators that are also responsible for controlling elements of the electric system.[46] Transmission operators, and often electric utility

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Report_041609.pdf.

39. *FERC Proposed Rule, supra* note 8, ¶ 64.

40. *See NERC Report, supra* note 38, at 2.

41. *See* Mandatory Reliability Standards for the Bulk Power System, 18 C.F.R. § 40.1–40.3 (2011); *see also Report of the Electricity Regulation Committee*, 28 ENERGY L.J. 267, 304–05 (2007).

42. *See NERC Report, supra* note 38, at 2.

43. *Id.*

44. NERC, *Glossary of Terms Used in Reliability Standards* (February 12, 2008), http://www.nerc.com/files/Glossary_12Feb08.pdf.

45. *Id*, *see also* W. Elec. Coordinating Council, *Western Interconnection Balancing Authorities* (2009), *available at* http://www.wecc.biz/library/WECC%20Documents/ Publications/Balancing%20Authorities.pdf (providing a map illustrating the variability in size of different balancing authorities).

46. David J. Hurlbut, *Multistate Decision Making for Renewable Energy and Transmission: An Overview*, 81 U. COLO. L. REV. 677, 685-86 (2010) (explaining that a

companies, may need to take steps in the management of their resources to maintain the reliability requirements across the BA.[47] Generators, as will be discussed later, may be required to purchase other services to maintain reliability.[48] Ultimately, though, the BA is responsible for managing all of the energy flow within its area to meet NERC reliability requirements.[49]

It is important to keep in mind that reliability requirements are not the only factor dictating the cost of integrating renewables. NERC reliability requirements are placed upon an entire BA, not upon any single generator.[50] How the BA and its constituent entities meet these requirements has a significant impact on the overall cost of integration. FERC regulations outline a general tariff structure allowing transmission providers to recover reliability costs from generators, which can also have a significant impact on integration costs.[51]

The danger comes when reliability is achieved through adjustments to the system as a whole but the accounting for those costs is allocated individually to each generating unit. Allocating a standard transmission tariff for variable energy resources creates a direct linear relationship between the amount of VERs on the system and the tariffs charged to those resources. However, the cost of balancing VERs does not increase in a linear scale.[52] As additional VERs are brought onto the system, the relative impact of each additional unit decreases because the variability between VERs will naturally

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BA is made up of the "generation, transmission, and loads within its metered boundaries).

47. *See* W. Elec. Coordinating Council, *supra* note 45 (listing numerous electric utilities which act as BAs including Puget Sound Energy, Bonneville Power Administration, Los Angeles Department of Water and Power).

48. *See infra* at Part IV.B (discussing ancillary services which generators may be required to pay).

49. Hurlbut, *supra* note 46.

50. *See generally* NERC, *Reliability Standards for the Bulk Electric System of N. Am., Standard BAL-001-0.1a et seq.* (2008) *available at* http://www.nerc.com/files/Reliability_Standards_Complete_Set.pdf (applying Real Power Balancing Control Performance Standard to balancing authorities).

51. *See infra* at Part IV.B (discussing FERC open access transmission tariffs).

52. *See* Brendan Kirby, Michael Milligan & Yih-huei Wan, Nat'l Renewable Energy Lab., *Cost-Causation-Based Tariffs for Wind Ancillary Service Impacts* 2 (June 2006), *available at* http://www.ornl.gov/sci/engineering_science_technology/cooling_heating_power/pdf/WindPower_2006_Tariff.pdf (finding that linear scaling of wind data can significantly over estimate wind impacts).

cancel out.[53] What this means is that more wind on a system make it more likely that low winds at one wind farm will be cancelled out by gusts at another wind farm. With only two wind farms the likelihood of this kind of balance is low, but with 20 wind farms balancing among the wind resources becomes more likely.

For BAs and other entities responsible for meeting reliability requirements, the added variability from renewables impacts both how the grid is managed and how to account for the cost of that management.

B. The Electricity System Has Not Been Designed to Incorporate Renewables

Our current electricity system operators are accustomed to managing power systems composed of more predictable resources to meet *variable customer demand* but with little experience handling *variable electricity generation*. To fully comprehend the context of the changes beginning to happen in the electricity system it is helpful to understand the current state of the electricity system. The vast majority of electricity in the United States comes from nuclear, hydroelectric and fossil fuel resources.[54] These conventional electricity sources have very predictable operating performance and well understood characteristics. Perhaps most importantly, utilities have incorporated each of these technologies into their short-term and long-term planning processes.[55]

The electric utilities were created in an age of mostly self-sufficient, vertically integrated electric utilities, which owned generation, transmission, and distribution facilities.[56] Service

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53. *See id*. at 9 ("Aggregating wind plant variability with aggregate system load further reduces the amount of regulating reserves that are required to balance the power system and maintain reliability").

54. *See* U.S. ENERGY INFO. ADMIN., DEP'T OF ENERGY, ELECTRIC POWER ANNUAL 2009, DOE/EIA-0348 Figure ES 1 at 2 (Revised January 4, 2011), *available at* http://www.eia.doe.gov/cneaf/electricity/epa/epa.pdf.

55. *See* NERC, *supra* note 38, at 3 (noting that under the NERC reliability standards utilities must engage in both long-term and short-term energy planning to meet the electricity demands of customers on their systems).

56. *See* Recovery of Stranded Costs by Pub. Utilities and Transmitting Utilities, 61 Fed. Reg. 21,540 at 21,543 (codified at 18 CFR §§ 35 and 385) [hereinafter Order No. 888], *available at* http://elibrary.ferc.gov/idmws/nvcommon/NVViewer.asp?Doc=8274712:0.

from these facilities was bundled and sold to wholesale and retail customers.[57] Electric utilities built their own generation facilities and transmission systems. Many relied heavily on large coal, hydroelectric, or nuclear generating stations.[58] Each system covered limited service areas and was designed to serve its own load independent of supply and demand from other service areas.[59] This structure of separate systems arose naturally due primarily to the cost and technological limitations on the distance over which electricity could be transmitted.[60]

For electricity systems built upon this traditional model, the majority of the system variability comes from the demand for energy. While utilities can forecast electricity demand, these forecasts are not exact. When a customer decides to turn on the light in her house, no one needs to call the local utility to tell them they are going to need a little more power. However, system operators know with a high degree of certainty that a nuclear plant will be running 24 hours a day.[61] This steady and consistent power supply is known as baseload power.[62]

Likewise, if a natural gas plant is scheduled to come on to serve peak electricity demand system operators can expect that power plant to deliver the needed power.[63] These peaking power plants are cycled on and off to follow the changing demands of the energy system throughout the day and the seasons. Because of their ability to quickly cycle on and off, these peaking plants also serve a critical backup role if another energy resource is not available. These two types of plants, baseload and peaking, have represented the two primary categories for our electricity supply.[64]

Introducing significant amounts of variable resources to the system places uncertainty on both the supply and demand sides of the energy equation. For BAs and other entities which

57. *See id.*

58. *See id.*

59. *See id.*

60. *See id.*

61. *See* James F. Wilson, *Restructuring the Electric Power Industry: Past Problems, Future Directions*, 16 NAT. RESOURCES & ENV'T 232, 235 (2002) (distinguishing baseload and peaking power).

62. *See id.*

63. *See id.*

64. *See* Ferrey, *supra* note 7, at 987.

must continuously match the supply and demand, this added variability and unpredictability makes the job more difficult.[65] First, there must be enough energy available in the case that wind and solar resources are not available at any given moment. Second, sufficient energy must also be available to meet future demands and ultimately ensure compliance with NERC's reliability standards.[66]

C. *Where Renewables Fit Into the Energy Supply*

Given the variability of energy supply from renewables, where do resources like solar and wind fit into the historical categories of baseload and peaking power? Renewable VERs are unable to be classified as baseload because they demonstrate relatively low availability factors.[67] However, due to the same unpredictable availability, variable renewable resources also cannot be relied upon to fill in as peaking power resources. As a result VERs are currently taken whenever they are available, similar to a baseload power plant, while decreasing the reliability of the overall baseload energy supply.

Operating VERs whenever they are available makes economic sense because the resources have extremely low marginal cost for production. In this sense, VERs share some characteristics with other baseload resources which have low marginal cost for energy production. [68] Wind and solar plants can have significant capital costs; however, once a wind plant enters operation there are no fuel costs and relatively low operations costs.[69] Thus the more energy the plant generates, the lower the overall cost of the energy it produces. This has significant implications for system operators who prioritize dispatch of energy according to marginal cost with the cheapest resources coming first.[70] The result is renewable

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65. *See NERC Report, supra* note 38, at 3.

66. *See id*.

67. *See* Steven Ferrey, *The Law of Independent Power* § 2:11 (25th ed. 2009); *see also* RENEWABLE ENERGY RESEARCH LAB, UNIV. OF MASS. AT AMHERST, WIND POWER: CAPACITY FACTOR, INTERMITTENCY, AND WHAT HAPPENS WHEN THE WIND DOESN'T BLOW? (2004), *available at* http://www.ceere.org/rerl/about_wind/RERL_Fact_Sheet_2a_Capacity_Factor.pdf (stating that typical wind power capacity is 20-40%, hydro power capacity is 30-80%, and solar power capacity is 12-15%).

68. *See* Ferrey, *supra* note 7, at 987.

69. *See id*. at 987.

70. *See id*. at 987-988.

energy units that will always be utilized when available, taking precedence over all other resources including large baseload plants.[71]

This represents a radical shift in management of baseload resources. To achieve the lowest marginal cost, most traditional coal and nuclear power plants are designed to run constantly at peak efficiency.[72] If taken offline to accommodate renewables, these conventional power plants require significant time to restart and cannot be quickly brought back into operation.[73] Put more simply, these plants are designed to serve the around-the-clock demands of the energy system. If forced to cycle on and off, these plants no longer serve their designed purpose and will run less efficiently.[74] This decreased efficiency translates to increases in the cost of the electricity produced as well as the pollution created per unit of energy.

Increasing renewable energy has three major implications for the cost of electricity. First, running old base load plants below peak efficiency means that utilities and ultimately ratepayers will pay more for the energy they purchase from these plants.[75] Second, because these base load plants may be forced to occasionally shut down due to renewable availability, the traditional base load generators will be selling less power overall. Finally, the decreases in system resource availability and reliability will increase the demand for backup power resources to compensate for the base load fluctuations caused by variable renewable resources.[76] These costs make up what have generally been characterized as renewable integration costs.[77] Complaints from BAs currently managing these costs

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71. *See id.* at 988.

72. *See* Ferrey, *supra* note 61, at §10.37 (noting the difficulty in quickly starting conventional power plants); *see also* Steven Lefton & Phil Presuner, *The Cost of Cycling Coal Fired Power Plants*, COAL POWER MAG., Winter 2006, at 16, 20, *available at* http://www.aptecheng.com/corporate/CurrentEvents/100_CoalPowerWinterMag16-20.pdf.

73. *See* Ferrey, *supra* note 67, at 988.

74. *Id.*

75. *See* NAT'L RENEWABLE ENERGY LAB, DEP'T OF ENERGY, WESTERN WIND AND SOLAR INTEGRATION STUDY 315-316 (2010) [hereinafter NREL INTEGRATION STUDY], *available at* http://www.nrel.gov/wind/systemsintegration/pdfs/2010/wwsis_final_report.pdf.

76. *See* Ferrey, *supra* note 7, at 990.

77. *See, e.g.,* Mark Bolinger & Ryan Wiser, *Balancing Cost and Risk: The Treatment of Renewable Energy in Western Utility Resource Plans* 1 (2005), *available at*

have generated significant debate about the future of renewable energy on the electricity grid.[78]

D. The Cost of Renewable Success

Experts predict wind and solar will make up anywhere from eleven percent to thirty-five percent of the energy supply for the Western United States by 2025, representing a substantial increase from current levels.[79] The result of successes in the expansion of VERs will be a corresponding increase in the need for new quick-starting peaking power plants that can provide the backup power for the renewables.[80] More VERs will mean increased integration costs. Just how significant these costs will be is a subject of vigorous debate. Both NERC and the National Renewable Energy Lab (NREL) have commissioned studies to investigate the issue.[81]

The NREL study found that under most scenarios a high penetration of wind and solar would actually decrease the system operating costs across the Western U.S.[82] However, one scenario requiring more significant curtailment of coal plant operation did show a significant increase in annual operating costs.[83] Moreover, assumptions in the NREL study could be viewed as artificially inflating the cost of fossil fuel energy. Most notably the study assumes a cost of $30 per metric ton of CO_2 presumably resulting from passage of federal climate change legislation.[84] This is a dubious assumption, considering passage of comprehensive climate regulation appears remote

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http://escholarship.org/uc/item/37p4j85p; *see also* Avista Corp., *Wind Integration Study* at *x* (2007), *available at* http://www.uwig.org/AvistaWindIntegrationStudy.pdf (defining integration cost as ". . . the reduction in value of wind energy due to its variability and uncertainty.").

78. *See, e.g.,* Order Rejecting Proposed Tariff Revisions, 132 F.E.R.C. ¶ 61,128 (August 13, 2010) [hereinafter Puget Rejection].

79. *See* NREL INTEGRATION STUDY, *supra* note 75, at 116-117 and ES-2.

80. *See* Ferrey, *supra* note 57, at 994.

81. *See, e.g.,* NERC, *supra* note 38, at 3; NREL INTEGRATION STUDY, *supra* note 75; and NAT'L RENEWABLE ENERGY LAB, DEP'T OF ENERGY, EASTERN WIND INTEGRATION STUDY (2010), *available at* http://www.nrel.gov/wind/systemsintegration/pdfs/2010/ewits_final_report.pdf.

82. *See* NREL INTEGRATION STUDY, *supra* note 75, at ES-14–ES-28 (finding that the highest savings reported in the 30% renewable penetration case resulted in a 40% system operations savings across the WECC service territory).

83. *Id.* at ES-28.

84. *See id.* at ES-3.

outside of California, the Northeast, and some cities which have already adopted such measures.[85] Ultimately NREL acknowledges that its study does not take into account the costs ". . .that would be required to implement the operational reforms needed to accommodate the renewables[.]"[86] While the reduced cost projections are a good motivator for achieving a higher level of renewables on our grid, ultimately the report does not take on the difficult task of estimating the cost of implementing its recommended changes.

The NERC study goes even further to avoid predicting the ultimate cost for achieving a fully integrated grid.[87] However, NERC shares NREL's conclusion that a functional integrated grid is achievable, finding that "[t]his proposed level of commitment to renewable variable generation offers many benefits such as new energy resources, fuel diversification, and greenhouse gas and particulates reductions."[88]

Determining these costs is a key first step in the process of renewables integration. Once the costs are determined, perhaps an even more divisive step must be taken when payment of the integration costs is allocated throughout the energy system. Within the energy system costs are felt by generators, utility companies and ratepayers. While law and policy can have some role in determining what the costs are, they play a much larger role in the allocation of those costs.

IV. LEGAL LANDSCAPE

Given the complex legal and regulatory landscape for electricity, it is helpful to have some understanding of the laws underpinning the regulation of electricity in the US and how these laws interact with the integration of renewable energy.

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85. *See id.* at ES-3; *see also* Editorial, *At Least Some Politicians Get It*, N. Y. TIMES, January 10, 2011, at A20, *available at* http://www.nytimes.com/2011/01/10/opinion/10mon3.html?ref=climateandenergylegislation (discussing the inability of Congress to pass climate legislation and the patchwork of climate programs that have been passed in some cities and states across the country).

86. NREL INTEGRATION STUDY, *supra* note 75, at ES-14.

87. *See* NERC, *supra* note 38, at 3 (". . . NERC does not advocate a particular resource mix, weight cost allocation approaches or recommend specific technology solutions to address identified reliability concerns.").

88. *Id.* at 63.

A. *Federal Power Act and Amendments*

Originally passed in 1920 to regulate and coordinate the development of hydroelectric projects across the United States, the Federal Power Act (FPA) has expanded in scope to regulate transmission and wholesale purchases of electricity in interstate commerce.[89] The FPA created the Federal Power Commission (later reorganized as FERC) to enforce the FPA.[90]

Of particular significance for renewable VER integration is section 205(a) requiring "[a]ll rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy. . .shall be just and reasonable."[91] This provision has laid the foundation for many key regulations and cases which provide the current structure for the pricing of electricity including renewables.[92] This passage was made all the more significant by the passage of the Energy Policy Act of 1992 (1992 Act) which mandated non-discriminatory open access to transmission.[93] This change represented a fundamental shift in the structure of the electricity market from utility-dominated generation monopolies to more competitive markets for independent electricity generators.[94]

B. *New Laws and Regulations Begin to Open the Market*

Passage of the 1992 Act empowered FERC to have a greater involvement in utility ratemaking.[95] One potential method for discriminating against market participants was through pricing for transmission, which is often owned by utility companies. FERC's new authority allowed the Commission to regulate transmission rates to ensure all market participants

89. Federal Power Act, 16 U.S.C. § 824 et seq. (2011); *see also* 29 C.J.S. *Electricity* § 3 (2011).

90. 16 U.S.C. § 792 (2011); *see also* 29 C.J.S. *Electricity* § 6.

91. 16 U.S.C. § 824d(a) (2011).

92. *See generally* Patrick J. McCormick III & Sean B. Cunningham, *The Requirements of the "Just and Reasonable" Standard: Legal Bases for Reform of Electric Transmission Rates*, 21 ENERGY L.J. 389 (2000).

93. 16 U.S.C. § 824k(a) (2011).

94. Susan Kelly & Elise Caplan, *Time For a Day 1.5 Market: A Proposal to Reform RTO-Run Centralized Wholesale Electricity Markets*, 29 ENERGY L.J. 491, 492 (2008).

95. 16 U.S.C. § 824k (2011) (giving FERC authority to regulate electric transmission rates).

had equal market access. As part of this move to a more open market, FERC indicated its willingness to allow utilities to recover "opportunity costs" in addition to their standard rate even before the 1992 Act was passed.[96] FERC explained that opportunity costs, "are incurred by a utility when the utility accommodates a third party's request for transmission service. . .and thereby foregoes an opportunity to reduce its own costs, to the economic detriment of the utility's native load customers."[97] In other words, generators who increased costs for their transmission provider could be required to pay for those costs. These opportunity costs opened the door for what has become the current debate regarding integration costs.

FERC cases addressing opportunity costs necessarily implicate the just and reasonable rate standard of the FPA. Courts have generally upheld FERC's rulings deferring to the Commission's judgment. One of the first cases to address the just and reasonable standard in relation to opportunity costs was *Pennsylvania Electric Co. v. FERC*.[98] In that case the D.C. Circuit was willing to defer to FERC's technical ratemaking expertise so long as it supplies "sufficient reasoning backed up by substantial evidence."[99] The court further noted the obligation for just and reasonable rates runs on both sides of the meter to both electricity customers and independent power producers such as renewable generators.[100] Even though the price of an energy contract was the product of bilateral negotiations between the utility and the generator, FERC determined that the opportunity cost was not just and reasonable for ratepayers who had not participated in the negotiation.[101]

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96. Pa. Elec. Co. v. F.E.R.C., 11 F.3d 207, 209 (D.C. Cir. 1993) (upholding FERC's approval of additional service charges for the provision of electric transmission service).

97. Pa. Elec. Co., 58 F.E.R.C. ¶ 61,871 (1992); *see also* Re Public Service Co. of New Hampshire, 58 F.E.R.C. ¶ 61,070 (1992); and Northeast Utilities Service Co., 58 F.E.R.C. ¶ 61,069 (1992).

98. *Pa. Elec. Co.*, *supra* at note 96.

99. *Id.* at 211.

100. *Id.* at 209-10 (explaining that, " FERC's responsibility…is to ensure just and reasonable rates for native load customers and for third parties" such as generators or other utility companies); *See also* Ferrey, *supra* note 67, § 8:9.

101. *See Pa. Elec. Co.*, *supra* note 96, at 209-10 (explaining, " FERC's responsibility…is to ensure just and reasonable rates for native load customers and for third parties. Whether a rate satisfies this requirement is to be determined by FERC,

FERC formalized its rulings on opportunity costs with promulgation of Order No. 888 requiring public utilities transmitting electricity to have non-discriminatory open access transmission tariffs (OATT).[102] However, the order also permits public utilities to seek recovery of legitimate and verifiable "stranded costs" associated with providing open access.[103] These stranded costs closely resemble the description of "opportunity costs" FERC had discussed in its decisions just a few years earlier.[104] Ultimately Order No. 888 and the ability for utilities to recover the costs of complying with new laws and regulations represents the first step in a series of legal and regulatory changes which lowered barriers and made more room for competition in the electricity industry.

One of the significant products of stranded costs was the creation of several categories of "ancillary services" transmission providers charge to their customers to implement the open access reforms.[105] Three categories of ancillary services are of particular importance to renewable generators: imbalance service, spinning reserve service, and operating reserve service. Imbalance service "makes up for any net mismatch over an hour between the scheduled delivery of energy and the actual load that the energy serves in the control area."[106] Imbalance service allows utilities to charge renewables generators for not meeting their scheduled obligations for delivered energy and has long been argued as discriminatory against intermittent renewable energy resources.[107]

Spinning reserve and supplemental reserve services (characterized generally as operating reserve) provide, "extra

not the parties to an agreement, however voluntary their agreement may be.").

102. Order No. 888, *supra* note 56, at 21540.

103. *Id.* at 21541.

104. *See* 18 C.F.R. § 35.26 (2011) (generally stranded costs may be recovered through retail rates by utilities for any costs incurred providing required services to customers).

105. Order No. 888, *supra* note 56, at 21579–21590.

106. *Id.* at 21582.

107. *See, e.g.,* Preventing Undue Discrimination and Preference in Transmission Service, 72 Fed. Reg. 12266, Summary (Mar. 15, 2007) (to be codified at 18 C.F.R. pt. 35, 37) [hereinafter Order No. 890], *available at* http://www.ferc.gov/whats-new/comm-meet/2007/021507/E-1.pdf; *see also* National Wind Coordinating Collaborative, *FERC Order 890: What Does it Mean for the West?*, *available at* http://www.nationalwind.org/assets/publications/ferc890.pdf.

generation available to serve load in case there is an unplanned event such as loss of generation."[108] Each transmission region has specific required reserve amounts based upon system characteristics in that region.[109] This service can then be imposed upon specific generators such as VERs which require higher levels of operating reserve.[110]

Order No. 888 had the positive effect of opening an electricity market that had been closely controlled by the transmission owners, most often electric utilities. Independent renewable energy generators have been a primary beneficiary of this market opening. In opening the door, though, renewables generators saw still more obstacles on the other side in the form of stranded costs and ancillary services they would be required to buy.

C. Policies Designed Specifically for Renewable Energy

As a result of federal and state policies supporting renewable energy, development of those resources continued to increase.[111] FERC reacted by initiating a proceeding which would result in the approval of Order No. 890 to limit discrimination against transmission customers and "increase transparency in the rules applicable to planning and use of the transmission system."[112] The order's intent was partly to benefit renewable resources through more equitable transmission access and pricing.[113]

One of the most significant changes the order made for the growth of renewable energy was the creation of a "conditional firm" and "hourly firm" transmission service.[114] Conditional firm service allows a transmission provider to guarantee a generator access to transmission with the condition that the transmission provider can curtail that generator under certain

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108. Order No. 888, *supra* note 56, at 21582–21583.

109. *Id.*

110. *See* North American Electric Reliability Corporation, *WECC Standard Operating Reserves, BAL-STD-002-0* (2007), *available at* http://www.nerc.com/files/BAL-STD-002-0.pdf.

111. *See supra* at 6.

112. Order No. 890, *supra* note 107, at Summary.

113. *Id.* ¶ 78 (noting that measures undertaken in the order "can be particularly beneficial to renewable generation resources").

114. *Id.* ¶ 73, 925, 1177.

grid conditions or for a certain defined number of hours during the year.[115] Hourly firm service allows transmission customers to request firm transmission service on shorter notice the day before the service is to commence.[116]

Conditional firm service addressed a problem that prior rules created for wind generators; previously, FERC tariffs allowed transmission operators to reject transmission contracts with generators if the transmission would not be available for even a single hour of the contract period.[117] Without long-term transmission rights, renewable generators could not procure financing for construction. Prior to conditional firm contracts, transmission operators had only been able to enter into two kinds of contracts: firm service and non-firm service. Firm service provides almost unconditional access to transmission usually under a long-term contract.[118] Non-firm service is reserved and scheduled as-available, can be interrupted under specific conditions, and cannot be contracted for longer than one year.[119]

Variable renewable resources did not easily fit into either of these categories. Purchasing firm service would inherently underutilize the transmission capacity. Specific terms for delivered energy could never be met for resources which cannot be scheduled with precision.[120] At the same time, under a firm contract, the transmission operator would be required to hold open transmission capacity for renewables in the case the energy was available as scheduled. As a result, a renewable generator entering a firm contract would be paying for more transmission access than would ever be used by the renewable project. The transmission operator, on the other hand, would underutilize transmission assets which could not be scheduled under the terms of the contract even if there was no power coming from the renewable project. Renewable generators also could not rely solely on non-firm service because year-to-year contracts create too much uncertainty for potential investors.

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115. *Id.* ¶ 925.

116. *Id.* ¶ 1178.

117. *Id.* ¶ 86. The transmission service provider would thus be required to reserve transmission capacity for a renewable project that, because of its intermittent nature, would never fully utilize the purchased transmission capacity.

118. Nunez, *supra* note 1, at 169.

119. *Id.*

120. *See* Ferrey, *supra* note 67, § 2:11.

Conditional firm service solves these problems by allowing transmission operators to offer long-term contracts while retaining the right to interrupt transmission access under certain limited conditions. Essentially, these terms give transmission operators the ability to limit transmission access to the generator until congestion can be relieved and firm transmission can be offered.

In addition, Order No. 890 opened the door for hourly-firm service which offers a more attractive alternative to the old non-firm service.[121] While FERC did not require transmission owners to offer hourly-firm service, the Commission made it clear that such a service was permissible.[122] Hourly-firm service guarantees transmission access in hourly increments and can be scheduled as late as 10:00 a.m. the day before the service is to commence.[123] This creates a more reliable spot market for renewable generators to sell into when compared against/with as-available non-firm service. Because the availability of variable renewable resources is difficult to determine far in advance, hourly firm service gives renewable generators incentive to improve forecasting in order to accurately predict energy output for sale into the hourly firm market.

Taken together, conditional firm and hourly firm transmission services represent a significant improvement on the electricity market structure for variable renewable resources. Conditional firm service gives renewable generators long-term transmission contracts required to finance projects. Hourly firm service encourages renewable generators to improve forecasting and allows them to sell into a reliable spot market when their resource availability does not match their scheduled transmission access under a conditional-firm contract. While conditional-firm service provides a foundation to finance new projects, hourly firm service allows renewable generators to maximize the sale of all electricity as it becomes available.

Order No. 890 also tried to rectify the harm caused by the

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121. Order No. 890, *supra* note 107, ¶ 1212-1213.

122. *See Id*. at 1213 (explaining that "transmission operators will continue to have the option to propose offering hourly firm service in an FPA section 205 filing with the Commission").

123. *See, e.g., Id* at 1178 (explaining FERCs proposal for required hourly firm service).

"discriminatory pricing" of imbalance service.[124] Previous regulations under Order No. 888 had given wide discretion to transmission entities in determining the rates charged for imbalance penalties and was thus subject to abuse.[125] To address the situation, FERC adopted a tiered structure for imbalance services and exempted intermittent resources, including renewables, from the highest tier. In addition, FERC tied the cost of the imbalance service to the incremental cost of energy for a given transmission system.[126]

While these specific regulatory actions to encourage renewable energy have helped increase growth in the sector, both renewable generators and transmission providers have continued to battle over the costs renewables place on the system and how to allocate those costs.

V. RECENT DEVELOPMENTS IN THE DEBATE OVER RENEWABLE INTEGRATION

In the past year the intensity has increased in the debate over renewable energy integration. Recent events have focused the attention of utilities, system operators, and generators of renewable and traditional energy technologies. In August, FERC rejected a proposal by Puget Sound Energy (Puget) to modify its OATT to create a wind integration service.[127] This proposal followed several similar efforts by other utilities across the U.S. Shortly afterward, FERC issued notice of a proposed rulemaking to reform the OATT by modifying ancillary service rules as well as offering intra-hour transmission scheduling. This section offers an overview of the utility proposals and suggests the implications these proposals may have on FERC's Proposed Rule.

A. Puget Sound Energy Tariff Proposal

In August 2010, a proposal from Puget to modify its OATT

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124. *Id.* ¶ 70.

125. *Id.*

126. *Id.*; *see also* S. Cal. Water Co. v. F.E.R.C., 433 F.3d 840, 842 (D.C. Cir. 2005) (ruling on a contract dispute in which the contract defined incremental cost as, "expense incurred…in providing an additional increment of energy or capacity").

127. Puget Rejection, *supra* note 78.

to include a "Wind Following Service" was rejected by FERC.[128] The proposal would have allowed Puget to recover the costs associated with following and balancing the within-hour variations in output from wind generation.[129] All wind resources within Puget's balancing authority would be required to purchase the Wind Following Service or enter into a contractual arrangement with a third party to provide the service, or self-supply the service.[130]

Puget argued that under its current transmission tariff structure it cannot afford to add additional wind resources while maintaining compliance with NERC reliability standards.[131] Puget currently has sufficient hydroelectric and natural gas resources to balance the existing wind on its system. In the future, Puget argues, additional wind resources will require the utility to seek out new following and balancing resources to support the new wind. Puget characterizes the cost of procuring these new resources as an opportunity cost under FERC regulations, with Puget customers effectively subsidizing wind following and balancing services.[132] Under the following service Puget proposes, wind generators within Puget's balancing area would shoulder the cost of balancing the intermittency of wind energy.[133]

A crucial element of the proposal and its ultimate failure was the cost calculation of the service charge. Puget based the cost of the charge upon the capital cost of flexible electric capacity from a General Electric natural gas peaker generating unit.[134] Opponents argued that although Puget would experience opportunity costs with holding additional reserve generation, it would not incur the need for additional generating to serve loads; in the worst case scenario when

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128. *Id.* ¶ 1.

129. *Id.* ¶ 4.

130. *Id.* ¶ 4. (If the service is to be provided by a third party, the terms of the contract must be acceptable to PSE).

131. *Id.* ¶ 3.

132. *Id.* at ¶ 8 (explaining that "…dedicating stored hydroelectric capacity for use by wind generation would present a steep opportunity cost to Puget's native load customers, and shifting this stored hydroelectric capacity to a wind balancing function would inappropriately subsidize the cost of providing following capacity to wind generation.").

133. *Id.*

134. *Id.* ¶ 9.

wind stops blowing Puget would operate just as much generation as it would require absent wind on its system and therefore the cost of new generating units was not representative of their costs.[135] Part of Puget's rationale for using the cost of new generation as a proxy for the service charge was an insufficient market for following services to support new wind generation.[136] Without a strong market, Puget was forced to rely on hypothetical pricing mechanisms instead.

FERC rejected Puget's proposal as not meeting the standard of "just and reasonable" under the FPA.[137] Because the rate Puget proposed was hypothetical and not based on any demonstrable costs, the charge for the service could potentially exceed the actual cost of providing it.[138] The terms of rejection do not completely rule out approval of a similar following service if the rate was more closely based on the cost of providing the service. In rejecting Puget's initial proposal, FERC did so without prejudice, welcoming a new rate proposal.[139]

B. Other Utility Tariff Proposals

FERC does not expressly state what modifications would be required to meet the just and reasonable standard, but other similar proposals and the reaction from FERC afford some indication.[140] In its Puget ruling, FERC suggests that any charges should be related to "actual, demonstrable costs incurred in providing service."[141] Furthermore, in calculating the service charge, Puget must show that the charges will not

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135. *Id.*

136. Amendment to Open Access Transmission Tariff, Schedule 12, Wind Integration Within-Hour Generation Following Service, Puget Sound Energy, Inc., Docket No. ER10-1436-000, at 2 (June 14, 2010) (explaining "Unfortunately, a liquid market for…flexible capacity does not exist in the Pacific Northwest") (on file with author).

137. Puget Rejection, *supra* note 78, ¶ 31; *see also* 16 U.S.C. § 824d(a) (2011).

138. *Id.* ¶ 34.

139. *Id.* ¶ 35.

140. *See, e.g.,* NorthWestern Corp., 129 F.E.R.C. ¶ 61,116 (2009) [hereinafter *NorthWestern*], *order on reh'g,* 131 F.E.R.C. ¶ 61,202 (2010); Westar Energy Inc., 130 F.E.R.C. ¶ 61,215 (2010); Cal. Indep. Sys. Operator Corp., 131 F.E.R.C. ¶ 61,087 (2010).

141. Puget Rejection, *supra* note 78, ¶¶ 31, 34.

lead to recoveries beyond the actual costs Puget incurs in providing the service.[142]

Based upon these requirements it would seem that the only way for Puget to evince the cost of their following service is to enter into a contract with a generator to actually provide the needed service. This suggests that FERC requires more thorough analysis than Puget provided. One way of doing that would be to undertake the sort of in-depth "wind integration cost study" some utilities have embarked on, or conversely to base charges on actual incurred costs where ancillary service markets exist and those services can be explicitly procured. In rejecting Puget's request, FERC also acknowledges the difficulty of the situation saying, "[c]hanging system conditions, such as an increasing amount of wind generation described by Puget, present unique challenges that may require novel solutions."[143] Other systems are experiencing similar strains.

In a filing from NorthWestern Corp. (NorthWestern), the transmission provider proposed that wind resources exporting energy to another balancing authority be required to provide their own balancing service.[144] NorthWestern reasoned that the proposal was necessary to ensure customers within its BA would not be paying for balancing service without receiving the energy produced from the wind generators.[145] FERC ruled that this proposal conflicted with NorthWestern's existing obligation to offer balancing and following services.[146] This ruling makes it clear that BAs such as utility companies and transmission providers must offer all VERs some kind of balancing and following services. The question then becomes one of pricing these services; the issue that Puget had struggled with.

One utility has had at least partial success in implementing an energy imbalance service charge. Westar Energy Inc. (Westar) proposed charging generator regulation services to all resources exporting energy out of Westar's balancing authority

142. *Id.* ¶ 34.
143. *Id.* ¶ 31.
144. *NorthWestern, supra* note 140.
145. *Id.* ¶ 3.
146. *Id.* ¶ 14.

area.[147] Rather than proposing a standardized service charge as Puget had, Westar proposed apportioning the total charge between dispatchable resources and VERs based upon their respective burdens upon the system.[148] FERC accepted this proposal on an interim basis until a market for such services could be developed.[149] While FERC's acceptance of this proposal indicates a willingness to allow energy imbalance charges generally, continued focus on market driven pricing points to the ultimate goal. A rulemaking currently underway at FERC may present a better defined path toward implementing comprehensive renewable energy integration measures.

C. FERC Proposed Rulemaking on Renewable Integration Measures

Acknowledging the pressure many utilities and transmission operators feel from increasing VERs, FERC has initiated a rulemaking reopening many of the issues addressed by Order No. 890.[150] Two elements of the Proposed Rule would directly address renewable integration cost concerns. First, FERC proposes to require public utility transmission providers to offer intra-hourly transmission scheduling.[151] Second, FERC proposes to amend the *pro forma* OATT to include a "Generator Regulation and Frequency Response Service" (Response Service).[152]

The requirement of intra-hourly scheduling is intended to better reflect the scheduling constraints of renewable energy, resulting in more efficient use of transmission and generation resources.[153] Giving transmission providers authority to adjust schedules within the operating hour allows transmission providers to commit fewer resources as reserves to back up the variability of renewables.[154]

The creation of a *pro forma* OATT for Response Service will

147. Westar Energy Inc., 130 F.E.R.C. ¶ 61,215, ¶ 1 (2010).
148. *Id.* at 35-36.
149. *Id.* at 35.
150. *FERC Proposed Rule, supra* note 8.
151. *Id.* ¶ 3.
152. *Id.*
153. *Id.* ¶ 4.
154. *Id.* ¶ 5.

allow transmission providers to price integration cost charges such as the one proposed by Puget. The proposal would provide a generic rate schedule prescribing how transmission providers could recover costs from balancing variability from generators.[155] At the same time, FERC argues that providing the generic *pro forma* tariff schedule increases market transparency and competition by informing all market participants of the cost of such a service.[156] These two measures will provide some relief to the stresses renewable energy has placed on the system, but in places FERC has not gone far enough.

VI. TAKING THE NEXT STEP IN RENEWABLE ENERGY INTEGRATION

The notice of inquiry for FERC's proposed rulemaking stimulated extensive reaction from utility companies, renewable generators, and government agencies.[157] The Proposed Rule addresses some concerns relating to integration costs and scheduling constraints. Yet the proposal from FERC backs away from significant opportunities to create more liquid markets for VERs and ancillary services. The following section will discuss how close FERC comes to achieving the stated goal of removing practices that unduly discriminate against variable energy resources.[158]

A. Requiring Shorter Uniform Scheduling Blocks

FERC's proposal requiring transmission providers to schedule generation in smaller time increments would undoubtedly improve market conditions for renewable energy generators. Bonneville Power Administration, a utility and balancing authority with large amounts of wind energy, has estimated that scheduling in ten-minute increments could reduce system integration costs by eighty percent.[159] Others

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155. *Id.* ¶ 5.

156. *Id.* ¶ 5.

157. *See FERC Proposed Rule, supra* note 8, *et seq*. (discussing various comments received from over 130 different commenters following the notice of inquiry).

158. *Id.* at Summary.

159. Bart McManus, Bonneville Power Administration Wind Integration Technical Lead, Large Wind Integration Challenges and Solutions for Operations/System Reliability, at slide 26 (Oct. 2008), *available at* http://www.uwig.org/Denver/

have estimated integration cost reductions of forty to sixty percent depending on different balancing authority characteristics such as the amount of VERs, system load, and other measures taken to integrate the VERs into the system.[160]

These cost reductions come from a number of different places. First, the shorter intervals allow more precise scheduling that reflects the rapid changes in output from wind generators, ultimately allowing more accurate system forecasts.[161] More accurate scheduling means fewer reserves must be scheduled to balance any variability from renewable resources.

Second, changing the scheduling intervals provides system flexibility at a very low cost. NERC reliability requirements force transmission providers to procure expensive balancing reserves in hourly increments to match the scheduling of the variable energy.[162] Flexibility can be created at a lower cost by allowing shorter scheduling blocks. These shorter scheduling blocks allow transmission providers to maximize reliability simply through more dynamic resource scheduling and without procurement of additional resources.[163] A system operator can schedule a VER when it is available even if that is only a short period of time. These shorter scheduling chunks also mean that system operators can purchase the following services in smaller increments. Allowing scheduling which more closely follows the characteristics of the generation ultimately allows for more efficient operation of the system as a whole.

Third, NERC expects that intra-hour scheduling will allow

McManus.pdf ("10 minute schedule changes would solve ~80% of the [integration] issues BPA is anticipating.")

160. Avista Corporation, *Wind Integration Study, Table 24: Effect on Integration Cost of Short-Term Liquid Markets* 48 (2007), *available at* http://www.uwig.org/AvistaWindIntegrationStudy.pdf.

161. Response of the Western Electricity Coordinating Council to the Notice of Inquiry Addressing Integration of Variable Energy Resources, FERC Docket No. RM10-11-000, at 6-7 (Apr. 2010) [hereinafter *WECC Response*], *available at* http://elibrary.ferc.gov/idmws/nvcommon/NVViewer.asp?Doc=12309166:0.

162. Comments of the American Wind Energy Association, FERC Docket No. RM10-11-000, at 38 (Apr. 2010) [hereinafter *AWEA Comments*], *available at* http://elibrary.ferc.gov/idmws/search/advintermediate.asp?link_desc=yes&slcfilelist=12315786:0.

163. MICHAEL MILLIGAN & BRENDAN KIRBY, IMPACT OF BALANCING AREA SIZE, OBLIGATION SHARING, AND RAMPING CAPABILITY ON WIND INTEGRATION 27-29, *available at* http://www.nrel.gov/wind/systemsintegration/pdfs/2007/milligan_wind_integration_impacts.pdf.

systems to respond to events in real time. These smaller scheduling blocks provide more accurate market data for providers of ancillary services, such as balancing reserves.[164] More accurate market data will lead to more efficient and economic scheduling and greater competition among service providers.

Taken together, the most significant overall effect of intra-hour scheduling should be a reduced need for VER balancing from other resources. NERC anticipates revisiting its reliability requirements because of the expected decrease in demand for balancing resources.[165] Such a measure by NERC would reduce the amount of following capacity BAs would be required to carry to meet reliability standards and thus reduce the overall cost of VER integration.

FERC proposes requiring intra-hour scheduling in fifteen-minute increments, creating four scheduling blocks for each hour.[166] The determination of the ideal time increment is described as a trade-off between improved reliability from more flexible scheduling and the cost of the updated infrastructure necessary to implement the requirement.[167] By electing the fifteen-minute time interval, FERC believes it is choosing the increment which will create the lowest burden on system infrastructure while still providing the flexibility needed by VERs.[168]

FERC chose a maximum scheduling interval of fifteen minutes in the face of pressure to provide a more flexible standard. Formal comments from numerous entities responsible for system operations urged FERC not to adopt a rigid standard.[169] FERC should not cave in to this pressure. By

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164. Comments of the North American Electric Reliability Corporation in Response to the Federal Energy Regulatory Commission's January 21, 2010 Notice of Inquiry on the Integration of Variable Energy Resources, FERC Docket No. RM10-11-000, at 17-18 (Apr. 12, 2010) [hereinafter *NERC Response*], *available at* http://elibrary.ferc.gov/idmws/search/advintermediate.asp?link_desc=yes&slcfilelist=12314664:0.

165. *NERC Response*, *supra* note 164, at 17-18.

166. *FERC Proposed Rule, supra* note 8, ¶ 37.

167. *WECC Response*, *supra* note 161, at 7.

168. *NERC Response*, *supra* note 164, at 17-18 (concluding that the ideal range of time increments would be five to fifteen minutes depending on system characteristics).

169. *See, e.g.,* Comments of the Edison Electric Institute, FERC Docket No. RM 10-11-000, at 8-9 (Apr. 2010) *available at* http://elibrary.ferc.gov/idmws/search/advintermediate.asp?link_desc=yes&slcfilelist=12314178:0 (claiming that because "of

mandating a standard scheduling increment, which all transmission providers will be required to provide, FERC creates common market rules. At the same time the fifteen-minute interval operates only as a maximum. Transmission providers will still be allowed to offer scheduling in smaller increments if they find it appropriate or advantageous. Standard scheduling will make it easier for renewable generators to schedule and sell their product to different BAs. The current proposal encourages compatibility while still allowing individual BAs to customize their scheduling practices as necessary.

FERC must still be vigilant though, because this limited flexibility can allow barriers to persist. If one BA schedules power in ten-minute increments and a neighboring BA schedules power in eight-minute increments, generators may have a difficult time scheduling between the two. FERC should further encourage BAs to have consistent scheduling practices across regions. By mandating intra-hour scheduling in compatible intervals, FERC can significantly reduce the cost of renewable integration and improve overall system performance.

B. Charging Renewable Generators for Ancillary Services

In allocating integration costs FERC analogizes renewable VERs with variability on the customer side of the electric meter. The new Response Service proposed by FERC would be priced using the same cost assessment for balancing customer load variability.[170] According to FERC, regulation of customer load and regulation of generation are functionally equivalent because both are designed to recover the costs of holding regulation reserve capacity to meet system variability.[171] This argument may not fully consider the different benefits of increased renewable energy compared to regulation of

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the variation in market structure and rules throughout the county, it is unlikely that any single scheduling practice will suit all regions."); Comments of the Bonneville Power Administration, FERC Docket No. RM10-11-000, at 6 (Apr. 2010) *available at* http://elibrary.ferc.gov/idmws/search/advintermediate.asp?link_desc=yes&slcfilelist=12314631:0 (urging FERC not to mandate intra-hour scheduling but instead allow regional cost-benefit analyses).

170. *FERC Proposed Rule, supra* note 8, ¶ 92–94.

171. *Id.* ¶ 93.

customer load. Costs should fall upon all those who receive benefits from renewable energy.

Because the resource requirements are functionally the same for balancing customer load and generator output, FERC argues that the pricing mechanisms should also be consistent. This argument does not consider where the costs of Response Service will land in relation to the benefits of the service. Under the customer load-balancing tariff, the transmission customer taking energy off of the grid pays for the balancing service.[172] The cost of the service is then placed on electric utilities that are the direct transmission customers and that cost is then passed on to utility customers. In paying for this service, utility customers gain the ability to cycle their electricity without service disruptions. The small variations in electricity caused by turning the lights on or starting the dishwasher are addressed by this balancing service. The cost of the service is then spread across the entire utility ratepayer base - the primary beneficiaries of the service.

Placing a similar charge upon variable renewable energy generators disconnects the placement of costs from the benefits. While there are costs associated with integrating renewable energy, it may not be appropriate for these costs to be borne solely by renewable generators. In efforts to treat all generators neutrally, FERC has lost sight of the policy goals that have stimulated growth in renewable energy.[173] Renewable energy policies offer broad public benefits such as reduced pollution, increased energy security, and mitigation of global warming.[174] As a result, while renewable generators should undoubtedly shoulder some of the burden, the costs for bringing renewable energy to the grid should also be shared more broadly.

The proposed service may be fair in the sense that it uses the same metrics to calculate the cost of similar services. However, in allocating those costs, the service could still be seen to unduly discriminate against renewable energy

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172. Order No. 890, *supra* note 107, at Open Access Transmission Tariff Schedule 3, Tariff Sheet No. 131 (explaining, "The Transmission Customer must either purchase this service from the Transmission Provider or make alternative comparable arrangements…").

173. *FERC Proposed Rule, supra* note 8, ¶ 93 (recounting FERC's policy to utilize the same rate structure for customer load and generator imbalance service).

174. *See supra* Part II.A..

providers. Though the benefits of renewable energy are spread widely, the cost of integrating those resources will be focused solely on the generators bringing the energy to market. The distribution of the costs of the Response Service will have an important impact on the ability of renewable energy to compete with other resources. FERC should more carefully consider where these costs are placed.

C. Creation of a More Liquid Market for Reserve Generation

The policies in the Proposed Rule do provide some direction to system operators and generators to move ahead with renewable integration, but it leaves out an important piece of the puzzle. Even if FERC does choose to go forward with the new Response Service, the Commission has failed on its own terms to provide a proper pricing mechanism for the service. FERC rejected Puget's following service proposal because of the reliance on a hypothetical proxy-generating unit for pricing. However, Puget chose to use a proxy for pricing in part because there was, "no existing liquid market for the flexible capacity in the region."[175]

1. FERC should continue to pursue virtual balancing authorities

FERC should encourage the creation of liquid local and regional markets for flexible capacity. Liquid markets would allow competitive pricing for ancillary services. It would also address the shortcomings of Puget's following service proposal by providing a reliable baseline upon which to base the service charge. Creating these markets is more easily said than done.

In the Notice of Inquiry leading up to FERC's Proposed Rule, the Commission asked for feedback on creation of a "virtual balancing authority" (virtual BA).[176] Though not fully developed, the concept would allow VERs across a large geographic area to virtually combine into a single BA required to meet the NERC reliability standards. While FERC left the concept open to the interpretation of stakeholders, the virtual

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175. Puget Rejection, *supra* note 78, ¶ 33.

176. *Integration of Variable Energy Resources*, *Notice of Inquiry*, 130 FERC ¶ 61,053, ¶ 33 (Jan. 21, 2010) *available at* http://elibrary.ferc.gov/IDMWS/nvcommon/NVViewer.asp?Doc=12249929:0.

BA concept presumably allows aggregated renewable generators to offset their own variability. Several comments to the Notice of Inquiry endorsed the general concept of aggregating variable resources as a positive potential measure.[177] It is argued that the creation of such a virtual BA may not require additional authorization from FERC so long as NERC reliability requirements are met.[178] Regardless, explicit endorsement and a regulatory roadmap from FERC would further encourage the creation of these virtual BAs.

In the current proposed rule from FERC there is no mention of a virtual BA, and FERC seems to have abandoned attempts to expand or create more liquid markets for variable energy resources. The hurdles for setting up such a BA are substantial, but not insurmountable.[179] To begin the process, a significant number of generators would need to agree on terms and proceed with establishing a BA. Such a BA would still be subject to NERC reliability standards and would need to procure balancing resources to moderate variability across the virtual BA. Allowing more renewable resources to balance each other could reduce the overall need for balancing resources ultimately reducing integration costs.

2. FERC must focus on new ways to create liquid markets for renewable resources and ancillary services

In seeking comment about the viability of a virtual BA for VERs, FERC asked the wrong question. FERC rejected Puget's proposal in part because the proposed following cost was not based on any functioning liquid market for flexible capacity or ancillary services. With that, FERC's inquiry should focus on the creation of a liquid market for ancillary services such as the proposed Response Service to ensure that such services are properly priced.[180] Creation of virtual balancing authorities for variable resources may also benefit renewables but will not

177. *See, e.g.*, *WECC Response*, *supra* note 161, at 9 (with all other factors being equal, larger balancing authorities are better equipped to reduce variability by aggregating variable resources).

178. *See* Carol Opartny & Malcolm McLellan, *Power System Balancing Authority Innovation*, 1 WASH. J. ENVTL. L. & POL'Y 1 (2011).

179. *Id.*

180. *See AWEA Comments*, *supra* note 162, at 54-55 (discussing the benefit of region-wide load following markets and ancillary services markets).

necessarily stimulate a robust ancillary services market.[181] Functioning markets for ancillary services address the immediate problem of properly pricing the services to avoid discrimination against the generators forced to buy them.

As an alternative to ancillary service markets, FERC's Proposed Rule does allow variable resources the option of "self-supply" by entering bi-lateral contracts with generators to provide ancillary services.[182] This does hold the potential to create a secondary market for ancillary services in places where there is sufficient market demand. However, basing the market on bilateral contracting will inherently restrict the markets liquidity and does not encourage efficient use of resources. This first step towards an ancillary service market does not go far enough.

FERC should attempt to meet its own demands by proposing policies to create unconstrained liquid ancillary service markets and increase access to these markets. This can be done by creating virtual BAs made up instead of peaker power plants able to provide ancillary services more easily across a wider region. In addition, FERC can make it easier for renewable generators and other balancing resources to form their own BAs and allowing them to negotiate their own costs for balancing services. Other market participants are likely to provide additional ideas as well.

In the Proposed Rule, FERC failed to initiate a serious discussion of measures to create liquid ancillary services. As a result, no consensus exists around the universe of options for achieving such markets. FERC must focus new regulatory efforts on creation of liquid ancillary service markets to properly and competitively price the overall integration of renewable energy.

VII. CONCLUSION

Since the adoption of Order No. 890 in 2007, renewable VERs have continued to grow placing additional strains on transmission providers to manage the variability. FERC's Proposed Rule to remove barriers to the growth of renewable

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181. *See* Kirby, *supra* note 52 (virtual balancing authorities may actually reduce the overall demand for ancillary services by allowing the renewable resources themselves to perform some of the balancing).

182. *FERC Proposed Rule, supra* note 8, ¶ 89.

energy resources acknowledge this growing problem.[183] The requirement of intra-hourly scheduling represents a significant cost savings for the integration of renewable energy into electric transmission systems.

By requiring compatible intervals for intra-hour scheduling, FERC can further increase cooperation across BA boundaries. However, the proposal to add additional ancillary service charges for renewable generators should be reevaluated. Charging renewable generators for the cost of integration does not acknowledge that the benefits of renewable energy are spread broadly. Integration costs should not be shouldered solely by the generators and FERC should investigate ways to spread these costs more evenly.

Finally, FERC should not abandon attempts to create more robust market options for variable renewable resources and the ancillary services required to balance variability. Endorsing the self-supply option is a small first step to creating more robust markets for ancillary services. However, FERC must look further into the future; as renewable energy generation continues to increase, so will the need to manage resource variability. Robust liquid markets in both variable renewable resources and ancillary services will represent a significant improvement in the long-term viability of renewable energy resources.

183. *Id.* at Summary.