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Who Regulates the Smart Grid?: FERC's Authority Over Demand Response Compensation in Wholesale Electricity Markets.

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TABLE OF CONTENTS

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I. INTRODUCTION

A potentially revolutionary shift is taking place in the wholesale electricity markets that provide power for roughly half the nation's customers. At present, these markets handle power generated and sold through a bidding process, which retail distribution utilities and other "load-serving entities" (LSEs) then sell to retail customers. The wholesale markets receive bids from generators who offer energy for sale for particular time periods. Regional Transmission Organizations (RTO) and Independent System Operators (ISO), the familiar stewards of transmission systems in roughly half the nation,[1] administer these markets. They dispatch generators from lowest to highest bids until all power demand is met, following the limits of safe and reliable dispatch.

A relatively new set of players has recently begun to participate in wholesale energy markets,[2] offering a different commodity: "demand response" (DR). Demand response is, "a reduction in the consumption of electric energy by customers from their expected consumption in response to an increase in the price of electric energy or to incentive payments designed to induce lower consumption of electric energy."[3]

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1. An RTO is an independent organization that sets tariffs for transmission, manages congestion, and monitors the markets. ISOs are comparable independent regulated entities that coordinate regional transmission to ensure grid safety and reliability. The current RTOs and ISOs in the U.S. are ISO-New England, PJM Interconnection, Midwest ISO, New York ISO, Southwest Power Pool, California ISO, and Electric Reliability Council of Texas. *Regional Transmission Organizations (RTO) / Independent System Operators (ISO)*, FED. ENERGY REG. COMMISSION, http://www.ferc.gov/industries/electric/indus-act/rto.asp (last updated Feb. 19, 2013). For the purposes of this Article, ISOs and RTOs are treated identically because they both operate wholesale energy markets, and the differences between them are not critical to the discussion.

2. PowerPoint: Role of Retail Regulation in Demand Response 7 (Robert L. Borlick 2012) (on file with author) [hereinafter Borlick, MADRI Presentation], *available at* http://sites.energetics.com/madri/pdfs/MADRI_Presentation_Borlick_02-02-12.pdf (noting that, "[t]he introduction of third-party aggregators of retail customers (ARCs) that sell the demand response of another market participant's retail customers is a new market paradigm that has only recently come into existence.").

3. 18 C.F.R. § 35.28(b)(4) (2012); *see also* U.S. Dep't of Energy, *Demand Response—Policy*, ENERGY.GOV, http://energy.gov/oe/electricity-policy-coordination-

These new firms will aggregate consumer agreements to refrain from using electricity, and offer the block of resulting reductions in demand for sale in the wholesale energy markets. By definition, this is a completely different product than wholesale markets trade at present. Demand response is not "energy," but a reduction in consumption.

That reduction can have numerous benefits. It can directly reduce overall demand for electricity. Like other demand-side strategies (including conservation and efficiency),[4] it can have the added benefit of reducing greenhouse gas emissions and the need for constructing new power plants.[5] It can also contribute to increased reliability of the electric grid.[6] Noting these benefits, the Energy Policy Act of 2005 declared a national policy to encourage DR.[7]

Increased DR is also an essential building block of the Smart Grid, which anticipates a revolutionary transformation of consumers' relationship with the electric grid.[8] It is an interactive and dynamic application that can spur the growth of other two-way uses of a Smart Grid, such as greater incorporation of distributed energy resources. For this reason, DR is the Smart Grid's "killer app."[9]

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and-implementation/state-and-regional-policy-assistance/technic-l (last visited Feb. 18, 2013).

4. *See, e.g.*, MAGGIE ELDRIDGE ET AL., ENERGY EFFICIENCY: THE FIRST FUEL FOR A CLEAN ENERGY FUTURE 34 (2008), *available at* http://www.aceee.org/research-report/e082.

5. *See, e.g.*, Stephen Pacala & Robert Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 SCIENCE 968, (2004) (including demand-side strategies).

6. PETER FOX-PENNER, SMART POWER: CLIMATE CHANGE, THE SMART GRID, AND THE FUTURE OF ELECTRIC UTILITIES 46 (2011) (describing carbon-saving impacts of "aggressive DR"); FED. ENERGY REGULATORY COMM'N, DOCKET NO. AD-06-2-000, ASSESSMENT OF DEMAND RESPONSE & ADVANCED METERING 12 (2006) [hereinafter FERC 2006 DR-AMI REPORT] (noting that, "Demand response may provide environmental benefits by reducing generation plants' emissions during peak periods.").

7. 16 U.S.C. § 2642(d) (2006).

8. *See generally* Joel B. Eisen, *Smart Regulation and Federalism For the Smart Grid*, 37 HARV. ENVTL. L. REV. (forthcoming 2012) (discussing the Smart Grid and DR's potential in it).

9. Jim Rossi & Thomas Hutton, *Federal Preemption and the Clean Energy Floor*, 92 N.C. L. REV. (forthcoming 2013) (citing to statements of FERC Chairman Jon Wellinghoff); U.S. DEP'T. OF ENERGY, 2010 SMART GRID SYSTEM REPORT 3 (2012), *available at* http://energy.gov/sites/prod/files/2010%20Smart%20Grid%20System%20Report.pdf (terming "the integration of distributed generation (DG), storage, and demand-side resources for participation in electricity system operation" the "largest 'new frontier'" for the Smart Grid).

The Federal Energy Regulatory Commission (FERC) has issued a controversial "Order 745" that requires DR to be compensated in wholesale energy markets at the same price as electricity bid into the markets.[10] This requires FERC to view the markets differently than it has until now. For years, FERC has largely defined its regulatory role as fostering competition in electricity generation and promoting the sale of electricity at its lowest cost.[11] By promoting DR, it is shifting to using the wholesale power system to achieve environmental objectives and other social goals. This would transform the wholesale market as fundamentally as FERC's initial restructuring orders that fostered the markets' creation.

This Article argues that Order 745 is both justified under the Federal Power Act (FPA) and important to ensure the transition to a clean energy future. A challenge to Order 745, *Electric Power Supply Association v. FERC*, is currently pending in the D.C. Circuit.[12] This Article contends that Order 745 should be upheld against this challenge because it fits within FERC's broad authority to regulate the wholesale power markets.[13]

Under the Federal Power Act, FERC may regulate practices that are "affecting or pertaining to" wholesale market prices for electricity.[14] The D.C. Circuit should interpret this language to give FERC broad authority to regulate DR. Order 745 requires DR to be compensated because it has system-wide impacts on prices and reliability, in addition to its environmental benefits.[15] D.C. Circuit precedent supports FERC's role, as the designer and overseer of the wholesale markets, to redesign those markets broadly to achieve these goals. Order 745 is therefore

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10. Demand Response Compensation in Organized Wholesale Energy Markets, 76 Fed. Reg. 16,658, 16,659 (Mar. 24, 2011) (to be codified at 18 C.F.R. pt. 35) [hereinafter FERC Order 745].

11. *See, e.g.*, Regional Transmission Organizations, 65 Fed. Reg. 810, 810 (Jan. 6, 2000) (codified at 18 C.F.R. § 35.24 (2012)) [hereinafter FERC Order 2000] (advancing the formation of RTOs, noting that, "[t]he Commission's goal is to promote efficiency in wholesale electricity markets and to ensure that electricity consumers pay the lowest price possible for reliable service").

12. Elec. Power Supply Ass'n v. FERC, No. 11-1486 (D.C. Cir. filed Dec. 23, 2011).

13. FERC's "just and reasonable" authority has been interpreted for decades to give it broad latitude "to consider some matters going beyond the direct financial interests of buyers and sellers in wholesale transactions [such as] 'conservation, environmental, and antitrust questions.'" Michael H. Dworkin & Rachel Aslin Goldwasser, *Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organizations*, 28 ENERGY L.J. 543, 545 (2007) (quoting Nat'l Ass'n for the Advancement of Colored People v. Fed. Power Comm'n., 425 U.S. 662 (1976)).

14. 16 U.S.C. § 824d(a) (2006).

15. Rossi & Hutton, *supra* note 9 (noting that, "for FERC's new demand response approach to survive legal challenges, the agency will likely need to depend on an expansive interpretation of the goals of the FPA, as including not only consumer protection but also reliability goals related to the system as a whole, and conservation and environmental goals").

supportable over its opponents'[16] claim that it is an impermissible expansion of federal authority because DR does not involve sales of energy.[17]

FERC should promote a wholesale market design that encourages DR. In a perfect electricity market, consumers with smart meters would respond directly to wholesale market prices and vary their consumption accordingly. However, this seamless connection between the wholesale and retail levels may take many years to develop. In the meantime, FERC has decided that states' DR programs alone will be insufficient to encourage more demand reductions. Order 745 is not an exclusive policy path. It neither eliminates nor preempts state DR programs, and the Supreme Court has empowered FERC to regulate in similar situations of mixed federal-state jurisdiction, even if it might have some adverse impacts on state programs.

Opponents also argue that even if FERC justifies Order 745 as "learning by doing," in the words of one critic, the price tag is too high. They claim that FERC has overcompensated DR by valuing it at the market price, asserting that those who reduce demand get a double reward by also receiving the savings from electricity purchases foregone.[18] However, providing electricity generation supply at the lowest possible cost is neither the only goal that FERC may pursue under the FPA, nor, in this Article's view, is it essential here. Moreover, FERC has created a net benefits test to promote DR's substantial environmental, reliability, consumer interactivity and other benefits without incurring excessive costs. FERC's judgment that the net benefits test will keep near-term costs of experimentation down is entitled to deference.

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16. Order 745's challengers include the Electric Power Supply Association, the Edison Electric Institute, the American Public Power Association, Dominion Electric Cooperative, the National Rural Electric Cooperative Association, the California Independent System Operator, and the California Public Utilities Commission.

17. Their views are outlined in an amicus brief opposing Order 745. Brief for Robert L. Borlick, et al. as Amici Curiae Supporting Petitioners at 1, Elec. Power Supply Ass'n v. FERC, No. 11-1486 (D.C. Cir. filed Dec. 23, 2011) (noting that, "[a]mici curiae (listed in Addendum A) are leading economists and educators who have designed, studied, taught, and written about the electricity markets affected by the Federal Energy Regulatory Commission Final Rule under review here").

18. The central substantive issue in *Electric Power Supply Association* is whether the market price, the so-called "locational marginal price" (LMP), or LMP minus the applicable retail rate (LMP-G) is the appropriate level of compensation for DR. Opponents argue that DR priced at full LMP provides a windfall to retail customers. *See infra* note 87 and accompanying text (discussing this argument).

On the whole, Order 745 is valuable policy experimentation. FERC believes that DR bid by intermediaries into wholesale markets will yield important experience and hard evidence about how to reap much greater benefits in the future.[19] Given that demand-side strategies have been underemphasized on the electric grid for decades, it is reasonable for FERC to promote experimentation with a new business model. This overcomes opponents' arguments that DR unnecessarily interposes intermediaries in the market, instead of letting the market perform its low-cost clearing function. Aggregators may turn out to be a disruptive force in the industry, acting more nimbly, and therefore more capably than utilities in promoting DR. Therefore, this Article contends that FERC's authority to promulgate Order 745 is and should be deemed fully supportable under a *Chevron* analysis and the case law interpreting FPA section 205.

II. DEMAND RESPONSE, THE POTENTIAL FOR ECONOMIC DR, AND THE BARRIERS TO MORE WIDESPREAD DEPLOYMENT

Order 745 applies only to demand response bid into wholesale energy markets. Demand response includes numerous techniques by which end-use customers directly reduce consumption of electricity.[20] It is fundamentally different from energy that generators produce and bid into energy markets. Demand response is not energy, but a mechanism designed to save it. A customer that reduces consumption using a DR technique has used less energy, not purchased more of it. DR is also different from energy efficiency improvements that make consumers more efficient per unit of electricity consumed.[21] Typically, consumers reduce their use of electricity in response to emergency needs on the electric grid or price signals. An example would be a system using sensors on devices that consume large amounts of electricity, such as air conditioning

19. A good example of this is the provision of Order 745 stating that dynamic integration of the net benefits test into RTOs' dispatch algorithms may produce more precise wholesale market prices over time. FERC Order 745, *supra* note 10, at 16,672 (calling for a study of this issue).

20. FERC 2006 DR-AMI REPORT, *supra* note 6, at x; FERC's most recent annual report on DR activities in the United States is FED. ENERGY REGULATORY COMM'N, ASSESSMENT OF DEMAND RESPONSE & ADVANCED METERING (2011) [hereinafter FERC 2011 DR-AMI REPORT].

21. MASS. INST. OF TECH., THE FUTURE OF THE ELECTRIC GRID 147 (2011). "Demand-side management (DSM)" includes both DR and energy efficiency programs and incentives. For a discussion of state efficiency programs, *see* COLUMBIA CTR. FOR CLIMATE CHANGE LAW, COLUMBIA LAW SCH., PUBLIC UTILITY COMMISSIONS AND ENERGY EFFICIENCY: A HANDBOOK OF LEGAL & REGULATORY TOOLS FOR COMMISSIONERS & ADVOCATES (2012), *available at* http://www.law.columbia.edu/media_inquiries/news_events/2201/august2012/Climate-Law-PUC-Report.

units, that link the devices to a utility or third party that can cut back the device's use automatically if the price of electricity increases.

Order 745 governs DR bid in quantities of megawatt-hours (MWh) by intermediaries into day-ahead or real-time wholesale energy markets. These firms are known as "aggregators," "curtailment service providers," or, in Order 745's terms, "demand response resources."[22] Under Order 745, aggregators that bundle demand reductions of individual residential and commercial customers and bid them into wholesale markets must be paid the same market price as generators, the locational marginal price (LMP).[23] An important qualifier is that aggregators are only compensated when it is cost effective to do so. Each RTO or ISO must establish a net benefits test[24] designed to ascertain the price level at which DR bid into the market will cost-effectively balance supply and demand.

There are two principal forms of DR: time-based (using varying rates to prompt demand reductions) and incentive-based (using incentives to reduce demand).[25] DR programs are also distinguishable on the basis of the signals that prompt reductions, either in response to the price of electricity (economic DR), or to lower consumption at periods of high stress on the grid (emergency DR).[26]

Emergency DR, used when grid reliability is jeopardized, has been the most common form of DR to date.[27] It involves reducing consumption at peak hours when electricity demand spikes. Demand for energy in wholesale markets peaks on a limited number of days and times, most notably in summer mid-day hours when air conditioning use is highest.

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22. Order 745 defines "demand response resources" as entities with the capability of providing DR services. 18 C.F.R. § 35.28(b)(5) (2010). This Article will use "aggregators" instead, because it describes their activities better and avoids confusion between "demand response" (activities reducing demand) and "demand response resources" (providers of DR).

23. FERC Order 745, *supra* note 10, at 16,659 n.5 (defining LMP as " . . . the price calculated by the ISO or RTO at particular locations or electrical nodes or zones within the ISO or RTO footprint . . . used as the market price to compensate generators"). *See infra* notes 80–83 and accompanying text (discussing the mechanics of compensating DR at LMP).

24. FERC Order 745, *supra* note 10, at 16,671.

25. U.S. DEPT. OF ENERGY, BENEFITS OF DEMAND RESPONSE IN ELECTRICITY MARKETS AND RECOMMENDATIONS FOR ACHIEVING THEM, at v (2006) (hereinafter 2006 DOE DR BENEFITS REPORT).

26. *See, e.g.*, PETER CAPPERS ET AL., DEMAND RESPONSE IN U.S. ELECTRICITY MARKETS: EMPIRICAL EVIDENCE 11–14 (2009), *available at* http://eetd.lbl.gov/ea/EMP/reports/lbnl-2124e.pdf (describing specific economic and emergency DR programs in eastern RTOs).

27. *Id.* at 19.

This problem will only get worse, as summer demand is expected to grow faster than electricity demand as a whole.[28] Emergency DR is designed to substitute negawatts at those peak hours for starting or using another power plant to meet high demand.[29] Consumers typically receive monetary incentives to take part in emergency DR programs. In return, they allow utilities or authorized third parties to control specific devices.[30] A DR program of this sort might use sensors on large residential appliances such as air conditioners or electric water heaters, controlled over the Internet (often through a gateway to the house such as a programmable thermostat[31]), that cycle devices back or off over a specific time period in response to a signal to reduce demand.

An economic DR program uses similar control technologies, but different signals and incentives. Instead of curtailing use when demand spikes, the system bases its incentives on the real-time price of electricity. Price signals allow consumers to modify their demand when the wholesale market price is too high.[32] When prices reach high levels (which can be set in system programming), a signal can be sent to cut controlled devices back or off. With proper design, this does not involve sitting in the dark without electricity for an entire day. The short-term reductions from well-structured DR programs would be imperceptible to most consumers.

According to one recent study, well over 100 gigawatts of economic DR is available nationwide.[33] This enormous amount is equivalent to the capacity of hundreds of new fossil fuel-fired plants. The same report observed that DR could reduce as much as 20% of the nation's electricity demand.[34] Another analysis suggests that large reductions could come from "residential and small commercial (i.e., mass market) customers," without adversely affecting their comfort level.[35] Yet, as Order 745

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28. ELEC. POWER RESEARCH INST., ASSESSMENT OF ACHIEVABLE POTENTIAL FROM ENERGY EFFICIENCY AND DEMAND RESPONSE PROGRAMS IN THE U.S. (2010–2030) 7 (2009), *available at* http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001016987.

29. FERC 2006 DR-AMI Report, supra note 6, at 59.

30. CAPPERS ET AL., *supra* note 26, at 19.

31. Eisen, *supra* note 8.

32. FERC 2006 DR-AM REPORT, *supra* note 6, at 51.

33. FED. ENERGY REGULATORY COMM'N, A NATIONAL ASSESSMENT OF DEMAND RESPONSE POTENTIAL, at x–xii (2009), *available at* http://www.ferc.gov/legal/staff-reports/06-09-demand-response.pdf [hereinafter FERC 2009 DR Potential Report]; *but see* Elec. Power Research Inst., *supra* note 28, at xxvii (estimating maximum achievable DR in summer peak hours at 101 GW by 2030).

34. FERC 2009 DR POTENTIAL REPORT, *supra* note 33, at x.

35. PowerPoint: Mass Market Demand Response and Variable Generation Integration Issues: A Scoping Study 5 (Peter Cappers et al., Envtl. Energy Tech. Div., Lawrence Berkeley Nat'l Lab.) (on file with author) [hereinafter LBL 2011 DR-DG Integration Scoping Study], *available at* http://eetd.lbl.gov/EA/emp/reporep/lbnl-5063e-ppt.pdf.

notes, there has not been much economic DR activity so far.[36] There are many reasons for this, including FERC's perception that DR has been undercompensated in wholesale markets.

Order 745 builds on the foundation of FERC's Order 719, which required ISOs and RTOs to revise their tariffs and allow DR aggregator participation in the wholesale markets.[37] In turn, Order 719 was based on the national policy established in the Energy Policy Act of 2005 that, "unnecessary barriers to demand response participation in energy, capacity and ancillary service markets shall be eliminated."[38]

A. Potential Benefits of Economic DR (Pricing, Reliability, Environmental, Integrating Renewables)

Order 745 encourages DR by fixing the amount of its compensation at the same level as generation resources. Its foundational assumption is that DR is functionally comparable to generation.[39] Using this logic, reducing demand for electricity by 1000 MWh is just as effective as producing 1000 MWh of supply to meet demand. As Order 745 puts it, "an increment of generation is comparable to a decrement of load for

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36. CAPPERS ET AL., *supra* note 26, at 19; PowerPoint: 2011 Final Emergency Load Management (ILR/DR) and Economic Demand Response Summary 2 (PJM Interconnection, L.L.C. 2011) (on file with author), *available at* http://www.pjm.com/ markets-and-operations/demand-response/~/media/markets-ops/dsr/2011-final-energy-load-management-and-economic-demand-response-summary.ashx (providing statistics on emergency DR and noting that in 2011, "PJM had very limited Economic Demand Response activity").

37. Wholesale Competition in Regions with Organized Electric Markets, 73 Fed. Reg. 64,100, 64,101 (Oct. 28, 2008) (codified as amended at 18 C.F.R. § 35.28 (2012)) [hereinafter FERC Order 719]. Under Order 719, RTOs and ISOs were required to permit aggregators to bid DR on behalf of their retail customers directly into the wholesale energy market, unless a state law prevented it. *Id.*; *see, e.g.*, Midwest Indep. Transmission Sys. Operator, Inc., 140 F.E.R.C. ¶ 61,060 (2012) (FERC Order on an Order 719 compliance filing by MISO RTO setting forth business practices for aggregators in the markets MISO administers).

Notwithstanding Order 719, aggregators "still face significant institutional and regulatory barriers in many regions of the United States." CAPPERS ET AL., *supra* note 26, at 26 (noting that states limit participation in wholesale markets by aggregators because PUCs are "concerned about the erosion of their authority to regulate the business and operations of incumbent monopoly utilities and its infrastructure."); Ind. Util. Regulatory Comm'n v. FERC, 668 F.3d 735 (D.C. Cir. 2012) (overturning an Indiana state law precluding customers from enrolling with aggregators without the state commission's prior approval). *See infra* notes 77–78 and accompanying text (discussing state regulation of aggregators).

38. 16 U.S.C. § 2642 (2006).

39. FERC Order 745, *supra* note 10, at 16,661.

purposes of balancing supply and demand in the day-ahead and real-time energy markets."[40]

While DR is not energy, FERC views it as comparable because it benefits wholesale energy markets. First, it can serve as a hedge against price spikes.[41] At present, wholesale markets are imperfect, because there is little opportunity for demand to participate to balance them. This has led to oversupply as a means of tamping down peaking prices.[42] As FERC Chairman Jon Wellinghoff noted, there has been overbuilding of plants that only run at peak hours. Wellinghoff observed that, this strictly supply-side management strategy requires sufficient peaking capacity and reserve margins to reliably meet the highest load on hot summer days when air conditioners are struggling to keep up, plus a contingency for outages and other disruptive events.[43]

DR's impact is greatest during peak hours when the cost of generation is high and the supply curve is the steepest.[44] By reducing demand at those times, DR can offset the need to run power plants that would be extremely costly to run at those peak hours.[45] Wholesale prices can therefore be lower at peak times. Thus, DR can reduce market prices, while mitigating generator market power by preventing generators from earning far more than their costs of production at peak hours.[46] As FERC puts it, DR, "helps to ensure the competitiveness of organized wholesale energy markets and remove barriers to the participation of demand response resources, thus ensuring just and reasonable wholesale rates."[47]

DR can also improve the electric grid's reliability.[48] At peak times, the grid is stressed. Like a rubber band stretched to the limit, supply is strained to meet peak demand. Under certain circumstances, that strain can cause service disruptions, such as forced outages or rolling blackouts. DR is a safety valve that lessens system pressure. By giving RTOs and ISOs another tool to reduce load and balance supply and demand, it offers a service that generation alone cannot provide.[49] To some, this

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40. *Id.* at 16,662.
41. *Id.* at 16,660.
42. *See* Jon Wellinghoff & David L. Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Market Equation*, 28 ENERGY L.J. 389, 393 (2007); Dworkin & Goldwasser, *supra* note 13, at 551.
43. Wellinghoff & Morenoff, *supra* note 42, at 393.
44. FERC Order 745, *supra* note 10, at 16,664–65.
45. 2006 DOE DR BENEFITS REPORT, *supra* note 25, at vi.
46. *Id.*
47. FERC Order 745, *supra* note 10, at 16,658.
48. Wellinghoff & Morenoff, *supra* note 42, at 410–11; 2006 DOE DR BENEFITS REPORT, *supra* note 25, at vi.
49. For example, one commenter on Order 745 asserted that "the fungibility of demand response and generation output creates greater operational flexibility that, in turn, offers

contribution to grid flexibility and resilience makes DR even more valuable than an equivalent increase in generation.[50] Not surprisingly, groups representing generators see it differently, arguing that because DR does not provide more supply to meet system demand, it simply "allows the marginal electron to serve a different customer."[51]

By reducing demand at specific peak times, DR can also have positive environmental impacts. It can offset the need to construct and dispatch polluting generation resources.[52] Power plants that run at peak times (peaker plants) are often older, dirtier and less efficient fossil-fuel burning generation sources.[53] DR has fewer—or possibly none—of the adverse impacts of generation, such as air pollution, greenhouse gas emissions, and land and water use issues.[54] However, current wholesale market prices fail to internalize these externalities, so there is an improper incentive to use peaking plants instead of DR to meet increased demand. This has led some to argue that DR should receive extra compensation because wholesale prices "radically understate the full environmental and health costs associated" with electricity generated from fossil fuels.[55]

Finally, as the requirements of renewable portfolio standards and other mandates will bring considerably more power generated from renewable resources onto the grid in the next several decades, increased use of DR can help integrate it into the grid.[56] Systems that produce power from

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RTOs and ISOs multiple options to solve system issues both in energy and ancillary service markets . . . " FERC Order 745, *supra* note 10, at 16,662.

50. *Id.*

51. *Id.*

52. Rossi & Hutton, *supra* note 9, at 46 (noting that, "[DR] also can advance values associated with conservation and environmental protection, insofar as reductions in demand may allow plants to operate at more efficient levels, or make new the construction of new facilities unnecessary.").

53. FERC Order 745, *supra* note 10, at 16,664.

54. One exception would be demand reductions by switching to behind-the-meter generation that runs on fossil fuel sources. *See infra* note 76 and accompanying text.

55. FERC Order 745, *supra* note 10, at 16,664.

56. *See generally* JOSEPH H. ETO ET AL., LAWRENCE BERKELEY NAT'L LAB., USE OF FREQUENCY RESPONSE METRICS TO ASSESS THE PLANNING AND OPERATING REQUIREMENTS FOR RELIABLE INTEGRATION OF VARIABLE RENEWABLE GENERATION (2010) [hereinafter "LBNL REGULATION REPORT"], *available at* http://www.ferc.gov/industries/electric/indus-act/reliability/frequencyresponsemetrics-report.pdf.

The connection between DR, DG, and frequency regulation is discussed further in Joel B. Eisen, *Distributed Energy Resources, "Virtual Power Plants," and the Smart Grid*, 7 ENVTL. & ENERGY L. & POL'Y J. 191 (2013).

renewable resources typically supply power intermittently.[57] This can create additional balancing challenges for RTOs and ISOs that must deal with the on-again, off-again nature of these resources.[58] The managerial challenge is exacerbated by the requirement of frequency regulation: the electric grid must always be kept in frequency balance between supply and demand in real time, within specific narrow limits.[59]

At present, there is no viable means of large-scale storage to serve as a safety valve for regulating the grid.[60] However, DR can step into the gap. A recent FERC analysis found that DR could play an important role in maintaining frequency regulation.[61] It can be deployed immediately, and does not have the time lag—however small it might be in some cases—that occurs when a grid operator orders the startup of a power plant.[62] Large-scale deployment of DR can therefore give RTOs and ISOs a tool to "quickly respond to changes in variable generation output without placing undue strain on the power system."[63]

B. Economic DR Participation in Wholesale Energy Markets

Economic DR can take place in today's electric grid under two different scenarios. First, retail distribution utilities could modify their rates to provide incentives to consumers for reducing their electricity demand. For example, a state could set a dynamic pricing structure that rewards demand reduction. Dynamic pricing is the term for the various mechanisms to change electricity prices in real time to mirror changes in marginal wholesale costs. Under dynamic pricing, consumers would buy electricity up to the point where its marginal cost exceeded its marginal utility to them.

However, dynamic pricing is not the norm across the nation, as there is a fundamental disconnect between the wholesale and retail electricity markets.[64] In theory, consumers could reduce their electricity use directly

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57. ANDRES CARVALLO & JOHN COOPER, THE ADVANCED SMART GRID: EDGE POWER DRIVING SUSTAINABILITY 18 (2011).

58. *See generally* LBNL REGULATION REPORT, *supra* note 56 (discussing this challenge and strategies to address it).

59. Paul L. Joskow, *Creating a Smarter U.S. Electricity Grid*, 26 J. ECON. PERSPECTIVES 29, 33 (2012).

60. N. AM. ELEC. RELIABILITY CORP., ACCOMMODATING HIGH LEVELS OF VARIABLE GENERATION, at i (2009), *available at* http://www.nerc.com/files/IVGTF_Report_041609.pdf.

61. LBNL REGULATION REPORT, *supra* note 56, at xviii.

62. N. AM. ELEC. RELIABILITY CORP., *supra* note 60, at iii.

63. *Id.*

64. SEVERIN BORENSTEIN, ENERGY INST. AT HAUSS, EFFECTIVE AND EQUITABLE ADOPTION OF OPT-IN RESIDENTIAL DYNAMIC ELECTRICITY PRICING 2 (2012), *available at* http://ei.haas.berkeley.edu/pdf/working_papers/WP229.pdf; FERC Order 745, *supra* note 10, at 16,667.

in response to wholesale market price signals. That is impossible for most residential and small commercial consumers, who are insulated from the wholesale market price of electricity. They typically pay a fixed retail price per kilowatt-hour (kWh), set by state public utility commissions (PUCs).[65] These static retail tariffs do not vary with the time of day, real time wholesale price, or any other variable. Thus, if wholesale prices spike, there is no direct impact on consumers, who have no market-based incentive to reduce their consumption or to take part in a DR program. No matter how much one consumes, the price of power will not change and the marginal cost of each unit of electricity remains the same.[66]

1. Demand Response Firms (Aggregators) and Their Relationship With Wholesale Energy Markets

The second model of economic DR involves organizing consumers as a group, bidding their aggregated reductions as a resource into the wholesale markets. By pulling together demand reductions from a number of retail customers, an aggregator enables individual customers to take part in the market when they otherwise could not do so. Most residential customers cannot interact directly with the wholesale markets, as market rules in RTOs and ISOs require small-scale customers to do so through licensed intermediaries.[67] The fundamental idea of curtailing an amount of demand larger than that of a typical household is not new. A traditional use of emergency DR going back several decades involves contracts between large industrial or commercial customers—such as major manufacturing facilities—and their utilities directly to allow the utilities to curtail their electricity use when necessary to balance the grid.

Order 745 applies only to aggregators, not to any state program that regulates consumers directly.[68] A wholly new business sector has arisen

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65. BORENSTEIN, ENERGY INST. AT HAUSS, *supra* note 64, at 2.
66. *Id.*
67. As an example, the minimum individual or aggregated curtailment that may be bid into the PJM RTO's markets is 100 kW, larger than the amount that could be provided by any single residential customer. *See, e.g.*, PJM INTERCONNECTION, L.L.C., AMENDED AND RESTATED OPERATING AGREEMENT OF PJM INTERCONNECTION ¶ 1.5A.9 (2013) ("Day-ahead and Real-time Energy Market Participation"), *available at* http://www.pjm.com/documents/~/media/documents/agreements/oa.ashx.
68. FERC Order 745, *supra* note 10, at 16,660 (stating that, "While a number of states and utilities are pursuing retail-level price-responsive demand initiatives based on dynamic and time-differentiated retail prices and utility investments in demand response

in the electricity market in recent years, in which firms such as EnerNOC, Comverge, and Viridity[69] serve as intermediaries to the wholesale markets.[70] They work with commercial customers to manage their electricity usage and handle the mechanics of bidding DR into the wholesale markets. Their portfolios to date typically consist of DR under contract with business and commercial customers. As noted above, these customers have a tradition of working with utilities to curtail electricity use on demand, so they are typically more familiar with DR and comfortable with it than residential customers.

In the past few years, these companies have begun to market to the retail electricity sector,[71] offering products and services tailored to households. The larger players in this sector are gradually becoming familiar to more customers, although their reach in the residential sector is still relatively small. Some firms operate in partnership with utilities,[72] but others operate independently.

Each demand response firm has its own proprietary hardware and software system that manages price signals and demand reductions. Typically, the company offers a means for the consumer to finance and install the system, and a technological solution designed to manage and control the response to price signals. So, for example, a program might allow a consumer to set a programmable thermostat to reduce demand of specific devices at given price levels. The technology might allow

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enabling technologies, these are state efforts, and, thus, are not the subject of this proceeding"). *See infra* note 137 and accompanying text (discussing the impact of Order 745 on existing state programs).

69. ENERNOC, http://www.enernoc.com (last visited Aug. 29, 2012); COMVERGE, http://www.comverge.com (last visited Aug. 29, 2012); VIRIDITY ENERGY, http://viridityenergy.com (last visited Aug. 29, 2012).

70. WARD JEWELL ET AL., POWER SYS. ENG'G RESEARCH CTR., FUTURE GRID: THE ENVIRONMENT 22–23 (2012), *available at* http://www.pserc.wisc.edu/documents/publications/papers/fgwhitepapers/Jewell_PSERC_Future_Grid_White_Paper_Environment_May_2012_Final.pdf (mentioning Comverge and EnerNOC and noting that, "to manage interactions with the system operator and participation in electricity markets, load aggregators have the ability to act as an intermediary between the operators and individual customers.").

71. Gene Wolf, *Targeting the Customer*, TRANSMISSION & DISTRIBUTION WORLD (May 1, 2012, 12:00 PM), http://tdworld.com/demandresponse/smart-meter-demand-response-050112/ (noting that, "aggregators offer residential and small commercial customers the same energy audits and smart building technologies that have long been available to large commercial and industrial (C&I) customers.").

72. *Id.* (noting that, "savvy utilities . . . are partnering with third-party DR providers"). Each of California's three largest investor-owned utilities has partnered with an aggregator to deliver DR services. *See generally* DULANE MORAN & JUN SUZUKI, RESEARCH INTO ACTION, INC., CURTAILMENT SERVICE PROVIDERS: THEY BRING THE HORSE TO WATER... DO WE CARE IF IT DRINKS? (2010), *available at* http://www.aceee.org/files/proceedings/2010/data/papers/2066.pdf (discussing the experience to date with these partnerships).

consumers to retain some control (for example, the ability to override a setting and leave an air conditioning unit on when household temperature reaches a prescribed level).

Empowering consumers to reduce consumption in response to price signals could be enormously beneficial. It would create a historic shift in the electricity system from its current left to right orientation, as consumers would have far more interaction with the entities that serve them. This is no small matter. It could empower consumers to control their own energy future, helping them become more familiar with changing their consumption and seeing how that translates into savings. It also gives them a chance to understand and use energy-saving technologies as aggregators deploy those solutions.

2. Challenges of Aggregation

However, there are concerns with this model of DR. Aggregating a resource and then bidding it into the wholesale markets is a complex endeavor that requires care in selecting customers and working with them. To be functionally the same as generation, aggregators must be able to sustain and control demand reductions for extended periods of time. Like Lucy yanking the football away from Charlie Brown, it would not be useful to the wholesale market to offer a specific level of demand reduction, only to have it last for mere minutes. Some commenters of Order 745 claimed that DR only provides short-term negawatts, while generators can be dispatched by an RTO or ISO to balance the grid for longer periods of time.[73]

Another issue is ensuring that "real" demand reduction takes place. The first aspect of this involves fixing the baseline for electricity consumption from which the demand reduction is measured.[74] Because little economic DR has taken place, there is no record of success in ensuring that baselines are set accurately. Measuring and verifying that real demand reductions from the baseline are achieved is another important challenge.[75]

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73. FERC Order 745, *supra* note 10, at 16,662.
74. *Id.* at 16,672.
75. *Id.* If demand is merely time-shifted, there is no real reduction. *See, e.g.*, JEWELL ET AL., POWER SYS. ENG'G RESEARCH CTR., *supra* note 70, at 24 (stating that, "[t]he environmental benefits of demand response depend on whether energy consumption is actually reduced, or delayed to a later time.").

One measurement problem identified by Order 745's opponents is the use of "behind the meter" generation to achieve demand reduction. In this scenario, a commercial or manufacturing facility with a backup generator located on its premises offers to "reduce" the amount of electricity that it purchases. It then substitutes the power it generates on site—and not measured by the utility, hence the term "behind the meter"—for the power it would otherwise purchase, thereby getting paid for the ostensibly reduced demand while still consuming as much power as before. Worse yet, if the on-site generator is a polluting unit, the environmental benefits of DR are diminished. FERC, however, does not distinguish among DR resources in deciding which are compensated.[76]

Much of this might be addressed by state regulation of aggregators' practices. For example, a state in which an aggregator does business might establish best practices for defining demand reductions, and perhaps establish the right to periodic inspections. Some states have attempted to regulate aggregators in the same manner as utilities or other electricity suppliers.[77] Order 745 does not explicitly preclude this. However, if a state imposes what FERC perceives as onerous regulations to hamper the growth of the DR sector, it may challenge them. In 2012, the D.C. Circuit refused to allow Indiana state regulators to bar customers from enrolling with aggregators without the state's prior approval.[78]

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76. *See, e.g.*, Demand Response Compensation in Organized Wholesale Energy Markets, 137 F.E.R.C. ¶ 61,215 at 66 (Dec. 15, 2011) (clarifying, in the context of an order denying rehearing on Order 745, that FERC believes there is no distinction among DR resources, whether or not they are behind the meter, because the impact on wholesale markets is the same); Midwest Indep. Transmission Sys. Operator, Inc., 140 F.E.R.C. ¶ 61,059 at 29 (July 19, 2012) [hereinafter, FERC Order on MISO Order 745 Compliance Filing] (noting that, "Order No. 745 focused exclusively on the amount of payment demand response would receive and did not require any changes with respect to whether load relying on behind-the-meter generation would be entitled to demand response compensation.").

77. *See, e.g.*, An Investigation of the Regulation of Curtailment Service Providers, Case No. 9241, Order No. 84275 (Md. Pub. Serv. Comm'n Aug. 22, 2011), http://webapp.psc.state.md.us/IIntrane/Maillog/orders_new.cfc (Maryland PSC order requiring curtailment service providers operating in PJM to register with the PSC).

78. *See* Ind. Util. Regulatory Comm'n v. FERC, 668 F.3d 735 (D.C. Circ. 2012) (where the D.C. Circuit sided with FERC after it approved a PJM tariff that allowed aggregators to put the burden on regulated utilities to demonstrate that customers were ineligible for aggregation, effectively overriding the Indiana state commission order enjoining retail customers in Indiana from selling DR in the wholesale market without the IURC's prior approval).

III. THE CONTROVERSY OVER COMPENSATING DR AND GENERATION EQUALLY

Order 745 provides for a uniform level of payment for the DR resource that aggregators bid into wholesale energy markets. Before Order 745, RTOs and ISOs showed wide variety in their compensation of DR, with most generally paying aggregators at a lower rate than generators.[79] The biggest challenge for FERC was determining the appropriate level of compensation for aggregators, while continuing to promote the economic goal of lower electricity prices for retail consumers. Without adequate compensation, aggregators have insufficient economic incentives to enter the market. If compensation is too high, prices would not be kept down, and aggregators would unbalance the market.

A. The Requirement of Payment of LMP, and Arguments For and Against

FERC's response in Order 745 was to level the playing field by requiring that aggregators be paid for reducing demand at the same market price as generators that supply power. While RTOs and ISOs give this rate different names, the mechanism of calculating it is effectively the same: "locational marginal pricing" (LMP). LMP is a marginal cost pricing mechanism under which, "the price to withdraw electric power . . . at each location in the grid at any given time reflects the cost of making available an additional unit of electric power for purchase at that location and time."[80] LMP is not equal to the marginal cost of a specific individual generator. Nor is it equal to the marginal cost of the least expensive generator not currently dispatched on the system. Instead, it is the price at specific locations of the grid at specific times, with factors

79. FERC Order 745, *supra* note 10, at 16,661 (stating that, "the Commission has allowed each RTO and ISO to develop its own compensation methodologies for demand response resources participating in its day-ahead and real-time energy markets. As a result, the levels of compensation for demand response vary significantly among RTOs and ISOs.").

80. ELEC. ENERGY MKT. COMPETITION TASK FORCE, REPORT TO CONGRESS ON COMPETITION IN WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY 58 (2006), *available at* http://www.ferc.gov/legal/fed-sta/ene-pol-act/epact-final-rpt.pdf; *see also* William W. Hogan, Getting the Prices Right in PJM: Analysis and Summary: April 1998 through March 1999, The First Anniversary of Full Locational Pricing (Apr. 2, 1999) (unpublished note) (on file with author), *available at* http://www.hks.harvard.edu/fs/whogan/pjm0399.pdf (early discussion of the LMP concept and its implementation in PJM by major academic proponent).

such as the cost of transmission congestion included. As FERC explains in Order 745, it is "the price calculated by the ISO or RTO at particular locations or electrical nodes or zones within the ISO or RTO footprint and . . . used as the market price to compensate generators."[81]

In Order 745, FERC found that payment of LMP to aggregators would compensate them, "in a manner that reflect[s] the marginal value of the [DR] resource to each RTO and ISO."[82] FERC qualified this by directing RTOs and ISOs to establish net benefits tests that approximate price levels at which DR will be cost-effective, to be updated monthly as historical data and supply conditions change.[83] Some RTOs and ISOs have already complied with this directive, establishing tests that FERC has approved.[84] By using the net benefits test, FERC sought to ensure "that the overall benefit of the reduced LMP that results from dispatching demand response resources exceeds the cost of dispatching and paying LMP to those resources."[85] To achieve this, Order 745 specifies that aggregators should only be paid LMP when it is cost-effective to do so under a net benefits test.[86]

FERC's choice to compensate DR at LMP has generated intense controversy, even with the net benefits test's circuit-breaker-like protection. Opponents argue that payment of LMP to aggregators sends the wrong market signal because it overcompensates those who reduce consumption.[87] Under this argument, consumers receive a windfall because they are paid twice. They reduce their consumption, saving an amount they would otherwise pay at the retail rate for purchasing generation (G), and receive the LMP as well (for a total of LMP+G). For example, a consumer would both save the cost of turning on the lights, and be paid the LMP for not turning them on. Opponents find it incomprehensible that any rational person would fail to understand this.[88] The proposed remedy, outlined in FERC Commissioner Moeller's vigorous dissent to Order 745,

81. FERC Order 745, *supra* note 10, at 16,6559 n.5.
82. *Id.* at 16,666.
83. *Id.* at 16,659.
84. Midwest Indep. Transmission Sys. Operator, Inc., 137 F.E.R.C. ¶ 61,212 at 36 (2011) (approving the MISO RTO's net benefits test, with requests for clarifications); PJM Interconnection, L.L.C., 137 F.E.R.C. ¶ 61,216 at 2 (2011) (approving the PJM RTO's net benefits test).
85. FERC Order 745, *supra* note 10, at 16,659.
86. *Id.* at 16,666.
87. *See* Brief of Petitioners at 45–50, Elec. Power Supply Ass'n v. FERC, No. 11-1486 (D.C. Cir. filed Dec. 23, 2011).
88. *See, e.g.*, Richard J. Pierce, Jr., *A Primer on Demand Response and a Critique of FERC Order 745*, GEO. WASH. UNIV. J. OF ENERGY AND ENV. LAW 102, 104–05 (2012) (stating that, "I have long been puzzled by the apparent inability of many smart people to understand that compensating some entity for producing a negawatt is inappropriate and involves simple double-counting.").

would be to subtract the retail rate, and compensate aggregators at LMP minus G (LMP-G).

Opponents also point to a cost associated with paying DR at LMP, known as the "missing money" or "billing unit effect" problem. The amount of load that pays LMP, after DR is figured in, is less than the total of resources (DR and generation) dispatched in real time to provide service. FERC describes this as follows: "Depending on the change in LMP relative to the size of the energy market, dispatching demand response resources may result in an increased cost per unit ($/MWh) to the remaining wholesale load associated with the decreased amount of load paying the bill."[89]

Consider a simplified example with 100 MW of demand on the system, and 10% of that demand (10 MW) withdrawn by a DR aggregator that is compensated at LMP for doing so.[90] At that point, consumers of the remaining 90 MW of load are asked to pay for 100 MW of "supply," of which 10 MW is DR. They either pay the prevailing price for the 90 MW, in which case compensation for 10 MW is "missing," or the system adjusts prices in real time to "settle" the 10 MW deviation and recalculate the price at a higher price per unit. Generation, by contrast, does not produce the billing unit effect because it does not decrease load.[91] RTOs and ISOs have begun to address how those costs might be recovered, with the preferred approach being allocation system-wide to all loads, on the theory that DR's benefits are system-wide.[92]

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89. FERC Order 745, *supra* note 10, at 16,659.

90. This example is adapted from DONALD J. SIPE, PRETIFLAHERTY, INTEGRATION OF DEMAND RESPONSE INTO DAY AHEAD MARKETS: A SUPPLY SIDE APPROACH 4–6 (2010). In this article, Sipe proposes a revised pricing algorithm, using commitments in the day-ahead markets, to solve the "missing money" problem.

91. FERC Order 745, *supra* note 10, at 16,666 n.118.

92. WILLIAM W. HOGAN, DEMAND RESPONSE COMPENSATION, NET BENEFITS AND COST ALLOCATION: PRELIMINARY COMMENTS 6 (2010) [hereinafter HOGAN 2010 DR TECHNICAL CONFERENCE COMMENTS] (arguing that in some cases, "part of the cost recovery would be separate from the allocation to the load serving entity. In this case the benefits would presumably be widely shared, and the costs should be recovered from a broader group, typically all loads.").

In Midwest Indep. Transmission Sys. Operator, Inc., 140 F.E.R.C. ¶ 61,060 at 80 (2012), FERC noted that, "in Order No. 745, the Commission determined that it is just and reasonable to allocate the costs associated with demand response compensation proportionally to all entities that purchase from the relevant energy market in the area(s) where the demand response reduces the market in the area(s) where the demand response reduces energy at the time the demand response resource is committed or dispatched." FERC rejected MISO's proposed cost allocation formula. *Id.*

This has led some observers to claim that the cost of paying LMP—particularly during off-peak hours—might outweigh the savings created by DR. To opponents, it is difficult if not impossible to design a net benefits test that reduces the added cost and, "minimizes any opportunities for distorting market prices or exploiting market inefficiencies."[93] In this view, the net benefits test is neither an appropriate element of a liquid market, nor a solution to the real problem of DR overcompensation. They argue it is unworkable and so novel that it would "reduce competition, have a 'chilling effect' on the development of demand response, and be costly and complex to implement."[94]

However, compensating DR at LMP-G might price aggregators out of the market before they even gained traction, as G is a large component of the energy price. It would also create an administrative burden on ISOs and RTOs, which would have to match each kWh of electricity to the location where it would be sold, and apply the prevailing retail price.

Maine attorney Donald Sipe, who represents DR providers and has issued a number of "white papers" on the subject,[95] argues that compensating DR at LMP-G impermissibly exalts the efficiency of wholesale markets in trading energy at the lowest possible price over the achievement of other societal goals. To him, providing "safe and reliable service at just and reasonable rates" requires allowing competition at the market price to select the optimal amount of DR based on consumers' preferences. Any other market design, such as LMP-G, is "an anti-competitive restriction on trade."[96]

Sipe's argument reflects the fact that Order 745 does create winners and losers. Increased participation of DR in wholesale markets would pay consumers at the expense of electricity generators. They stand to lose market share, particularly in the hours when prices spike, which can be the most profitable.[97] The prospect of a large transfer of wealth from generators to consumers is an important factor in understanding the arguments for and against Order 745.

An additional argument for payment of full LMP, as noted above, is that it corrects the mispricing of environmental externalities in the wholesale markets.[98] FERC's opponents acknowledge that wholesale

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93. FERC Order 745, *supra* note 10, at 16,665.
94. *Id.*
95. SIPE, PRETIFLAHERTY, *supra* note 90; DONALD J. SIPE, PRETIFLAHERTY, DEFINING THE PRODUCT: MARKET THEORY FOR AN ESSENTIAL SERVICE AND THE PROPER ROLE OF DEMAND RESPONSE (2010).
96. SIPE, PRETIFLAHERTY, *supra* note 90, at 36.
97. *See* Katherine Tweed, *Demand Response Providers Take on Generators*, GREENTECH MEDIA (June 2, 2011), http://www.greentechmedia.com/articles/read/demand-response-providers-take-on-generators/.
98. FERC Order 745, *supra* note 10, at 16,662.

markets do not properly price environmental externalities.[99] However, they reject this as a justification for pricing DR at LMP, viewing a carbon tax as the optimal solution. In a recent critique of Order 745, Robert Borlick argued that environmental externalities should be addressed through a carbon surcharge, and compared doing so by compensating DR at LMP to "surgery with a meat ax—the patient is more likely to die than be cured."[100]

A carbon tax or across-the board carbon regulation might well be an effective way to incorporate environmental externalities into wholesale electricity prices.[101] Depending on its design, a carbon tax would presumably increase pricing for fossil fuel fired generation across the board. Generators would internalize the tax in the price at which they offered electricity to the wholesale markets, and their bids would be used to clear the market, depending on where they fell in the dispatch order. However, FERC could not intervene in the wholesale markets to impose a carbon tax, as it does not have the authority under the FPA to do so. Regulatory authorities outside of FERC would have to act.

To Order 745's opponents, this means environmental externalities should be addressed in another forum, not FERC's rules governing the wholesale markets' design. Critics of this position claim that paying LMP is a pragmatic second best solution to internalizing externalities. In response to Borlick's critique of Order 745, Flak and Rosenzweig observe, "(1) FERC isn't about to [explicitly monetize externalities] any time soon; and (2) in the absence of doing so, economic analysts should

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99. *See, e.g.*, Pierce, *supra* note 88, at 106–07; Robert Borlick, *Paying for Demand Response at the Wholesale Level: The Small Consumers' Perspective*, 24 THE ELECTRICITY J. 8, 11 (2011).

100. Borlick, *supra* note 99, at 11.

101. Pierce, *supra* note 88, at 107 (claiming that, "the most effective response to this problem would be to implement a form of government intervention that would require generators to internalize this social cost through a well-designed cap-and-trade system or a large carbon tax.").

The EPA's proposal for New Source Performance Standards under the Clean Air Act would impose an output-based standard for carbon dioxide and effectively force the construction of a generation of new, cleaner power plants. Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,392 (proposed Apr. 13, 2012) (to be codified at 40 C.F.R. pt. 60); *see also* Adam James & Jorge Madrid, *Carbon Limits Will Help Fix a Broken Energy Market and Spur Economic Growth: Benefits of EPA's Proposed Carbon Pollution Rule*, CTR. FOR AM. PROGRESS (June 7, 2012), http://www.americanprogress.org/issues/green/news/2012/06/07/11678/carbon-limits-will-help-fix-a-broken-energy-market-and-spur-economic-growth/.

take these unpriced [environmental] externalities into effect when calculating the efficiency of any particular policy."[102]

B. Arguments For Federal Authority Over DR

We return to the central question: can FERC use its authority to promote societal preferences other than fostering a wholesale market that offers electricity generation supply at the lowest possible cost? The touchstone for this is the familiar "just and reasonable" authority of FPA Section 205, which provides in part that:

> All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and *all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable*, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.[103]

Using this authority, for example, FERC requires "public utilities"[104] to file tariffs outlining the rates, terms and conditions for interstate electricity transmission and wholesale electricity sales.[105]

1. DR Is Not a "Sale" But It "Affects or Pertains To" Wholesale Rates

FERC's authority extends to the "transmission or sale" of electric energy at wholesale. An aggregator's offer of DR promises a specific amount of negawatts, so it is not a sale.[106] However, FERC also has

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102. Jonathan Falk & Michael Rosenzweig, *Response from Jonathan Falk and Michael Rosenzweig: Critique Betrays Misperception of Purpose of Demand Response*, 24 THE ELEC. J. 19, 21 (2011).

103. 16 U.S.C. § 824d(a) (2006) (emphasis added).

104. The Federal Power Act's definition of a "public utility" is not the same as the common understanding of a "utility." The Act defines a "public utility" as "any person who owns or operates facilities subject to the jurisdiction of the Commission," that is, "any person who owns or operates" facilities for the transmission of electric energy in interstate commerce and to the sale of electric energy at wholesale in interstate commerce. 16 U.S.C. § 824(e) (2006).

FERC does not claim that aggregators are public utilities subject to its Section 205 authority simply because they engage in transactions in the wholesale market. To claim otherwise would require FERC to claim that DR is energy. *See* U.S. Dep't of Energy, *supra* note 3.

105. *See, e.g.*, PSEG Energy Res. & Trade L.L.C. v. FERC, 665 F. 3d 203 (D.C. Cir. 2011) (upholding a challenge to FERC's revisions of the ISO-NE forward capacity auction tariff, filed under Section 205 authority).

106. *See* Opening Brief of Petitioners at 28–29, Elec. Power Supply Ass'n v. FERC, No. 11-1486 (D.C. Cir. filed June 6, 2012).

In the aftermath of the California electricity crisis of 2000, FERC took the position that DR was a sale. Removing Obstacles to Increased Electric Generation and Natural Gas Supply in the Western United States, 94 F.E.R.C. ¶ 61,272 at 61,972 (2001), *aff'd*

authority over matters "affecting or pertaining to" wholesale prices. DR is an example of this, as it changes the market's overall pricing structure by serving as a balancing mechanism. Using the example of the California electricity crisis of 2000, Professor Richard Pierce explains that a market operator can infuse DR into the system to bring demand down and reduce spiking wholesale prices.[107] That option is a means of risk protection for the entire market.[108]

The D.C. Circuit's opinion in *California Independent System Operator v. FERC (CAISO)*[109] sheds light on the interpretation of Section 205. In that 2004 decision, the D.C. Circuit concluded that FERC lacked authority to order the California ISO to replace its governing board in the aftermath of the California electricity crisis.[110] FERC argued that the CAISO's state appointed board was not independent of market participants, as FERC's restructuring Orders require.[111] It claimed that "the composition of the governing board of a utility and the method of its selection is a 'practice . . . affecting [a] rate'"[112] and subject to FERC regulation. The D.C. Circuit disagreed.[113] It noted that it had previously rejected FERC's suggestion in *City of Cleveland v. FERC*[114] that it could regulate an "infinitude of practices affecting rates and service."[115] Instead, it recited the standard

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on reh'g, 95 F.E.R.C. ¶ 61,225 (2001), *aff'd on reh'g*, 96 F.E.R.C. ¶ 61,155 (2001); PJM Interconnection, L.L.C., 99 F.E.R.C. ¶ 61,139 at 61,573 (2002). However, in Order 745, FERC referenced its more recent EnergyConnect decision, and stated that it no longer thinks of a DR bid as a resale of energy. FERC Order 745, *supra* note 10 at 16,668 (citing EnergyConnect, 130 F.E.R.C. ¶ 61,031 at 31 (2010) (defining DR not as a "sale or resale of energy that would normally be consumed by an end-use consumer," but as a reduction in consumption by consumers in response to a price signal or incentive payment)).

107. Pierce, *supra* note 88, at 103 (noting that, "the failure to provide incentives for any demand response in the California retail electricity market had catastrophic results for the wholesale electricity market that serves California").

108. David B. Spence, *Can Law Manage Competitive Energy Markets?*, 93 CORNELL L. REV. 765, 814 (2008).

109. Cal. Indep. Sys. Operator Corp. v. FERC, 372 F.3d 395 (D.C. Cir. 2004).

110. *Id.* at 398.

111. *Id.*

112. *Id.* at 399.

113. *Id.* at 403; *see also* Wellinghoff & Morenoff, *supra* note 42, at 404.

114. City of Cleveland v. FERC, 773 F.2d 1368 (D.C. Cir. 1985).

115. *Cal. Indep. Sys. Operator Corp.*, 372 F.3d at 401 ("FERC apparently would have us hold that the existence of an 'infinitude' of practices supposes that there is also an infinitude of acceptable definitions for what constitutes a 'practice' to give it the authority to regulate anything done by or connected with a regulated utility, as any act or aspect of such an entity's corporate existence could affect, in some sense, the rates. We are not biting.").

set forth by then-Judge Scalia in *City of Cleveland*, under which FERC can regulate "only those practices that affect rates and service[s] significantly, that are realistically susceptible of specification, and that are not so generally understood in any contractual arrangement as to render recitation superfluous."[116]

Former FERC Commissioner William Massey discussed the meaning of "significantly" in a 2004 article on potential national reliability standards for the electric grid.[117] At the time, FERC had no authority to develop such standards, and a significant debate was ongoing about FERC's FPA authority to impose mandatory standards on market participants. Massey concluded that reliability standards would affect rates significantly.[118] As he pointed out, reliability standards have direct system-wide implications that affect rates and other jurisdictional matters.

While the Energy Policy Act of 2005 and subsequent developments rendered that particular issue moot,[119] Massey's argument applies equally here. Promoting an entire new class of market participants so fundamentally affects the markets that FERC can regulate their activities. As the overseer of RTOs and ISOs, FERC has approval authority over their wholesale markets. It is the markets' creator and could withdraw approval of the markets entirely if it so chose.[120] It follows that it can make sweeping changes to require RTOs and ISOs to gain experience with DR and

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116. *City of Cleveland*, 773 F.2d at 1376.

117. William L. Massey et al., *Reliability-Based Competition In Wholesale Electricity: Legal and Policy Perspectives*, 25 ENERGY L.J. 319, 328–31 (2004).

118. *Id.*

119. The Energy Policy Act of 2005 added a new Section 215 to the Federal Power Act, giving FERC an explicit role in the development of reliability standards. That section ended the voluntary reliability standards regime, and provided for the creation of a national "Electric Reliability Organization" (ERO) to establish and enforce FERC-approved mandatory reliability standards. Energy Policy Act of 2005, Pub. L. No. 109-58, § 1211(b), 119 Stat. 594 (2005) (codified at 16 U.S.C. § 824o(a)(2) (2006)); Mandatory Reliability Standards for the Bulk-Power System, 72 Fed. Reg. 16,416-01 (Apr. 4, 2007) (codified as 18 C.F.R. § 40 (2012)); 18 C.F.R. § 40.2 (2012) (making approved reliability standards mandatory); *see, e.g.*, Entergy Nuclear Vt. Yankee, L.L.C. v. Shumlin, 838 F. Supp. 2d 183, 193 (D. Vt. 2012) (the grid "must meet mandatory reliability standards").

120. Dworkin & Goldwasser, *supra* note 42, at 558 (noting that, "FERC oversees these markets, approving tariffs and market rules, and because RTOs are regulatory animals, the FERC can actually take away approval for their operation. In this sense, RTOs are the FERC's agents, because that is where their power is derived."); *see, e.g.*, Sacramento Mun. Util. Dist. v. FERC, 616 F.3d 520, 522–24 (D.C. Cir. 2010) (approving redesign of the California ISO market, including the use of LMP).

Conn. Dep't of Pub. Util. Control v. FERC, 484 F.3d 558, 560–61 (D.C. Cir. 2007), relied upon by Order 745's opponents, does not change this outcome. In that case, FERC claimed jurisdiction to review a filing on generation resource adequacy by ISO New England. *Id.* In response to a challenge to its jurisdiction under Section 205, FERC abandoned its position and asserted that Section 201 conferred jurisdiction. *Id.* The D.C. Circuit criticized this as a new and unsupportable argument. *Id.* Thus, it did not decide the underlying issue of whether FERC had Section 205 authority over the issue.

reverse the lack of participation by aggregators in wholesale markets.[121] Standards for DR compensation have direct system-wide effects on wholesale rates. They are more similar to the restructuring Orders approved in *New York v. FERC* and reliability standards, than to the corporate governance issues discussed in *CAISO* that bear a much more tangential relationship to the market as a whole.[122] The *City of Cleveland* standard "provides an adequate safeguard against overreaching" if FERC decided to regulate less significant matters such as the price of shoes, thinking it "affected" wholesale rates.[123]

Previous D.C. Circuit decisions support FERC's position.[124] The D.C. Circuit has stated that FERC is entitled to great deference when it engages in fundamental reworking of the wholesale market design. When FERC creates policies aimed at all participants, "agency discretion is at its zenith."[125] The D.C. Circuit has frequently sided with FERC when it is choosing between competing predictions of how a market will work in the future, after a change in market design.[126] FERC believes that

121. Any such decision would be subject to the typical limitations of administrative law (for example, the APA's arbitrary and capricious standard on judicial review of a FERC decision).

122. The *CAISO* court observed that *New York v. FERC* is not directly relevant to this point, because it did not require the utilities to change any "practice" thought to "affect" rates, but simply required jurisdictional utilities to file tariffs. Cal. Indep. Sys. Operator Corp. v. FERC, 372 F.3d 395, 398 (D.C. Cir. 2004) (citing Transmission Access Policy Study Grp. v. FERC, 225 F.3d 667, 685 (D.C. Cir. 2000)). One could just as easily conclude that because DR compensation will be changed via tariff filings, it has the same effect.

123. Wellinghoff & Morenoff, *supra* note 42, at 404; *see* Opening Brief of Petitioners, *supra* note 106, at 32–33. For those with memories of the decade-long experience with restructuring the electric grid, this slippery slope argument is all too familiar.

124. Detroit Edison Co. v. FERC, 334 F.3d 48, 53 (D.C. Cir. 2003) ("FERC's interpretation of its own statutory jurisdiction is entitled to Chevron deference.").

125. Wellinghoff & Morenoff, *supra* note 42, at 409 (noting FERC's "broad remedial authority"); *see, e.g.*, Sacramento Mun. Util. Dist. v. FERC, 616 F.3d 520, 541 (D.C. Cir. 2010) ("When reviewing FERC's selection of a remedy, we give the Commission 'great deference'"); La. Pub. Serv. Comm'n v. FERC, 522 F.3d 378, 393 (D.C. Cir. 2008); Towns of Concord, Norwood, & Wellesley v. FERC, 955 F.2d 67, 76 (D.C. Cir. 1992) ("[a]gency discretion is often at its zenith" when the agency is fashioning remedies).

126. *See, e.g.*, Envtl. Action, Inc. v. FERC, 939 F.2d 1057, 1064 (D.C. Cir. 1991) ("[I]t is within the scope of the agency's expertise to make such a prediction about the market it regulates, and a reasonable prediction deserves our deference notwithstanding that there might also be another reasonable view.").

compensating DR at LMP will not cause price spikes, and that view is entitled to "great deference"[127] over opponents' competing claims.

2. The Interplay Between Section 205 Jurisdiction and State Regulatory Authority Does Not Preclude FERC's Authority Over DR

Order 745 states that "jurisdiction over demand response is a complex matter that lies at the confluence of state and federal jurisdiction."[128] DR requires decisions about consumption undertaken by retail customers who are subject to state regulation. This leads opponents to conclude that Order 745 impacts retail rates, intruding on the states' sole jurisdiction.[129] Economist Robert Borlick claims that DR is "inherently a retail product because it can be coordinated solely by energy market price signals"[130] and only becomes a wholesale product when an aggregator offers it into the wholesale energy market.[131] Opponents also raise a preemption argument, asserting that Order 745 will quash states' DR programs. Yet neither of these should preclude federal regulation.

Understanding the first argument requires attention to how state PUCs calculate retail electricity rates. They begin by determining fixed and operating costs for a regulated utility, then sum these into a "revenue requirement" that fixes the total amount of revenue the utility must earn to receive a prescribed rate of return. Rates are then calculated by dividing the total revenue by kWh of electricity sold to yield prices per kWh, with prices then set at that level. If an aggregator bids 1000 MWh into the wholesale market, and that bid is accepted, less electricity is sold at retail, impacting the utility's revenue. That is of course an intended impact of DR (less electricity sold), but does not lessen the fact that it also affects retail rates.

In *New York v. FERC*, the landmark Supreme Court decision upholding FERC's Orders that restructured the national electricity market,[132] the Supreme Court carefully observed that the FPA "limit[s] FERC's sale

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127. Tenn. Gas Pipeline Co. v. FERC, 400 F.3d 23, 27 (D.C. Cir. 2005) ("The court properly defers to policy determinations invoking the Commission's expertise in evaluating complex market conditions.").

128. FERC Order 745, *supra* note 10, at 16,676.

129. HOGAN 2010 DR TECHNICAL CONFERENCE COMMENTS, *supra* note 92, at 3–4.

130. Borlick, MADRI Presentation, *supra* note 2, at 5–6. In roughly half the nation, DR is done at the retail level only. FERC has no authority over DR in the half of the nation in which utilities do not purchase power at wholesale in organized markets. Individual load-serving entities (utilities and energy suppliers in deregulated states, or LSEs) are responsible for DR in those states, and subject to state regulatory authority only.

131. *Id.* at 6.

132. New York v. FERC, 535 U.S. 1 (2001).

jurisdiction to that at wholesale."[133] Retail sales are still subject to state jurisdiction.[134] However, the Court established that if FERC has the authority to regulate, it could do so even if its policy has impacts at the retail level.

New York v. FERC is best remembered for approving FERC's expansive view of its jurisdiction. The Supreme Court pointed to "dramatic changes in the power industry that have occurred in recent decades,"[135] as the electric grid has become more interconnected, the movement of electricity increasingly links the wholesale and retail levels. The Court upheld FERC's sweeping Orders that established open access requirements for interstate electricity transmission as a valid exercise of FERC's FPA authority, despite their potential impact on retail level matters. Thus, FERC has exclusive jurisdiction over all interstate transmission services, even though that impacts intrastate (retail) transmission.[136]

This authority to regulate in mixed jurisdictional settings alone supports upholding Order 745. In addition, unlike the situation in *New York*, Order 745 does not divest states of any authority. It has only indirectly affected retail rates, by encouraging a business model that will lead to demand reductions and changes in individual states' supply and demand curves. It has not set retail rates themselves, or even the rates at which individual utilities can compensate DR. FERC is authorizing consumers to participate in wholesale markets through aggregators' assistance. There is no requirement that consumers take part in these programs, and they are free to take part in any parallel state program. There is only a mandate that if consumers do contract with an aggregator, the compensation level of that aggregator's bid into the wholesale market is fixed.

The federal regulatory scheme is not so pervasive as to preclude state innovation. FERC has stated in Order 745 that it is not explicitly

133. *Id.* at 17.

134. *Id.* at 12 (stating that, "[FERC's statutory jurisdiction] over sales of electric energy extends only to wholesale sales. However, when a retail transaction is broken into two products that are sold separately (perhaps by two different suppliers: an electric energy supplier and a transmission supplier), we believe the jurisdictional lines change. In this situation, the state clearly retains jurisdiction over the sale of power. However, the unbundled transmission service involves only the provision of 'transmission in interstate commerce' which, under the FPA, is exclusively within the jurisdiction of the Commission.")

135. *Id.* at 5.

136. *Id.* at 17 ("There is no language in the statute limiting FERC's *transmission* jurisdiction to the wholesale market").

preempting state DR programs.[137] Moreover, Order 745 does not fit the familiar standards for field (implicit) or conflict preemption.[138] A state might argue that Order 745 overtakes state programs by sanctioning aggregators to siphon off the pool of potential participants in state programs. Even if that happened, this is not the all-encompassing "occupying the field" of DR regulation that field preemption requires.[139] Moreover, it is just as plausible that aggregators' programs may have the opposite effect, spurring demand for innovative state programs that complement them.[140]

The most likely form of state DR program that might be preempted is one that compensated DR at greater than LMP.[141] FERC might actually welcome this type of program,[142] and even if it did not, the prospect that it would be preempted is unclear.[143] Order 745 does not make it "impossible" in this situation "to comply with both the state and federal requirements,"[144] as conflict preemption requires. If a state established a program that compensated DR above LMP, that would not affect DR bid into the wholesale markets. Perhaps the best argument in favor of preemption is that if a state established a program that compensated DR above LMP, it would exacerbate the billing unit effect problem in the wholesale markets. This does not rise to the level of an outright conflict between the state and federal regulatory regimes.

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137. FERC Order 745, *supra* note 10, at 16,676 (stating that, "[b]y issuing this Final Rule, the Commission is not requiring actions that would violate state laws or regulations. The Commission also is not regulating retail rates or usurping or impeding state regulatory efforts concerning demand response.").

138. *See generally* Altria Group, Inc. v. Good, 555 U.S. 70 (2008).

139. *See* Medtronic, Inc. v. Lohr, 518 U.S. 470, 485 (1996).

140. MASS. INST. OF TECH., *supra* note 21, at 147–48 (noting that dynamic pricing and dispatchable load control programs "need not be mutually exclusive" and might reinforce each other).

141. Rossi & Hutton, *supra* note 9.

142. Jim Rossi and Thomas Hutton find that any such program would be a salutary development, noting, "it is hard to see how such a plan presents an obstacle to federal goals of promoting efficiency, conservation and energy independence under the FPA." *Id.*

143. *Id.* (arguing that this depends on whether the compensation level is treated as a ceiling or floor, and noting that, if FERC's demand response pricing rules are interpreted as a ceiling under the FPA, state conservation approaches that require utilities to make conservation-minded decisions in procuring wholesale power could be preempted if they require utilities to pay more than the rates FERC has approved for avoided consumption.).

144. English v. Gen. Elec. Co., 496 U.S. 72, 79 (1990).

IV. FERC SHOULD PROMOTE AGGREGATORS AS A NEAR-TERM SECOND-BEST DR SOLUTION

FERC's jurisdictional claim is on solid ground, because its approach to DR compensation is based on system-wide impacts,[145] and the FPA has been interpreted to allow FERC to pursue such broad goals in regulating matters within its authority.[146] This part supports a second justification for FERC's position: that it is both desirable, and a permissible interpretation of Section 205 for FERC to promote DR by aggregators as a means of transitioning to a future in which consumers respond instantaneously to changes in wholesale prices.

A perfect electricity market would be transparent. Utilities would provide consumers with information about real time prices, and consumers would respond instantaneously to changes in wholesale prices.[147] To economist Paul Centolella, a former state utility commissioner and opponent of Order 745, this would be an evolutionary third generation of demand response, or "DR 3.0."[148] This requires a seamless connection between the wholesale and retail marketplaces.[149] At present, there are substantial barriers to this. There is a lack of infrastructure and appropriate retail rate structures,[150] including "the lack of a direct connection

145. Rossi & Hutton, *supra* note 9 (noting that, "for FERC's new demand response approach to survive legal challenges, the agency will likely need to depend on an expansive interpretation of the goals of the FPA, as including not only consumer protection but also reliability goals related to the system as a whole, and conservation and environmental goals").

146. FERC's "just and reasonable" authority has been interpreted for decades to give it broad latitude "to consider some matters going beyond the direct financial interests of buyers and sellers in wholesale transactions [such as] 'conservation, environmental, and antitrust questions.'" Dworkin & Goldwasser, *supra* note 13, at 545 (quoting National Ass'n for the Advancement of Colored People v. Fed. Power Comm'n., 425 U.S. 662, 670 n.6 (1976)).

147. At times, this concept is termed "price responsive demand." PAUL CENTOLELLA & ANDREW OTT, THE INTEGRATION OF PRICE RESPONSIVE DEMAND INTO PJM WHOLESALE POWER MARKETS AND SYSTEM OPERATIONS 1 n.2 (2009), *available at* http://www.hks.harvard.edu/hepg/Papers/2009/Centolella%20%20Ott%20PJM%20PRD%2003092009.pdf.

148. *Id.* at 1 n.2 ("This can be characterized as a third generation of demand response. First generation demand response would include utility interruptible rates and direct load control, and RTO Demand Response programs would be a second generation of demand response").

149. PJM INTERCONNNECTION, L.L.C., PROCEEDINGS, PJM SYMPOSIUM ON DEMAND RESPONSE III: INTEGRATING PRICE RESPONSIVE DEMAND 10 (2009), *available at* www.naruc meetings.org/Presentations/Demand_Ott_PJMDOCS.pdf (hereinafter PJM DR SYMPOSIUM PROCEEDINGS).

150. CENTOLELLA & OTT, *supra* note 147, at 3.

between wholesale and retail prices,"[151] lack of dynamic retail pricing, and lack of real-time information sharing.[152] Without both enabling technologies (such as smart meters) and policies (such as real time dynamic pricing) in place, individual consumers cannot respond to price signals from wholesale markets.[153]

Most consumers lack the technologies to respond to price signals. Typical existing electric meters only measure the amount of electricity consumed on a gross household level, and have no two-way communications capabilities. If consumers had advanced smart meters, and sensors and communication devices to support them, they could view their usage in real time.[154] An integrated system using hardware and software can record consumption hourly or even more frequently.[155] By one estimate, utilities are expected to deploy about 65 million smart meters—reaching nearly half of American households—by 2015.[156] Some utilities are updating communications systems, establishing data analysis platforms and metrics, and creating other systems to support the flow of real-time information.[157] This has not been a smooth process, however, as demonstrated by the opposition to smart meters in some states. Moreover, the infrastructure is costly, and some state PUCs have taken a skeptical view of utilities' proposals to deploy such advanced metering infrastructure.

Dynamic pricing is necessary to provide price signals to consumers,[158] but there has been political resistance to it in some states.[159] PUCs

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151. FERC Order 745, *supra* note 10, at 16,667.

152. *Id.*

153. *See, e.g.*, PJM DR SYMPOSIUM PROCEEDINGS, *supra* note 149, at 10–11 ("The most important risks associated with PRD identified by symposium participants include billing system issues; the need to develop standardized 'plug and play' in-home devices, appliances, and control systems; the need for constant and effective customer interface; and equipment or software obsolescence").

154. REGULATORY ASSISTANCE PROJECT, IS IT SMART IF IT'S NOT CLEAN?: SMART GRID, CONSUMER ENERGY EFFICIENCY, AND DISTRIBUTED GENERATION 3 (2011), *available at* http://www.raponline.org/document/download/id/828.

155. FERC defines "Advanced metering" as "a metering system that records customer consumption [and possibly other parameters] hourly or more frequently and that provides for daily or more frequent transmittal of measurements over a communication network to a central collection point." FERC 2006 DR-AMI REPORT, *supra* note 6, at vi n.2.

156. INST. FOR ELEC. EFFICIENCY, THE EDISON FOUND., THE COSTS AND BENEFITS OF SMART METERS FOR RESIDENTIAL CUSTOMERS 2 (2011). As of September 2011, advanced meters made up 18.4% of all installed meters, for a total of 27.3 million smart meters. FERC 2011 DR-AMI REPORT, *supra* note 20, at 3. The U.S. Department of Energy's annual reports on the Smart Grid detail current and planned deployments of smart meters by individual utilities. U.S. DEP'T. OF ENERGY, *supra* note 9, at 22 (table listing current and planned deployments totaling 50.7 million meters).

157. Joskow, *supra* note 59, at 42.

158. BORENSTEIN, ENERGY INST. AT HAUSS, *supra* note 64, at 2.

159. Pierce, *supra* note 88, at 105 (stating that, "even with strong encouragement and partial governmental funding, states have resisted real-time pricing").

sometimes balk at utilities' business cases for dynamic pricing, thinking the benefits are too speculative to justify the risk to consumers. Consumers might save on their electric bills,[160] but that claim is difficult to substantiate without a demonstrated record of experience. PUCs are concerned about the prospect of spiking marginal wholesale market costs being passed through to consumers. The memory of the California electricity crisis of 2000, where that is exactly what happened,[161] is not too distant for many state commissioners. Order 745's opponents sometimes observe that if the real barrier is a lack of retail dynamic pricing, the states would be better off moving in that direction instead of FERC empowering aggregators to offer DR in the wholesale markets.[162] That has been a slow grind, however, and moving forward with DR compensation might ensure more DR is integrated into wholesale markets in the near term.

A seamless connection between the wholesale markets and consumers requires changes at the wholesale level as well.[163] Demand response will reduce the need for new power plants, but regional capacity planning processes do not currently account for this. These models do not forecast the impacts of demand reductions from the actions of numerous disaggregated consumers. Until RTOs and ISOs account for this dynamic change, DR's full value to capacity markets cannot be captured.[164] There is

160. CENTOLELLA & OTT, supra note 147, at 3 (noting that, "The investment in AMI will be enabled through support by retail regulatory authorities, but will be justified based on the avoidance of capacity and scarcity pricing payments.").

161. Pac. Gas & Elec. Co. v. FERC, 373 F.3d 1315, 1317 (D.C. Cir. 2004) ("In 2000, wholesale prices for electricity in California increased dramatically and resulted in the now-infamous California energy crisis.").

162. HOGAN 2010 DR TECHNICAL CONFERENCE COMMENTS, *supra* note 92, at 6 (claiming that, "[s]pecial demand response programs provide a means to work around the failure to offer customers dynamic prices that reflect the real costs of electricity.").

163. PowerPoint: The Demand Response Roadmap For the PJM Region 6 (PJM Interconnection, L.L.C. 2009) (on file with author), *available at* http://www.pjm.com/sitecore%20modules/web/~/media/committees-groups/stakeholder-meetings/dr/drs-III/20091109-demand-response-roadmap.ashx (observing that, "some [needs] are areas in which the retail market should take a leading role, some are areas in which the wholesale market must take a leading role, and others required a joint retail/wholesale commitment."); *see, e.g.*, PJM DR SYMPOSIUM PROCEEDINGS, *supra* note 149, at 8 (PRD requires changes to PJM's Unit Dispatch System).

164. Paul Centolella argues that planning processes should change immediately to provide proper incentives, and not wait until consumers actually reduce demand. CENTOLELLA & OTT, *supra* note 147, at 3 (noting that, "it is not possible to simply wait until there is significant Price Responsive Demand before integrating its consideration into the determination of forward capacity and planning reserve requirements. Adjustments to these rules are needed to ensure that the benefits of making significant AMI investments and implementing retail rate reforms will flow through to consumers.").

also a lack of proper information systems to bridge the gap between the wholesale and retail levels, and promote sharing of data needed for consumers to see real-time wholesale prices.[165]

Given the institutional obstacles to change, compensating aggregators at LMP is an appropriate second best solution for the near term. Aggregators may even have advantages over utilities in bringing about demand reductions. They tend to be better at customer outreach and marketing than utilities,[166] which historically have not specialized in it. Their cost structure can be leaner than that of utilities, so they can resist under compensating their customers, thereby stimulating more DR. Finally, utilities also have a well-known tendency to value power plants—"iron in the ground"—over DR and efficiency programs.[167] These and other factors have been barriers to wider scale deployment of demand-side measures over the past several decades, and there is little reason to believe utilities will wholeheartedly embrace DR if it is left solely to them. It may be inefficient to interpose intermediaries between consumers and the markets,[168] but the alternative is a suboptimal amount of DR.

As economist Alfred Kahn, a supporter of Order 745, explains:

> These circumstances—specifically, the fact that pass-through of the LMP is costly and (perhaps) politically infeasible, the possibly prohibitive cost of the metering necessary to charge each ultimate user, moment-by-moment, the often dramatic changes in true marginal costs for each—can justify direct payment at full LMP to distributors and ultimate customers who promise to guarantee their immediate response to such increases in true marginal costs of supplying them.[169]

Order 745 could also help us understand more about consumers' demand patterns. There is some inelasticity for electricity consumption, because it fuels so much of modern life, but economists agree that at some levels, higher rates would lead to lower consumption.[170] However, there is insufficient data on whether DR will reduce consumption.[171]

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165. *See, e.g.*, ELEC. POWER RES. INST., DECISION SUPPORT FOR DEMAND RESPONSE TRIGGERS: METHODOLOGY DEVELOPMENT AND PROOF OF CONCEPT DEMONSTRATION, at iii (2010) (demonstrating a proposal for "connecting retail to wholesale electricity markets").

166. MORAN & SUZUKI, RESEARCH INTO ACTION, INC., *supra* note 72, at 5–289 (stating that, "[o]ne of the most important advantages of engaging aggregators is leveraging their marketing expertise").

167. Borlick, MADRI Presentation, *supra* note 2, at 12.

168. *Id.* at 7.

169. FERC Order 745, *supra* note 10, at 16,667–68.

170. For example, a DR program may be effective at prompting substitution if it lasts long enough to provide an incentive to consumers to switch to lower-consumption appliances. Kathleen Spees, Meeting Electric Peak on the Demand Side: Wholesale and Retail Market Impacts of Real-Time Pricing and Peak Load Management 35 (Sept. 2008) (unpublished Ph.D. thesis, Carnegie Mellon University) (on file with author) (citing studies by Professor Severin Borenstein on DR).

171. MASS. INST. OF TECH., *supra* note 21, at 147–48.

Moreover, given the lack of economic DR to date, what has been studied is whether consumers respond to specific incentives, not how they might respond over time to price signals.[172] An expansion of economic DR would allow for more focused research on this issue.

Expanding economic DR can also generate valuable data that can be translated into other means of saving electricity. When it becomes familiar with their preferences, an aggregator could extend its services to offer on-premises energy management services tailored to customers. States could gain expertise with the nuts and bolts of business regulation of DR aggregators, and such important matters as protecting consumer privacy. The prospect of much larger flows of data between consumers and aggregators raises important concerns about data privacy that must be addressed,[173] and states can tailor privacy protection policies to the type of information being generated.

The data accumulated in the DR bidding process could also yield valuable clues to improving system-wide performance at times of peak demand. With more DR coming into the markets, RTOs and ISOs could understand more fully how it can be used to balance supply and demand.[174] They could also change their capacity planning processes to reflect the impacts of consumption savings and provide a feedback loop that in turn allows for more DR. The enhanced frequency regulation of the electric grid could allow for adding more distributed generation to the grid, improving grid resilience and pricing in the markets.

Even one of FERC's principal opponents, Harvard economist William Hogan, acknowledges that a reason to compensate DR may be to capture future cost reductions from near term "learning by doing."[175] The net benefits tests will lessen any near term cost shock to consumers,[176] and

172. Spees, *supra* note 170, at 33 (stating that, "responsiveness behavior is complex and highly dependent on the details of the experiment including how prices are communicated.").

173. Sonia McNeil, Note, *Privacy and the Modern Grid*, 25 HARV. J. OF L. & TECH. 199, 201 (2011).

174. CAPPERS ET AL., *supra* note 26, at 17 (noting that "[i]f DR is to play an increasing role in wholesale markets as an economic or reliability resource, system operators and resource planners must be able to accurately predict what DR resources can provide during system events in order to maximize their contribution to market efficiency and system stability while minimizing overall system costs.").

175. HOGAN 2010 DR TECHNICAL CONFERENCE COMMENTS, *supra* note 92, at 6.

176. Professor Richard Pierce, who opposes Order 745 (preferring compensation at LMP-G), nevertheless finds that the net benefits test should lead the court to uphold it:

Order 745's opponents can invoke Section 206 of the FPA to request appropriate changes to rates and policies if they believe the rates resulting from Order 745 are unjust and unreasonable.[177]

FERC has the authority to require compensation at LMP, even if near-term aggregate costs to market participants might be higher than current market prices. Achieving the lowest cost of electricity is not FERC's only permissible policy goal.[178] As Professor Jim Rossi and Thomas Hutton explain in a recent article, "the [FPA] has never been construed to require that electricity be produced and sold at the lowest *possible* price, and the plain language of the FPA obviously does not compel such an interpretation."[179] The D.C. Circuit could find that the risk of increased costs is both lessened by the net benefits tests, and outweighed by the benefits of gaining experience with DR while waiting for the states to move forward with their programs.

V. CONCLUSION

DR bid by intermediaries steps in as a bridge to deal with the disconnect between today's wholesale and retail electricity markets. Order 745's proponents and opponents have diametrically opposing and fundamentally irreconcilable positions on the value of this business model.

In a seamless electricity market, DR would not exist. Consumers would see real time prices that would fluctuate with supply and demand

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> I would uphold FERC's rule on the basis that the agency provided reasoning adequate to support each step in its decision-making process. . . . While I agree with Commissioner Moeller that the net-benefits calculation is likely to be more confusing and burdensome than applying LMP-G, I cannot say that the FERC's contrary belief is unreasonable.
>
> My strong belief that LMP is an inappropriate measure of compensation in most cases is tempered by FERC's adoption of a net-benefits test. I suspect that this approach will limit compensation based on LMP to rare cases in which LMP is not much above the appropriate level of compensation.

Pierce, *supra* note 88, at 108.

177. Sacramento Mun. Util. Dist. v. FERC, 616 F.3d 520, 542 (D.C. Cir. 2010) (citing 16 U.S.C. § 824(e) (2006)). Section 206 requires FERC to set the "just and reasonable" rate where it finds that "any rate, charge, or classification, demanded, observed, charged, or collected by any public utility for any transmission or sale subject to the jurisdiction of the Commission, or that any rule, regulation, practice, or contract affecting such rate, charge, or classification is unjust, unreasonable, unduly discriminatory or preferential." 16 U.S.C. § 824e(a).

178. The two Supreme Court cases that form the foundation of modern interpretation of cost based rates under the "just and reasonable" standard (*Hope Natural Gas* and *Permian Basin Rate Cases*) require that "a court must uphold an agency's decision to authorize particular rates if those rates fall within a 'zone of reasonableness.'" Pierce, *supra* note 88, at 107 (citing Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591, 602 (1944); *In re* Permian Basin Rate Cases, 390 U.S. 747, 767 (1968)).

179. Rossi & Hutton, *supra* note 9, at 38.

conditions, and adjust their consumption of electricity up or down accordingly. Aggregators are therefore a reminder that the markets are *not* seamless. Not surprisingly, opponents would rather they did not exist. They claim that it would be superior to encourage a transparent market, asserting that DR bid into wholesale markets is out of place in markets meant to price electricity at low cost. In their view, the markets were meant for sellers and buyers of electricity, not for those who intend *not* to consume.

Yet opponents and FERC share common ground on two core issues. They agree on the importance of reducing demand for electricity as a societal goal, and that price signals should prompt deployment of generation resources and consumers' decisions to voluntarily shed load. To move toward that and capture DR's environmental and reliability benefits, FERC has decided that paying DR at LMP is essential.

Order 745 is a fundamental choice between two radically different policy paths. By opposing DR bid into the markets by intermediaries, opponents prefer a different institutional and regulatory path for accomplishing the transition to the future. They seek to have state initiatives build connections between the wholesale and retail levels. Order 745 is a different—and defensible—means of achieving the same goal. FERC's goal of promoting new entrants in the wholesale markets, to achieve a broad spectrum of benefits, is strongly similar to the *New York v. FERC* decision approving the foundation of the wholesale market designs.[180] This Article has argued that for this and other reasons, FERC's choice is entitled to deference.

180. *See* New York v. FERC, 535 U.S. 1, 28 (2001).