The Futility of Regulating the Smart Grid & Demand Response

A Case for a Laissez Faire Approach In Lieu of Attempts to Regulate the Law of the Horse

Roque K. Thuo | roque.thuo@asu.edu

5/9/2014

This paper argues that attempting to regulate the smart grid as a unified field is a nebulous concept akin to attempts to regulate cyberspace, and as such is a misguided and futile endeavor. The paper explores what pieces of the smart grid in general and demand response in particular are suitable for regulation, and identifies a few aspects that ought to be left to a natural market-driven evolution. Finally, the paper examines the appropriate role of the federal and state governments and whether their respective regulatory commissions have the authority and the comparative advantage to regulate what needs to be regulated.

TABLE OF CONTENTS

I. INTRODUCTION

Judge Easterbrook, in 1996 when asked to talk about "Property in Cyberspace," analogized "cyberlaw" to the "Law of the Horse[1]," and dismissed it as a futile endeavor. He wittily stated:

> Lots of cases deal with sales of horses; others deal with people kicked by horses; still more deal with the licensing and racing of horses, or with the care veterinarians give to horses, or with prizes at horse shows. Any effort to collect these strands into a course on "The Law of the Horse" is doomed to be shallow and to miss unifying principles.[2]

An attempt to regulate the smart grid as a unified field is akin to regulating the Law of the Horse and is thereby a futile undertaking at best and a counterproductive effort at worst. The smart grid encompasses many disparate ideas and technologies primarily revolving around "computerizing" the electric utility grid. Some key components of the smart grid include control, automation, protection, sensing, monitoring, demand response management and energy efficiency, and supporting infrastructure.[3] Because the smart grid builds upon existing communication and network infrastructure, a utility regulator would be unlikely to have the competence or resources to effectively regulate all the constituent pieces.[4]

Similarly, demand response (also known as load response) entails a wide range of mechanisms by which end-use customers reduce their electricity in response to power grid needs, economic signals

---

[1] Frank H. Easterbook, *Cyberspace and the Law of the Horse*, 1996 U. Chi. Legal F. 207.
[2] *Id.*
[3] Philip Lewis, *Smart Grid 2013 Global Impact Report*, Vaasa ETT (2013).
[4] The wiser route would be to let experts in respective fields continue innovating thereby allowing the smart grid to evolve in tandem with advancements in technology rather than get stuck in time and get quickly outdated.

from a competitive wholesale market, or special retail rates.[5] The very premise on which market-based demand response (DR)[6] is built is the use of market forces to control the demand side (the load side) of the electricity demand-supply equation.[7] Historically, regulators focused on the supply side (the generation side), and indeed they should have given that the supply of electricity from the generators inherently favored natural monopolies.[8]

The ideal regulatory scheme would be to allow market forces to establish the pareto optimal equilibrium point of the electricity demand-supply equation. This equilibrium consumption level would eliminate the deadweight loss inherent in energy users' consumption of kWh's of electricity even when it costs more than it benefits them. In fact, some have argued for a shift from traditional demand response to a dynamic pricing scheme given that many of the technological barriers such as access to real-time pricing have been removed leaving only regulatory barriers.[9] Because consumers will always know more than regulators about their true baseline level of consumption, regulatory interference through administratively set baselines is likely to crowd out the more reliable and effective dynamic pricing approaches.[10]

That is not to say that regulators should be completely hands-off. Even in my proposed laissez faire approach, government protection is needed, for example, to correct externalities, lower transaction

---

[5] *See* http://energy.gov/oe/technology-development/smart-grid/demand-response. Retrieved 2014-0502.
[6] This paper focuses on market-based DR which is triggered by economic signals, as opposed to reliability-based DR which is generally triggered under emergency conditions. *See* Farrokh Rahimi & Ali Ipakchi, *Overview of Demand Response under the Smart Grid and Market Paradigms*, IEEE OATI (2010).
[7] *See* Hon. Jon Wellinghoff & David Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation*, Energy Law Journal, Vol.28, No. 2 (2007) at 393.
[8] *See* Sidney A. Shapiro & Joseph P. Tomain, *Regulatory Law and Policy: Cases and Materials*, 3ed. (2003) at 101.
[9] James Bushnell, Benjamin F. Hobbs, and Frank A. Wolak, *When It Comes to Demand Response, Is FERC Its Own Worst Enemy,* CSEM, Univ. of Cal. Energy Institute (2009) at 10.
[10] *Id.* at 2-3.

costs, control monopoly powers particularly as related to asymmetric information, and in some cases limit discrimination. While retail consumption of electricity has traditionally been regulated at the state level, federal regulation may be needed in some areas to guarantee national uniformity and global harmonization.

However, some aspects of the smart grid and demand response should be out of the reach of regulators if the promise of a 21st century grid is to be realized. For example, regulators should let market dynamics shape demand response programs and not interfere with the management practices of demand response aggregators. Regulators should also defer to industry stakeholders to define the pertinent technical standards and protocols, perhaps only facilitating an environment for such collaboration and endorsing or mandating any one standard only after it has achieved substantial industry consensus.

I start by providing a brief overview of the smart grid and demand response. I then explore the proper role for the federal government (through FERC), and state government (through its PUC), with special reference to the role of the Arizona Corporation Commission. I then identify a few areas of the smart grid and demand response that I argue are amendable to regulation, and those that regulators should adopt a laissez faire approach towards.

II. THE SMART GRID & DEMAND RESPONSE

One service that the smart grid enables is demand response (DR).[11] DR support allows generators and loads to interact in an automated fashion in real time, coordinating demand to flatten spikes in energy demand. Eliminating the fraction of demand that occurs in these spikes benefits utilities by eliminating the need to maintain reserve generators, by cutting wear and tear associated with ramping up additional capacity when needed, and by extending the life of equipment. Ratepayers benefit in the short term by allowing them to cut their energy bills by programming low priority devices to use energy only when it is cheapest.[12] DR also eliminates the incidence of brownouts and rolling blackouts required to meet peak demand.[13] Ratepayers also benefit in the long term because utilities do not need to add the cost of new plants to the rate base, and from the environmental benefits accompanying reduced generation.[14] DR is possible without an impact to device performance or user experience because many electric devices either have thermal inertia (e.g., HVAC, water heating, and refrigeration) or potential flexibility as to when they may draw power from the grid (e.g., pool pumps, dishwashers, clothes dryers, and charging of electric vehicles and battery-powered devices).

By staggering electricity consumption during the day thereby smoothing the demand for electricity, demand response reduces dependence on dirty generation capacity, a result similar to the goals of feed-in-tariffs (FITs), net metering, and power purchase agreements (PPAs) although without the increase in

---

[11] Energy Future Coalition, *Challenge and Opportunity: Charting a New Energy Future*, Report of the Smart Grid Working Group. http://energyfuturecoalition.org/files/webfmuploads/EFC_Report/EFCReport.pdf. Retrieved 2014-0503.

[12] Such automated demand response systems more effective than time-of-use plans (TOU) where electricity users have to remember not to use certain appliances at certain times of the day.

[13] U.S. Dept. of Energy, *Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them*, Rept to Congress Pursuant to § 1252 of EPAct 2005 (February 2006).

[14] For example, could eliminate reliance of dirty energy such as the coal plants in Northern Arizona.

renewable energy generation. In some ways, DR may arguably have an advantage in that it does not feed energy into the grid[15] and does not result in a reliance on potentially intermittent sources of energy such as wind. Also as discussed below, a laissez faire approach to attaining equilibrium electricity demand-supply points is preferable to FITs set above avoided cost[16] or Renewable Portfolio Standards (RPS) that artificially create a demand for renewables and then rely on the market to meet that demand. DR is particularly popular in markets with ISOs and RTOs because aggregators may sell the demand in the next day market.[17]

Next, I examine how federal and state regulatory agencies have been involved with the evolution of smart grid and demand response and what they have claimed as a basis for their authority to intervene.

III. THE PROPER ROLE FOR FERC

The Commerce Clause of the Federal Constitution[18] gives Congress the power to regulate interstate commerce. Congress has delegated its authority to regulate the transmission and wholesale sales of electricity in interstate commerce to the Federal Energy Regulatory Commission (FERC).[19] FERC's top priorities for 2014 include both smart grid and demand response.[20]

---

[15] The U.S. electric grid was not designed for multiple tap points.
[16] *See, e.g.*, CPUC Standard Offer No.4 (SO4) contract which had an escalating schedule of fixed purchase prices designed to reflect the long-run avoided costs of new electric generation but which led to an expensive burden to ratepayers when actual oil and gas prices plummeted.
[17] For example, PJM is experimenting with a pilot program in which utility customers can have tstats programmed to "see" the price of electricity almost as it is occurring (5 min intervals) and which can be turned on or off depending on when the value of that turn off is most optimal. This DR service is bid into the PJM market as a service, and the customers get credit for it on their bill. http://www.pjm.com/markets-and-operations/demand-response.aspx.
[18] U.S. Const. Art. I, § 8, Cl. 3.
[19] FERC is an independent regulatory agency within the Department of Energy.
[20] *See* http://www.ferc.gov/about/top-initiatives.asp.

FERC has authority to regulate the smart grid and demand response.

Wellinghoff contends that FERC has a strong legal basis for assuming jurisdiction over facilitating demand response in wholesale electric markets, and that such action on the demand side of the equation is warranted by the benefits associated with robust load participation in those markets.[21] He cites several basis for FERC jurisdiction including: (1) that EPAct 2005 explicitly authorizes FERC to promote the use of DR and eliminate unnecessary barriers; (2) that because DR directly and significantly affects wholesale rates, facilitating DR is essential to FERC fulfilling its responsibility to ensure that those rates are just and reasonable; and (3) by characterizing DR as involving a wholesale sale of electric energy in interstate commerce. [22]

FERC has itself held that its interest and authority in the area of smart grid derive from its authority over the rates, terms and conditions of transmission and wholesale sales in interstate commerce, its responsibility for reliability standards for the bulk-power system, as well as from EISA.[23] Specifically, it has declared its jurisdiction over the transmission of electric energy in interstate commerce by public utilities pursuant to Federal Power Act (FPA) section 201, and over the reliable operation of the bulk-power system in most of the nation under FPA section 215.[24] FERC also notes that section 1305(d) of EISA directs it to initiate rulemaking proceedings to adopt such standards and protocols as may be necessary to insure smart grid functionality and interoperability in interstate transmission of electric

---

[21] Hon. Jon Wellinghoff & David Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation*, Energy Law Journal, Vol.28, No. 2 (2007).
[22] *Id*. at 396.
[23] 128 FERC ¶ 61,060, *Smart Grid Policy*, (July 16, 2009).
[24] *Id*.

power, and in regional and wholesale electricity markets.[25] Where FERC authority is found, the judiciary will pretty much defer to its authority. [26]

However, FERC has correctly disclaimed jurisdiction over retail aggregators that merely deal in agreements to reduce demand.

EnergyConnect, Inc., an aggregator of retail customers (ARC), sought authority from FERC to sell energy, capacity, and ancillary services in wholesale transactions at market-based rates through the provision of demand response services. In response, FERC disclaimed FPA regulatory jurisdiction over such retail aggregators that provide service only from demand response resources.[27] The rationale was that such ARCs deal only in agreements to reduce demand, i.e., agreements not to purchase electric energy under certain circumstances, rather than agreements to sell electric energy at wholesale.[28] FERC however clarified that, although an ARC was not required to obtain market-based rate authorization, [29] demand response providers remained subject to various other regulatory requirements including rules for doing business with regional transmission organizations (RTOs), prohibitions against market manipulation, and market transparency rules.[30]

[25] *Id*.
[26] *See, e.g.*, *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 (1944) (deferring to the utility in rate-setting).
[27] 130 FERC ¶ 61,031, Docket Nos. ER09-1307-000/01 (January 19, 2010).
[28] *Id*. at 7.
[29] *Id*. at 6.
[30] *Id*. at 8.

FERC's proper role and focus ought to be in the identification and removal of barriers as well as in promoting standards to achieve interoperability.

Congress has aptly declared that pursuit of demand response is in the policy interest of the United States.[31] Although I argue that it would be misguided and futile to attempt to regulate the entire smart grid as one unified system, government action that seeks to identify and remove barriers to effective functioning of these systems is quite different, and may in fact be pursued holistically. That is precisely what the federal government has done. The Energy Policy Act of 2005 (EPAct 2005) section 1252(e)(3)[32] requires that FERC prepare and publish annual reports, by appropriate region, that assesses electricity demand response resources, including those available from all consumer classes.[33] The Energy Independence and Security Act of 2007 (EISA) [34] required FERC to conduct a national assessment of demand response potential, develop a national action plan on demand response, and with the Department of Energy develop a proposal to implement the national action plan.[35] As yet another example, FERC Order 719 sought to eliminate barriers to demand response and encourage the use of market prices to elicit demand response.[36] In Order 719, FERC required that ISOs and RTOs, unless prohibited by the relevant regulatory authority, permit an aggregator to bid demand response on behalf

---

[31] EPAct 2005 § 1252(f). Congress went further to state that it was also the policy of the United States that the benefits of such demand response that accrue to those not deploying such technology and devices, but who are part of the same regional electricity entity, shall be recognized. *See also Illinois Commerce Commission v. FERC*, 576 F.3d 470 (7th Cir. 2009) (FERC cannot rely solely on a presumption that all users of an integrated transmission network benefit from improvements to the network's reliability, but instead must compare the allocated costs with the benefits expected to be realized by those who will pay the assigned costs).

[32] Pub. L. No. 109-58, § 1252(e)(3), 119 Stat. 594 (2005).

[33] *See* October 2013 report: http://www.ferc.gov/industries/electric/indus-act/demand-response/dem-res-adv-metering.asp.

[34] 42 U.S.C. ch. 152 § 17001 et seq.

[35] *See* http://www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential.asp for (1) 2009 National Assessment; (2) 2010 National Action Plan; and (3) 2011 Implementation Proposal.

[36] 125 FERC ¶ 61,071, *Wholesale Competition in Regions with Organized Electric Markets* (October 17, 2008).

of retail customers directly into the organized energy market. This allows small retail loads that otherwise could not participate on an individual basis to participate in the markets by pooling their loads together.[37]

Likewise, government action to promote interoperability of separate smart grid system components by necessity requires government to take into account all the disparate systems and devices. Provided that FERC promotes and supports such interoperability efforts through collaboration with industry players and the states, rather than by mandating what standards and methods to deploy, such action is not doomed to be futile and misguided.[38] To this end, FERC has released a Policy Statement that provides guidance on standards to help realize a smart grid.[39] Key standards discussed in this Policy include: system security, communication and coordination across inter-system interfaces, and demand response.[40]

Just because FERC may have authority to regulate certain aspects of the smart grid or demand response does not, however, mean that they should. Recognition of federalism and comity should encourage the federal government to defer to the states particularly in areas where the states have

[37] *Id*. at 311-12.
[38] This idea is also shared by various commentators who have expressed fear that FERC might intend to implement mandatory protocols in areas that are traditionally under state jurisdiction. *See, e.g.*, 128 FERC ¶ 61,060, Smart Grid Policy at 11 (Kansas and California Commission's request for clarification and guidance on whether FERC has the authority to specify physical layer standards).
[39] 128 FERC ¶ 61,060, *Smart Grid Policy* (July 16, 2009).
[40] *Id.* at 19.

traditionally regulated.[41] In fact, it is expressly stated in Section 201 of the FPA that Federal regulation is to extend "only to those matters which are not subject to regulation by the States." [42]

IV. THE PROPER ROLE FOR STATE PUCs

FERC may only preempt a state PUC's actions on demand response (1) if it has the authority to do so under the FPA and (2) where the state's authority conflicts with FERC's authority, i.e., where compliance with both federal and state regulations is impossible, or where state law stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.[43]

In Arizona, the Public Utility Commission exists pursuant to Article 15 of the Arizona Constitution and is called the Arizona Corporations Commission (ACC). The ACC is independent from the state legislative and executive branches.[44]

The Arizona Corporations Commission may only regulate Public Service Corporations.

Demand response aggregators must be deemed to be public service corporations (PSC) to be subject to ACC's jurisdiction. The Arizona Constitution defines PSCs as "[a]ll corporations other than municipal engaged in *furnishing* gas, oil, or *electricity* for light, fuel, or power." (emphasis added).[45] However, realizing that many entities may literally fall under the Constitutional definition, Arizona courts have

---

[41] This is also consistent with the Congressional mandate in EPAct 2005 § 1252(e)(1) (it is the policy of the United States to *encourage states to coordinate their energy policies* on a regional basis to provide reliable and affordable demand response services to the public) (emphasis added).
[42] 16 USC § 824(a).
[43] Wellinghof, *supra*, at 415.
[44] *See State v. Tucson Gas, Electric Light & Power Co.*, 15 Ariz. 294 (Ariz. 1914) (the functions of the Corporation Commission are neither legislative, executive, nor judicial, but its duties and powers pervade them all, and it is in fact another department of government; where it is given exclusive power, it is supreme).
[45] Ariz. Const. art. 15, § 2.

provided guidelines (*see, e.g.*, *Serv-Yu* factors) that may be used in determining whether a particular business qualifies as a PSC.[46] To be deemed a PSC, the entity's business and activities must be such as to make its rates, charges, and methods of operation, a matter of public concern, clothed with a public interest; its business must be of such a nature that competition might lead to abuse detrimental to the public interest.[47] Where a business is held to be a PSC, the courts gives the ACC great deference in exercising its regulatory authority.[48] Arizona utilities implement demand response as part of the Electric Energy Efficiency Rules.[49]

Demand response aggregators are likely not public service corporations subject to the jurisdiction of the Arizona Corporations Commission.

DR aggregators neither furnish electricity nor are they clothed with a public interest and are thereby not subject to regulation by the ACC. Such a classification would otherwise encounter resistance as it requires one to accept that an end-use customer could "sell" energy that they did not produce (and in fact was not produced by anyone).[50] However, just because the state PUC may not regulate certain aspects of the smart grid or demand response does not mean that the state itself may not. A state legislature may act via its police powers to regulate the health, safety, and general welfare of its citizens.[51]

---

[46] *See* ACC Decision No. 71795, citing *Southwest Transmission Coop. v. ACC*, 213 Ariz. 427 (Ariz. Ct. App. 2007).
[47] *See Id*. at 7.
[48] *See, e.g.*, *ACC v. Woods*, 171 Ariz. 286, (en banc) (Ariz. 1992).
[49] For example, SRP's Power Partner Program in partnership with EnerNOC (a maximum of one DR response event can be called per day, and no more than 3 events may be called in a 7-day period).
[50] Wellinghoff, *supra*, at 406.
[51] *See, e.g.,* discussion *infra* California's Title 24 building codes requiring DR capability.

V. WHAT SHOULD BE REGULATED AND BY WHOM

While I advocate for a general laissez faire approach to dealing with the smart grid evolution, I concede that there are areas where government regulation is vital. For example, government must regulate the demand response market itself to allow for true market operation and protect it from market manipulations. Also, because of the risk inherent in physical or electronic disruption of the grid,[52] government must regulate smart grid security and data privacy as well as provide mechanisms by which grid reliability is assured given that externalities might prevent the market to naturally establish an optimal level of grid reliability. Finally, regulators retain their authority to regulate areas that are independent from but tangentially related to smart grid and demand response. For example, they may mandate the use of demand response to achieve the state's energy efficiency resource standard.[53]

A. Regulation of Security & Data Privacy

Fueled by stimulus funding in the American Recovery and Reinvestment Act of 2009 (ARRA), electric utilities have accelerated their deployment of smart meters to millions of homes across the United States with help from the Department of Energy's Smart Grid Investment Grant program.[54] As the meters multiply, so do issues concerning the privacy and security of the data collected by the new technology. Detailed electricity usage data offers a window into the lives of people inside the home by revealing what individual appliances they are using, and the transmission of the data potentially subjects

---

[52] *See, e.g.*, *DOE Report, Economic Benefits of Increasing Electric Grid Resilience to Weather Outages*, (2013) (placing the cost to industries for weather and non-weather related outages in the tens of billions annually).
[53] *See, e.g.*, ACC Decision No. 71819 (setting Arizona's EERS to 22% cumulative electricity savings by 2020).
[54] *See* Smart Grid Investment Grant Awards by State at http://energy.gov (Arizona total Recovery Act Funding as of 11/15/2011 was $94,095,594). Retrieved 2014-0503.

this information to interception or theft.[55] What worse is that because demand response allows for remote control of powered devices, a security breach could allow for HVAC units to be remotely shut down in the middle of an Arizona summer or an Alaskan winter, or for economic sabotage of industrial plants.[56]

Regulating data privacy and security has the added benefit that it would instill consumer confidence in the smart grid and in demand response particularly where there is additional deterrence through criminal sanctions for circumventing access control measures. Regulators could also further incentivize device manufacturers and ecosystem vendors by granting immunity from liability for those who comply with privacy and security regulations.

Smart grid data privacy and security should be specifically regulated because existing laws and regulations may not adequately address its peculiar aspects.

Driven by consumer concern about data privacy, cybersecurity, failure rates, and adverse effects from RF emissions, many consumer groups have endorsed the ability of customers to opt out of advanced meter installations (AMI).[57] Many utilities such as PG&E, SCE, APS, and SRP have implemented opt-out options – although some have a controversial opt-out fee. However, what users opt out to is the installation of the meter. The peculiar nature of machine-to-machine (M2M) communications in general and smart grid in particular is that it is difficult for those who actually get the meters installed to selectively opt out of what actual data is collected. For starters, such meters lack a human interface through which the energy user could read and agree to privacy policies governing the system as they

[55] Brandon Murrill, et. al., *Smart Meter Data: Privacy and Cybersecurity*, CRS Report for Congress, (February 2012).
[56] *See also* Sniper Attack on PG&E's Metcalf Transmission Substation, San Jose, April 16, 2013.
[57] FERC, *Assessment of Demand Response & Advanced Metering*, Staff Report, (2012) at 25.

would on a smartphone. True an energy user could agree to privacy terms through an independent system such as by accepting privacy policy available online prior to system activation. However, it would be cumbersome to handle policy changes that might later become necessary, such as when the advanced meter is remotely programmed to collect new data, or when the utility needs to use the data collected for a purpose not previously consented to.

Data privacy and security should be specifically regulated because there might otherwise be insufficient incentive or market pressure for vendors to do so voluntarily.

Designing robust data privacy and security features often conflicts with the goal of low system cost, increased energy efficiency,[58] and improved ease-of-use. Unlike other types of communication systems, there is arguably less commercial risk associated with not providing for privacy in smart grid and demand response systems, primarily because privacy breaches here are more difficult to detect.[59] Furthermore, because many of these systems are implemented by the incumbent utilities, the nature of their natural monopoly makes it rather difficult for energy users to defect in protest after a security or data breach occurs. By mandating a certain minimum threshold of privacy and security, regulators change the cost-benefit calculus by imposing a cost on noncompliance, but they also simultaneously lower the cost of compliance through the economies of scale inherent in having all devices comply with the same standards of privacy and security.[60]

---

[58] "Energy efficiency" here means low power consumption which allows for long battery life – especially important for remote sensors in hard to reach places.

[59] It is difficult to detect when private system data has been diverted because smart grid systems run autonomously with little/no human intervention.

[60] Because everyone has to use the same security and privacy systems, compliance cost reduces because specialized security vendors and privacy experts emerge to supply the entire industry.

Data privacy and security would best be regulated by the federal government to ensure national uniformity and global harmonization.

Because the smart grid relies on data communication networks that may be remotely hacked from anywhere in the world, the federal government is better suited to regulating data privacy and security, which would also guarantee national uniformity.[61] Furthermore, because the federal government is better positioned to coordinate international standards,[62] it is in a position to influence global harmonization of privacy and security.[63]

Additionally, because the energy users' reasonable expectation of privacy is determined in light of existing laws, regulations, and practices,[64] having FERC regulate data privacy will result in two advantages: (1) it will ensure a uniform national standard by which to adjudge if the citizen's expectation of privacy is legitimate; and (2) citizen participation through FERC's notice-and-comment rulemaking will prevent a diminution in protected privacy interests. As to the second point, it is important to note that once third-party access to certain types of energy data become routine, it is difficult to later argue that the user had a reasonable expectation of privacy to it.[65]

---

[61] *See, e.g.*, ANSI/NEMA SG-IC 1-2013, *Smart Grid Interoperable and Conformant Testing and Certification Scheme Operator Guidelines* (national certification ensures products are interoperable right from installation date).
[62] *See* U.S. Const. art. I, § 8, cl. 3 (granting Congress the power to regulate foreign commerce).
[63] Global harmonization will lead to enhanced privacy and security (U.S. systems will not be vulnerable to deficiency in foreign systems, e.g., for data stored in overseas clouds), and to lower costs (cost saving from having to deal with just one standard and from economies of scale in building security engines for one standard).
[64] *See Katz v. United States*, 389 U.S. 347 (1967).
[65] *See, e.g.*, *Kyllo v. United States*, 533 U.S. 27 (2001) (reasonable expectation of privacy existed from a thermal-imaging device aimed at home partly because the technology was not in general public use); *Florida v. Riley*, 488 U.S. 445 (1989) (no reasonable expectation of privacy existed from aerial surveillance partly because this was at an altitude at which the public traveled with sufficient regularity).

NIST, as part of FERC's mandate from Section 1305(d) of the Energy Independence and Security Act of 2007 (EISA), has created a Cyber Security Working Group (CSWG) whose primary goal is to develop an overall cyber security strategy for the Smart Grid.[66]

B. Regulation of the Demand Response Market

Regulators retain a vital role in preventing market manipulations and ensuring fair competition in the energy sector. Regulation is necessary to prevent events such as the Western Energy Crisis of 2000-2001 when California had a shortage of electricity supply leading to large-scale blackouts partly caused by market manipulations by energy traders such as Enron.[67] Although it is true that many of the actions taken by Enron were illegal under existing laws and regulation, FERC's investigation concluded that without California's partial deregulation and the underlying market dysfunction, attempts to manipulate the market would not have been successful. [68]

Social fears over Enron-style abuses resulting from information leverage in the demand response market ought to be quelled with specifically targeted regulation particular where specialized energy transactions may be exempt from the regulations imposed on other types of securities.[69] However, as discussed in Section VI(B) *infra*, regulating the operation of the demand response market to prevent market manipulation is very different from interfering with the natural operation of the market say by setting artificial incentives for participating in demand response.

---

[66] NIST SGIP Cyber Security Working Group (CSWG): http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/CyberSecurityCTG. Retrieved 2014-0504.
[67] Tomain, *supra*, at 152-156.
[68] Docket No. PA02-2-000, *Price Manipulation in Western Markets*, FERC Staff Report.
[69] For example, the Dodd-Frank Wall Street Reform and Consumer Protection Act directed the Commodity Futures Trading Commission (CFTC) to provide exemption for entities described in FPA section 201(f) from its regulations and from the provisions of the Commodity Exchange Act (CEA) if it was in the public interest to do so.

C. Regulation of Reliability-Based Demand Response

The "reliability problem" is best thought of not as a single problem, but a cluster of challenges that arise at the intersection of at least three critical trends: (1) power quality demands of the digital economy; (2) effects of persistent load growth particularly peak load growth; and (3) the de-integration of functions that formerly occurred within tightly-woven franchise operations.[70] While EPAct 2005 encourages demand response that allows customers to face the time-varying value of electricity and respond as they choose to those changes, incentive-based demand response programs can help address reliability problems or can be tailored to achieve specific operational goals, such as localized load reductions to relieve transmission congestion.[71] Regulation of reliability-based DR is more readily justifiable given that the individual energy user's self-interest and rational profit maximizing may be incompatible with the goal of ensuring system reliability. This is essentially an externality problem and regulators, not markets, are best at removing such externalities.

FERC has jurisdiction to regulate reliability-based demand response given its role in protecting the reliability of the interstate electric transmission system, and given that demand response is important to that task.[72] This jurisdiction extends to intrastate transmission where it is commingled with interstate transmission.[73]

---

[70] Richard Cowart, *Distributed Resources and Electric System Reliability*, The Regulatory Assistance Project (2001) at 3-4.
[71] DOE Benefits of Demand Response, *supra*, at 11.
[72] *See Wellinghoff* at 396.
[73] *Federal Power Commission v. Florida Power & Light Co.*, 404 U.S. 453 (1972); *see also Illinois Commerce Commission v. FERC*, 576 F.3d 470 (7th Cir. 2009) (FERC cannot rely solely on a presumption that all users of an integrated transmission network benefit from improvements to the network's reliability).

In fact, EPAct 2005 added a new section 215 to the FPA, which requires a FERC-certified Electric Reliability Organization (ERO) to develop mandatory and enforceable Reliability Standards.[74] Because load aggregators and industrial customers who do not take service through load serving entities (LSEs) may play a role in meeting the Reliability Standard, FERC directed the ERO to modify its definition of demand-side management to cover not only activities undertaken by LSEs or their customers to influence the amount or timing of their electricity use, but also comparable activities undertaken by "any other entities."[75]

While reliability problems related to failures of local distribution facilities are outside the jurisdiction of FERC,[76] given the necessity of maintaining reliable distribution facilities, and the difficulty and risk of voluntary market-driven participation, state PUCs should step in and regulate in this area.

D. Other Areas of Permissible Regulation

Of course, the federal and state governments remain free to continue regulating within their authority even if they thereby require one flavor of specific smart grid or demand response feature over another. For example, starting in 2014, California's latest version of its sprawling Title 24 building code[77] kicks in, requiring that a whole host of systems come with some sort of demand response capability.[78] Specifically, demand responsive controls and equipment are required to be "capable of receiving and

---

[74] *Wellinghoff* at 410.
[75] *Id*. at 410-11.
[76] *See* http://www.ferc.gov/about/ferc-does.asp.
[77] California Code of Regulations, title 24 (California Building Standards Code, part 6) www.energy.ca.gov/title24
[78] For example, in response to a DR signal, buildings larger than 10,000 square feet will have to automatically reduce their lighting power by at least 15% below the building's maximum lighting power. The signal can come directly from a local utility, independent system operator (ISO), curtailment service provider, or aggregator.

automatically responding to at least one standards-based messaging protocol"[79] sent via a broadband or wireless connection.[80] Similarly, several PUCs have required that electric utilities provide and install time-based meters and communications devices for each of their customers to participate in time-based pricing rate schedules and other demand response programs.[81]

Such regulatory mandates as Arizona Appliance and Equipment Efficiency Standards[82] and California's Title 24 Building Code Energy Efficiency Standards are permissible because (1) they are not aimed at trying to mandate what the smart grid or demand response should look like but rather are targeted at areas within the regulators' existing authority; and (2) they are correctly mandated by states rather than the federal government, given that they primarily relate to retail users of electricity.

VI. WHAT MUST BE LEFT ALONE

Just like the Internet evolved naturally without regulatory interference, a fact largely credited with its overwhelming success, so too should smart grid and demand response be allowed to develop organically with no unnecessary regulatory interference. An attempt to interfere with the organic growth of the smart grid should be shunned just like the recent attempts to regulate the Internet have largely been rejected in the recent net neutrality decision.[83] The smart grid largely sits on top of the same network and communication infrastructure that powers the Internet, and may therefore equally benefit from the government's laissez faire approach to regulating the Internet (whereby innovation and

[79] All three major California utilities have announced support for OpenADR 2.0.
[80] Cal. Title 24, § 30.5(e).
[81] Congress directed in EPAct 2005 that each state regulatory authority conduct an investigation and issue a decision if utilities should so require.
[82] A.R.S. § 44-1375 (standards for pool pumps, pool pump motors, and electric spas).
[83] *See Verizon Communications v. FCC*, 740 F.3d 623 (D.C. Cir. 2014) (largely rejecting FCC's authority to regulate broadband providers like common carriers).

invention is driven by natural economic forces rather than regulatory mandates). The disintermediation of utilities by companies such as Nest Labs, Wal-Mart, EnerNOC and others is perhaps a glimpse of what's to come.[84]

A. Management Interference

While both FERC and state PUCs have the authority and mandate to ensure just and reasonable rates, they ought not to interfere with practices and methods of the regulated entities other than those that directly affect rates or are closely related to rates. Such mandates do not give regulators *carte blanche* authority to regulate all remote things beyond the rate structure that might in some sense indirectly or ultimately affect rates.[85]

> **Regulators lack authority to assert jurisdiction – even against public utilities clearly under their jurisdiction – on all conceivable things that might in some sense indirectly affect electricity rates.**

For example, in *CAISO*,[86] FERC had directed CAISO to replace its governing board chosen under California law, with a new board chosen through a method it dictated.[87] The Court rejected FERC's claim of authority.[88] The Court reasoned that such claimed authority to regulate all actions or activities of public utilities, including the structure of corporate governance, under the rubric of "practices" would be staggering.[89]

---

[84] For example, Nest Labs, recently acquired by Google, Inc. for $3.2B, is the maker of the Nest thermostat which has in-built demand response capability (Nest Labs refers to DR as "Rush Hour Rewards").
[85] *See California Independent System Operator v. FERC*, 372 F.3d 395 (D.C. Cir. 2004).
[86] *Id*.
[87] *Id*. at 396.
[88] *Id*. at 403.
[89] *Id*.

Likewise, in *Miller*,[90] in a collateral attack to Arizona's REST rules, the Court highlighted the distinction between ACC rules that constitute an attempt to control the PSC, and rules that attempt to control rates, with the former being impermissible.[91] In fact, as seen in *Miller*, utilities are less likely to allege that a regulator has usurped their managerial prerogative when they in fact worked collaboratively with the regulator in developing the pertinent rules. This further strengthens the justification in support of regulators building consensus with stakeholders especially in areas which I argue should be out of their exclusive jurisdiction such as the development of technical standards and protocols for smart grid and demand response (discussed in section VI(C) *infra*).

B. Market Interference

Regulators should be wary of interfering with true market driven demand response and cede way to market forces to smooth out the peaks in daily energy demand. As an example, regulators should shy away from shielding rate payers from the true cost of opting out of smart meter installation lest all rate payers be unduly burdened. [92]

Most traditional DR programs pay consumers to reduce their consumption relative to some administratively set level. [93] However, any initiative that pays customers *not* to consume something, be it water, CO_2 emissions, or electricity, faces a serious challenge of measuring what the consumer *would have* consumed without the payment.[94] Worse yet, because in some DR programs customers are paid based upon the comparison of their actual consumption to this a baseline level, they have a strong

---

[90] *Miller v. ACC*, 227 Ariz. 21, (Ariz. App. 2011).
[91] *Id*. at 13.
[92] APS proposed a $75 initial charge, and a $30 per month fee to those who opt out of automated meters.
[93] James Bushnell, et. al., *When It Comes to Demand Response, Is FERC Its Own Worst Enemy,* CSEM, Univ. of Cal. Energy Institute (2009) at 8.
[94] *Id*.

incentive to inflate the level of their baseline consumption which defeats the very goals of DR in reducing excess generation capacity. A true market-driven dynamic pricing demand response (DR) program with no unnecessary regulatory intervention is more efficient in the long run because consumers will always know more about their true baseline consumption level than regulators would.

Regulators should avoid the knee-jerk reaction of attempting to guarantee low-income energy users equal access to the smart grid by imposing undue burdens on other energy users.

Low-income families may not have access to utility web portals, or to smart phone aps to remotely control smart-grid-tied devices and view energy usage information, or may not have money to purchase and install such devices, or even the right to install demand response capable thermostats in their rentals. Nonetheless, an attempt by regulators to artificially even out the playing field would be a futile and misguided endeavor as it would unduly burden other rate payers and unnecessarily slow down the evolution of the smart grid. Benefits to low-income households should come from the eventual rate reductions inherent in utilities not having to build additional generation capacity or not having idle standby capacity to meet the peak demand. In any case, the cost of smart devices should eventually be driven down by unhindered competition ultimately making it affordable to all rate payers.

C. Interference with Technical Standards and Protocols

Technical standards and communication protocols are best left to industry consortia. It would be futile and misguided for regulators to mandate smart grid or demand response standards and methods without adequate collaboration with the appropriate stakeholders. Congress recognized the appropriate role of regulators in Section 1305(d) of the Energy Independence and Security Act of 2007 (EISA). Congress directed FERC to institute a rulemaking proceeding to adopt such standards and protocols as may be necessary to insure smart-grid functionality and interoperability in the interstate transmission of

electric power, and in regional and wholesale electricity markets. However, Congress required such adoption only after FERC was satisfied that the work of the National Institute of Standards and Technology (NIST) had led to "sufficient consensus" on the smart grid interoperability standards.[95] FERC has taken this mandate seriously and has not simply rubber-stamped NIST's work.[96]

Such collaboration in developing standards actually has the added benefit of giving the standards credibility, which a regulator's imprimatur alone could not do.[97] This approach to standard-setting may even promote a more positive federal-state relationship in the development of the Smart Grid, and may even portend a more collaborative relationship in energy law federalism generally, avoiding the disruptive jurisdictional clashes that have marked recent attempts to innovate in the electric grid.[98]

Another example of government's appropriate role in smart grid and demand response evolution without unnecessary regulatory pressure is OpenADR.[99] This standard, which is already in use by some of the country's largest utilities, was built with public funds as a free and open source standard to allow customers to receive automatic demand response signals for control of building equipment such as air-conditioning and lighting.

Recall, however, as previously discussed in section V(A) *supra*, standards and protocols dealing with security and privacy ought to be mandated after being collaboratively developed. To this end, NIST has created a Cyber Security Working Group (CSWG) whose primary goal is to develop an overall cyber

---

[95] *See* http://www.nist.gov/smartgrid/sgipbuffer.cfm for NIST's Smart Grid Interoperability Panel (SGIP), a vehicle for NIST to solicit input and cooperation from private and public sector stakeholders in developing the smart grid standards framework.
[96] *See, e.g.*, 136 FERC ¶ 61,039, *Smart Grid Interoperability Standards*, (2011) (declining to adopt standards under consideration as having not achieved sufficient consensus with stakeholders).
[97] Joel B. Eisen, *Smart Regulation and Federalism for the Smart Grid*, 37 Harv. Envtl. L. Rev. 1 (2013).
[98] *Id*.
[99] *See* http://www.openadr.org

security strategy for the Smart Grid. CSWG's work includes developing a risk mitigation strategy to ensure interoperability of solutions across different domains/components of the infrastructure.[100]

Similarly, interconnection standards[101] aimed at protecting the grid and utility workers, particularly when integrating non-utility distributed generation (DG) systems, may be mandated after being collaboratively developed. Because FERC and PUCs have a mandate to ensure the reliability of the transmission system, utilities reserve the right to disconnect smart grid and DG systems if there is a problem. It is therefore fitting that the regulators mandate the precise standards by which such connections to the grid should occur, and when such disconnections would be warranted.

VII. CONCLUSION

The nature of the smart grid as an amalgamation of disparate systems overlaying the existing communication and network infrastructure make any attempts to effectively regulate it as a unified system a difficult if not impossible endeavor. It is akin to attempting to unify the different branches of law that comprise the Law of the Horse. It would be a futile and misguided endeavor. To achieve the benefits promised by the smart grid and demand response, regulatory commissions ought to largely adapt a laissez faire approach: regulate only where they must, then sit back and let the market do its thing.

---

[100] *See*, *supra*, CSWG.
[101] *See, e.g.*, IEEE 1547, UL 1741.