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## Data Transmission and Energy Efficient Internet Data Centers

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## Data Transmission and Energy Efficient Internet Data Centers

### Abstract

The internet is a marvel of human accomplishment and a feat of technological engineering, which allows nearly instantaneous communication across the globe—an act once considered the stuff of science fiction. It has been lauded for its environmental benefits, such as reducing paper production and waste, but, as with any great accomplishment, there are unintended consequences. The increased proliferation of electronic devices to access the internet and the exponential advancement of those devices results in large amounts of electronic waste—a problem in its own right. Compounding the issue, for all of those internet-enabled devices to work, they must rely on the backbone of the internet: data servers. Data servers are connected by the thousands within data centers, and these centers must continuously draw electricity from the national electric grid to keep up with internet user demand. This overwhelming amount of energy and electricity consumption creates huge electricity bills for U.S. companies and produces millions of metric tons of toxic carbon emissions annually.

This Comment addresses the impacts of increased energy consumption by internet data centers and suggests a regulatory solution to make those data centers more energy efficient. Within the United States, the Federal Energy Regulatory Commission is the best-suited agency to address the energy efficiency of the internet. Under the Federal Power Act—and consistent with the Supreme Court's interpretation of the Act's language in *New York v. FERC* and *FERC v. Electric Power Supply Ass'n*—FERC has the authority to mandate efficiency standards for internet data centers because those data centers transmit electric energy in interstate commerce and may be considered transmission facilities. Overall, this Comment aims to suggest a regulatory means by which the United States can reduce its energy consumption, thereby harmonizing environmental and business concerns to allow for sustainable economic growth.

## COMMENTS

### DATA TRANSMISSION AND ENERGY EFFICIENT INTERNET DATA CENTERS

JOSEPH R. BRISCAR\*

*The internet is a marvel of human accomplishment and a feat of technological engineering, which allows nearly instantaneous communication across the globe—an act once considered the stuff of science fiction. It has been lauded for its environmental benefits, such as reducing paper production and waste, but, as with any great accomplishment, there are unintended consequences. The increased proliferation of electronic devices to access the internet and the exponential advancement of those devices results in large amounts of electronic waste—a problem in its own right. Compounding the issue, for all of those internet-enabled devices to work, they must rely on the backbone of the internet: data servers. Data servers are connected by the thousands within data centers, and these centers must continuously draw electricity from the national electric grid to keep up with internet user demand. This overwhelming amount of energy and electricity consumption creates huge electricity bills for U.S. companies and produces millions of metric tons of toxic carbon emissions annually.*

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\* Managing Editor, *American University Law Review*, Volume 67; J.D. Candidate, May 2018, *American University Washington College of Law*, B.A., English—Language, Writing & Rhetoric, 2014, *North Carolina State University*. I would like to thank the entire staff of the *Law Review* for helping me improve this Comment; Professor William J. Snape, III, for his insight and guidance; the faculty at WCL for their invaluable legal instruction; and, of course, my family and friends for their love and support. Lastly, I thank Sagan Lampe for her patience as I continue to overbook myself and for her constant encouragement—I would not be where I am today without her.

*Court's interpretation of the Act's language in New York v. FERC and FERC v. Electric Power Supply Ass'n—FERC has the authority to mandate efficiency standards for internet data centers because those data centers transmit electric energy in interstate commerce and may be considered transmission facilities. Overall, this Comment aims to suggest a regulatory means by which the United States can reduce its energy consumption, thereby harmonizing environmental and business concerns to allow for sustainable economic growth.*

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INTRODUCTION

Over the past few decades, a modern awareness of human impact on the Earth has inspired American society and businesses to adopt more environmentally friendly and energy efficient technologies. As a complement to this awareness, people now seem to notice when industries affect or harm the environment. When people think of environmental dangers, they often identify air pollution, toxic waste, or even climate change as the major problems.<sup>1</sup> But, aside from these obvious environmental hazards, there are seemingly clean or innocent industries that actually have a net-negative impact on the environment. Ironically, one such innocent industry hidden in plain sight was also a harbinger of the green movement: the internet. While the internet encourages the reduction of paper usage through electronic file storage and email communication, the internet is not as clean as it seems.

The foundation of the internet, and what many people may not realize, is that everything a person does online requires physical storage space somewhere.<sup>2</sup> Whether a person clicks on a link, performs a search, or downloads a movie, that person’s computer must access the data associated with these actions by retrieving the information from a data server. Every website and internet company<sup>3</sup> either owns its own data server or rents space from a third-party, multi-tenant data server, and each byte of data that goes into making the website visible

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1. See generally Lydia Saad & Jeffrey M. Jones, *U.S. Concern About Global Warming at Eight-Year High*, GALLUP (Mar. 16, 2016), <http://www.gallup.com/poll/190010/concern-global-warming-eight-year-high.aspx> (noting that “sixty-four percent of Americans say they are worried a ‘great deal’ or ‘fair amount’ about global warming”); PRINCETON SURVEY RESEARCH ASSOCS. FOR HEALTH-TRACK, NATIONAL SURVEY OF PUBLIC PERCEPTIONS OF ENVIRONMENTAL HEALTH RISKS 3 (2000), <http://healthyamericans.org/reports/files/survey0620.pdf> (identifying air pollution, water pollution, contaminated drinking water, pesticides in foods, and toxic waste as Americans’ main environmental concerns).

2. See John Patrick Pullen, *You Asked: How Does the Internet Work?*, TIME (Dec. 16, 2014), <http://time.com/3634454/how-does-internet-work> (clarifying that even a GIF of an elephant playing is physically stored somewhere on a server).

3. For the purpose of this Comment, the term “internet company” refers to companies that maintain a website as their primary operation, rather than companies that provide exclusively internet infrastructure services.

needs physical storage on a server. What makes this trail of connection between websites and servers environmentally significant is that facilities, known as data centers, house data servers by the thousands and require constant electricity. The servers they house must be readily accessible to internet users at any time; in other words, they are always on.

The energy usage of data centers is staggering, with estimates placing energy consumption around ninety-one billion kilowatt-hours of electricity annually—the equivalent of thirty-four coal-fired power plants, or enough energy to power all the homes in New York City for two years.<sup>4</sup> This level of electricity consumption is not only costly to the data center business, with projected costs of electricity bills for U.S. companies reaching \$13 billion in 2020, but it also threatens our health and safety by incidentally emitting millions of metric tons of carbon annually.<sup>5</sup> In response to this trend, there is a growing body of literature criticizing the practices of internet data centers and their overwhelming impact on energy consumption, the environment, and climate change.<sup>6</sup> Though some internet companies have taken steps to reduce their environmental footprint by relying on renewable energy sources or implementing more efficient technologies, the practice is hardly ubiquitous.<sup>7</sup> Coordination between businesses and the government is necessary to create either incentives or penalties that help reduce the energy footprint of internet company data centers.

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4. NAT. RES. DEF. COUNCIL, DATA CENTER EFFICIENCY ASSESSMENT: SCALING UP ENERGY EFFICIENCY ACROSS THE DATA CENTER INDUSTRY: EVALUATING KEY DRIVERS AND BARRIERS 5 (Aug. 2014) [hereinafter DATA CENTER EFFICIENCY ASSESSMENT], <https://www.nrdc.org/sites/default/files/data-center-efficiency-assessment-IP.pdf>. Additionally, by 2020, the annual electricity consumption by data centers is projected to be around 140 kilowatt-hours. *Id.*

5. *Id.* (noting that by 2020, data centers may be responsible for 150 million metric tons of carbon emissions per year).

6. See generally Alvan Balent, Note, *An Energy-Efficient Internet: The Next Revolution*, 37 FLA. ST. U. L. REV. 981, 982 (2010) (suggesting that the U.S. tax code can be used to make the internet more energy efficient); Michael F. Kaestner, Note, *Sensible Bytes: States Need a New Approach to Justify Their Recruitment of Internet Data Centers*, 38 WM. & MARY ENVTL. L. & POL'Y REV. 733, 736 (2014) (warning that states should be hesitant to provide building incentives to data centers because the disproportionate energy impact of data centers may not be worth the economic benefits); Alexandra L. Pichette, Note, *Becoming Positive About Being Carbon Neutral: Requiring Public Accountability for Internet Companies*, 14 VAND. J. ENT. & TECH. L. 425, 431 (2012) (discussing how internet companies' non-disclosure of carbon emissions can be solved by stronger reporting requirements).

7. See *infra* notes 55–60 and accompanying text (describing steps internet companies have taken to make data centers more efficient).

Reducing the energy consumption of internet data centers is also an easy way for the United States to meet international climate change goals. With recent shifts in the federal government's policies regarding energy production in the United States,<sup>8</sup> improving data center energy efficiency may help the United States meet its obligations under the Paris Agreement.<sup>9</sup> While the United States has announced its intention to formally withdraw from the Paris Agreement, the withdrawal process takes at least three years and many states and localities have stated they will continue to try to meet its goals.<sup>10</sup> Regardless of the political disparities, the federal government's shift in energy policy makes it difficult for the United States and/or its localities to meet the first round of commitments under the Agreement.<sup>11</sup> Reducing data center energy consumption,

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8. See Coral Davenport & Alissa Rubin, *Trump Signs Executive Order Unwinding Obama Climate Policies*, N.Y. TIMES (Mar. 28, 2017), <https://www.nytimes.com/2017/03/28/climate/trump-executive-order-climate-change.html> (reporting that President Trump signed an Executive Order aimed at reviving the coal industry and undoing environmental regulations related to climate change).

9. The Paris Agreement is part of the United Nations Framework Convention on Climate Change. It aims "to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius." *The Paris Agreement*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, [http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php) (last visited Oct. 23, 2017).

10. See Meghan Keneally & Julia Jacobo, *Cities and States Aim to Take up Paris Accord After Trump's Withdrawal*, ABC NEWS (June 2, 2017, 11:20 AM), <http://abcnews.go.com/US/cities-states-aim-paris-accord-trumps-withdrawal/story?id=47773477> (reporting that sixty-eight mayors across the country and three governors committed to take action on climate change in order to uphold the Paris Agreement); David Lumb, *61 U.S. Cities and Three States Vow to Uphold the Paris Climate Agreement*, ENGADGET (June 1, 2017), <https://www.engadget.com/2017/06/01/61-us-cities-and-three-states-vow-to-uphold-paris-climate-agreem>. For an in-depth look at how litigants are challenging the government through litigation, see Michael C. Blumm & Mary Christina Wood, "No Ordinary Lawsuit": *Climate Change, Due Process, and the Public Trust Doctrine*, 67 AM. U. L. REV. 1 (2017).

11. See Paul Bodnar, *Is the Paris Climate Agreement Dead?*, FOREIGN POLICY (Mar. 28, 2017), <http://foreignpolicy.com/2017/03/28/is-the-paris-climate-agreement-dead-trump-energy-coal-clean-power-obama> (noting that the Trump administration policy change makes it "very challenging, if not impossible, for the United States to meet the first national climate target"); Nadja Popovich, *Trump's Executive Order Pushes the U.S. Climate Pledge Further Out of Reach*, N.Y. TIMES (Mar. 28, 2017), <https://www.nytimes.com/interactive/2017/03/28/climate/trumps-executive-order-pushes-the-us-climate-pledge-further-out-of-reach.html> ("[T]he United States is set to fall far short of its 2015 Paris Agreement pledge . . .").

while not the most significant step a country could take, will help the United States reduce its overall greenhouse gas emissions, an important step in meeting the targets of the Paris Agreement.

The framework for improving the efficiency of data centers already exists—it merely requires implementation. Governments, non-profits, and private companies have created efficiency standards for data centers.<sup>12</sup> These standards range from installing more efficient technologies, to maximizing existing technologies through smarter performance metrics, to mandating industry reporting of energy and carbon consumption.<sup>13</sup> Suggestions on how to improve the efficiency of data centers are widespread, ambitious, and varied. However, the variety of approaches available creates ambiguity for investors and developers of data centers, as well as for internet companies using the data centers, resulting in sluggish implementation.<sup>14</sup> Problems with energy efficiency implementation will increase as the internet continues to grow, but, luckily, the Federal Energy Regulatory Commission (FERC) can fix the ambiguity of efficiency standards because it has the authority to regulate the transmission of energy in interstate commerce and the facilities for such transmission. Furthermore, as the major energy-regulating agency in the United States, FERC is the agency best suited to tackle the challenges associated with implementing a new regulatory scheme.

This Comment analyzes how the regulatory power granted by the Federal Power Act (FPA or “the Act”) and two Supreme Court decisions—*FERC v. Electric Power Supply Ass’n*<sup>15</sup> and *New York v. FERC*<sup>16</sup>—provide FERC the legal justification and jurisdiction to implement efficiency standards for internet data centers or, in the alternative, to create incentives to meet the standards. Part I of this Comment describes the important aspects of the internet’s mechanisms as they relate to data transmission and how the internet uses electricity, including a general overview of the electricity system. Part II introduces the existing legal framework for energy regulation,

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12. See *infra* Section II.B.

13. See *infra* Section II.B (detailing the standards already in place that would increase efficiency of data centers and reduce carbon consumption, including the energy star program and initiatives in Europe and California).

14. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 12 (noting that while data centers have made some progress “implementing energy efficiency measures[,] . . . broad adoption of best practices has yet to take place across the sector”).

15. 136 S. Ct. 760 (2016).

16. 535 U.S. 1 (2002).



including relevant statutes and cases, and provides examples of existing efficiency standards that could be used as a template for data centers. Finally, Part III applies the legal framework to internet data centers to show that FERC has authority to regulate data centers because they are transmission facilities under the FPA and the authority to implement efficiency standards for data centers because of the Supreme Court's sanctioning of general energy efficiency regulation.

## I. BACKGROUND

Data centers are a critical backbone of the internet, but the relationship between the two results in disproportionate energy consumption compared to other industries.<sup>17</sup> The transmission of internet data from data centers to internet users is a key link for developing a regulatory framework. As such, it is important to understand how the internet works and how it affects internet data centers' energy usage. With the connection speeds of the modern internet, it is easy to perceive the internet as simple, but in practice, the internet is a feat of electrical and telecommunications engineering with thousands of hidden layers. Notwithstanding these complexities, this Comment provides a simplified overview of the relevant intricacies, focusing specifically on transmission of electronic data to users. Therefore, this Part details the relationship between data transmission and the internet and its environmental and energy impacts.

### A. Data Transmission and the Internet

When a person turns on a computer and accesses the internet, the user is assigned an internet protocol (IP) address, which will be a unique identification on the internet.<sup>18</sup> Once a computer has its unique IP address, a user can open a web browser to access the

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17. See Tom Bawden, *Global Warming: Data Centres to Consume Three Times as Much Energy in Next Decade, Experts Warn*, INDEPENDENT (Jan. 23, 2016, 9:37 PM), <http://www.independent.co.uk/environment/global-warming-data-centres-to-consume-three-times-as-much-energy-in-next-decade-experts-warn-a6830086.html> (emphasizing that in three years, the energy consumption of the internet has spiked to the same carbon footprint as the airline industry).

18. Vince Streiff, *(Relatively) Plain English Guide to How the Internet Works*, CATALYST, Mar./Apr. 2004, at 38, 38. The computer uses a media access control (MAC) address to retrieve the IP address from a dynamic host control protocol (DHCP) server run by the internet service provider. *Id.* The DHCP server also tells the computer what network mask, default gateway, and dynamic naming system (DNS) server to use. *Id.* at 39.

internet.<sup>19</sup> The user types in a domain name and submits a request.<sup>20</sup> The computer searches for the web server to ask for permission to access the website.<sup>21</sup> The web server then accesses its data centers to find the relevant webpage, and the web server transmits the information back to the user who requested the information.<sup>22</sup> As part of this transmission, the web server converts the data into electronic signals, sends it over cables, and converts it back to data packets once it reaches its destination.<sup>23</sup> This back and forth happens constantly as users click links on web pages and search for information.

While there are many in-between steps from when a user types in a website address to when the user sees the results on a screen, the most important step may be the user's connection to the internet data server. An internet data server is essentially a "bulked-up desktop computer, minus a screen and keyboard, that contains chips to process data."<sup>24</sup> The importance of data servers to the internet cannot be overstated because they contain all of our online activity, including social media posts, emails, and online business.<sup>25</sup> Data centers house thousands of interconnected data servers<sup>26</sup> and contain not only the servers and telecommunications equipment, but also supporting infrastructure, such as cooling and power delivery systems.<sup>27</sup> Data centers are important to large internet companies—such as Google,

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19. *Id.*

20. *Id.*

21. *Id.*

22. *Id.*

23. Rus Shuler, *How Does the Internet Work?* (2002), <https://web.stanford.edu/class/msande91si/www-spr04/readings/week1/InternetWhitepaper.htm>.

24. James Glanz, *Power, Pollution, and the Internet*, N.Y. TIMES (Sept. 22, 2012), <http://www.nytimes.com/2012/09/23/technology/data-centers-waste-vast-amounts-of-energy-belying-industry-image.html>.

25. See Pierre Delforge, *New Study: America's Data Centers Consuming—and Wasting—Growing Amounts of Energy*, NAT. RES. DEF. COUNCIL (Aug. 26, 2014), <https://www.nrdc.org/experts/pierre-delforge/new-study-americas-data-centers-consuming-and-wasting-growing-amounts-energy> (explaining that online activity “is delivered through nearly 3 million data centers across America”).

26. See Kaestner, *supra* note 6, at 743 (explaining the ways in which data centers are run, what they look like, and what purposes they serve). The three major types of data centers are enterprise, cloud, and colocation. *Id.* at 742. Enterprise data centers are typically owned and operated by a specific company such as Google and meant to only contain that company's data. *Id.* at 743. Cloud and colocation data centers, or multi-tenant data centers, provide server space to multiple companies, ranging from global to regional customers. *Id.*

27. TAO JIANG ET AL., ENERGY MANAGEMENT OF INTERNET DATA CENTERS IN SMART GRID 4 (2015).

Amazon, and Facebook, which typically own their data servers—because they provide data reliability, ease of management, and smooth execution of their online applications.<sup>28</sup> Additionally, however, multi-tenant data centers make up a significant portion of the market and are responsible for approximately half of all data server electricity consumption.<sup>29</sup> Without data servers and data centers, the internet as we know it would not exist.

### *B. Energy and the Internet*

One of the main concerns for internet data center operators and, vicariously, internet users, is availability and cost of energy supplies to ensure a reliable flow of electricity for data servers.<sup>30</sup> These concerns are evident by the sheer size and scale of the internet—in fact, “[i]f the worldwide [i]nternet were a country, it would be the [twelfth] largest consumer of electricity in the world.”<sup>31</sup> While data centers are globally important, the relationship between internet users and data centers in the United States is key to understanding the chain of energy transmission from power generation to internet users and everyone in between.

#### *1. Chain of energy transmission*

The electric energy markets of America used to be fairly simple and vertically integrated, but the modern system contains many actors at various levels of the industry.<sup>32</sup> Power plants generate electricity, but they cannot store it effectively and must constantly produce it according

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28. *Id.*; Kaestner, *supra* note 6, at 743.

29. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 5 (noting that fifty percent of the energy used by multi-tenant data centers is wasted).

30. See Kaestner, *supra* note 6, at 743–44 (listing factors that data center personnel consider when selecting a new location, including “accessibility to highways and airports, proximity to markets and customers, cost of real estate, tax and regulatory climate, economic development incentives, and the cost of electricity”).

31. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 8 (describing the hypothetical country whose energy usage would fall between that of Spain and Italy).

32. See *Electricity Explained: How Electricity Is Delivered to Customers*, U.S. ENERGY INFO. ADMIN., [http://www.eia.gov/Energyexplained/index.cfm?page=electricity\\_delivery](http://www.eia.gov/Energyexplained/index.cfm?page=electricity_delivery) (last updated Aug. 31, 2017) [hereinafter *Electricity Explained*] (describing how “[a]t the beginning of the 20th century, more than 4000 individual electric utilities operated in isolation from each other,” but “[a]s the demand for electricity grew, especially after World War II, utilities began to interconnect their transmission systems”). The modern electric grid is typically broken down into three stages: generation, transmission, and distribution. *Id.*

to demand.<sup>33</sup> This generated electricity is entered into the “grid,” where wholesale market operators work to distribute the electricity to energy utilities.<sup>34</sup> To do this, the wholesale market operators consolidate orders from load-serving entities (LSEs)<sup>35</sup> and bids from generators in the most cost-effective ways for each.<sup>36</sup> Once this process is sorted out, LSEs distribute electricity to consumers, including internet companies and internet users.<sup>37</sup> When internet users and the companies receive the electricity, they then utilize the internet’s infrastructure to transmit electric data back and forth as users access websites.

## 2. *Internet energy consumption and environmental impact*

The chain of energy transmission from generation to data centers to internet use ties all these stages together, but the relationship among them results in high levels of energy consumption and environmental impact. The resulting consequences caused by internet data centers are becoming clearer to industries and outside observers. While some internet companies have attempted to address these concerns, the efforts of a few may not be enough to mitigate the actions of the entire industry.

### a. *Energy consumption*

The energy consumption of the internet has been estimated to be between one and thirteen percent of the United States’ total energy

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33. See *FERC v. Elec. Power Supply Ass’n*, 136 S. Ct. 760, 768 (2016) (“Suppliers must generate—every day, hour, and minute—the exact amount of power necessary to meet demand . . .”).

34. *Id.* The national grid is a system of interconnected local electricity grids; there are three major interconnections: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas. *Energy Explained*, *supra* note 32.

35. A load-serving entity is any entity that “serves end-users within a control area and has been granted the authority or has an obligation pursuant to state or local law, regulation, or franchise to sell electric energy to end-users located within the control area.” *FERC: Guide to Market-Oversight Glossary*, FED. ENERGY REG. COMMISSION, <https://www.ferc.gov/market-oversight/guide/glossary.asp#L> (last updated Mar. 15, 2016). LSEs are more commonly understood as electric utility companies that provide electricity to customers, but they can also include competitive retailers, as well as electric cooperatives and municipally owned utilities. *Load Serving Entities*, ELECTRIC RELIABILITY COUNCIL OF TEX., <http://www.ercot.com/services/rq/lse> (last visited Oct. 23, 2017).

36. *Elec. Power Supply Ass’n*, 136 S. Ct. at 768–69 (describing the process by which wholesale market operators distribute energy to utilities, which begins by accepting bids from energy generators based on the demand for energy, as indicated by orders from load-serving entities).

37. *Id.* at 769.

consumption.<sup>38</sup> This includes all computers, data servers, and office equipment.<sup>39</sup> Within that cross-section, data centers are estimated to consume ninety-one billion kilowatt-hours per year, or two percent of all the energy consumed in the United States.<sup>40</sup> This number is sure to grow as the internet becomes more ubiquitous and readily available to more individuals around the world who may access websites with servers in the United States.<sup>41</sup>

While most of the energy that data centers use is necessary for operators, consumer expectations for reliable internet service results in significant energy waste because of inefficient technologies and poor facility management.<sup>42</sup> One of the key features of the internet is the nearly instantaneous access to information.<sup>43</sup> For internet companies to keep up with consumers' desire for speedy access to websites, servers must remain running almost constantly, severely

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38. See Balent, *supra* note 6, at 982 (noting that the constant expansion of the internet and the reluctance of internet companies to report information make it difficult to determine the exact amount of energy the internet uses).

39. *Id.* at 981–82.

40. See U.S. ENVTL. PROT. AGENCY, REPORT TO CONGRESS ON SERVER AND DATA CENTER ENERGY EFFICIENCY, PUB. L. 109-431 7, 18 (2007), [https://datacenters.lbl.gov/sites/all/files/EPA\\_Datacenter\\_Report\\_Congress\\_Final.pdf](https://datacenters.lbl.gov/sites/all/files/EPA_Datacenter_Report_Congress_Final.pdf) (reporting that in 2006, data centers used 1.5 percent of the national energy usage and that by 2011, the Environmental Protection Agency (EPA) estimated that energy consumption would nearly double); Glanz, *supra* note 24 (reporting that data centers used two percent of the nation's electricity in 2010); Yevgeniy Sverdlik, *Here's How Much Energy All US Data Centers Consume*, DATA CTR. KNOWLEDGE (June 27, 2016), <http://www.datacenterknowledge.com/archives/2016/06/27/heres-how-much-energy-all-us-data-centers-consume> (reporting that data centers used seventy billion kilowatt-hours in 2014); Patrick Thibodeau, *Data Centers Are the New Polluters*, COMPUTER WORLD (Aug. 26, 2014, 4:30 AM), <http://www.computerworld.com/article/2598562/data-center/data-centers-are-the-new-polluters.html> (stating that data centers “used [ninety-one] billion kilowatt-hours of electrical energy in 2013”).

41. See Thibodeau, *supra* note 40 (estimating that by 2020, data centers will use 139 billion kilowatt-hours per year); DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 5 (finding that electricity consumption by data centers may reach 140 billion kilowatt-hours per year by 2020).

42. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 12–21 (noting the biggest challenges to internet data centers include the slowing of energy efficiency progress, low server utilization, and split incentives between investors and operators, all of which are exaggerated in multi-tenant data centers).

43. See *What Is an Internet Service Provider?*, WHAT IS MY IP ADDRESS, <http://whatismyipaddress.com/isp> (last visited Oct. 23, 2017) (describing the transmission of internet signals as “virtually instantaneous”).

contributing to data center resource drain.<sup>44</sup> For example, in 2010, one data center ran a diagnostic of its energy consumption and discovered that out of a sample of 333 servers, more than half were plugged in but performing few to no functions.<sup>45</sup>

Data centers need to run their facilities nearly 24/7 to keep up with user demand, real or projected, resulting in data centers wasting up to ninety percent of the electricity that they pull from the grid.<sup>46</sup> Additionally, for multi-tenant data centers, part of the problem is that internet companies are not responsible for running the data centers;<sup>47</sup> thus, the financial motivation for improving efficiency is slightly removed because they can simply charge higher rents rather than implement better practices.<sup>48</sup>

*b. Impact and response*

The massive energy requirements of the internet and data centers, combined with unchecked energy usage, results in a disproportionately large impact on internet companies' carbon emissions.<sup>49</sup> Much of the potential environmental damage caused by internet data centers remains unregulated because data centers fall under the U.S. Environmental Protection Agency (EPA) "scope 2" emissions.<sup>50</sup> The

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44. See Glanz, *supra* note 24 (explaining that this rate of consumption makes "[d]ata centers . . . among utilities' most prized customers").

45. *Id.* (reporting that "nearly three-quarters of the servers in the sample were using less than 10 percent of their computational brainpower, on average, to process data").

46. *Id.*

47. See Kaestner, *supra* note 6, at 743 (describing multi-tenant data centers and the various customers they serve). Unlike enterprise servers, which are typically run by the internet company responsible for the server, multi-tenant data centers are not solely providing space to one company. *Id.*

48. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 6 (stating that customers' decisions to use efficient IT equipment has no bearing on the multi-tenant data centers' bills, "removing any financial motivation to improve energy efficiency").

49. Growing evidence suggests that internet companies are responsible for a disproportionate amount of emissions. See, e.g., Thibodeau, *supra* note 40. Additionally, while there is popular debate regarding the effect of carbon emissions on climate change, among experts, there is no question that emissions contribute significantly toward climate change. Pichette, *supra* note 6, at 427–28; see also Kaestner, *supra* note 6, at 745 (discussing a U.S. Energy Information Administration report which found that at least eighty percent of U.S. greenhouse gas emissions come from energy-related sources).

50. Scope 2 emissions are indirect emissions that are a consequence of the supplier, but they occur at sources owned or controlled by an entity other than the supplier. Pichette, *supra* note 6, at 427. For example, in this case, an internet company causes scope 2 emissions when a power plant emits more energy in order to keep up

EPA only requires greenhouse gas reporting from “scope 1” emitters.<sup>51</sup> This gap in reporting and oversight allows data centers to consume energy at a harmful rate with little political and social repercussions because most regulations only focus on scope 1 emitters.<sup>52</sup> Additionally, the positive public perception surrounding internet companies helps shield them from public scrutiny and allows them to focus more on delivering their product instead of on environmental concerns.<sup>53</sup> Without pressure from government or interest groups, the growing environmental footprint of internet companies could become worse as more and more Americans rely on the internet.<sup>54</sup>

While these problems appear to be growing, internet companies have not been blind to the inefficiencies of data centers, and the public has not entirely ignored the companies’ environmental impact. For example, internet companies such as Yahoo! and Google have pledged to introduce voluntary green policies and have attempted to become “carbon neutral.”<sup>55</sup> Google has implemented new hardware at some of its data centers, which will help them run more efficiently, saving

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with the company’s energy demands. Therefore, the internet company is not subject to heavy EPA regulations, unlike a coal burning factory, which is regulated under “scope 1.” *Id.*; *FAQ, GREENHOUSE GAS PROTOCOL*, <http://ghgprotocol.org/calculation-tools/faq> (last visited Oct. 23, 2017); *Greenhouse Gases at EPA*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/greeningepa/greenhouse-gases-epa> (last updated Sept. 6, 2017) [hereinafter *Greenhouse Gases at EPA*].

51. Scope 1 emissions come from fossil fuel suppliers, manufacturers, engines, and facilities emitting more than 25,000 metric tons of greenhouse gases per year. Pichette, *supra* note 6, at 435; *Greenhouse Gases at EPA*, *supra* note 50.

52. Pichette, *supra* note 6, at 427–28 (discussing the EPA’s reporting rule regarding carbon emission disclosure and noting that the reporting rule only requires facilities to publish their carbon emissions if they fall under one of thirty categories of scope 1 emissions or directly emit over 25,000 metric tons per year of carbon dioxide equivalent).

53. Frank Newport, *Americans Rate Computer Industry Best, Oil and Gas Worst*, GALLUP (Aug. 16, 2012), <http://www.gallup.com/poll/156713/Americans-rate-computer-industry-best-oil-gas-worst.aspx> (reporting that in terms of overall image, Americans rated the computer/internet industry and the oil and gas industry the most favorable and least favorable, respectively).

54. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 8 (“[T]he continued expansion of the industry means that the energy use of data centers, and the associated emissions of greenhouse gases . . . and other air pollutants, will continue to grow.”).

55. Pichette, *supra* note 6, at 429–30 (discussing internet company green policies and defining “carbon neutral” as “a state in which they will cancel out any negative effects from their own emissions by reducing the world’s carbon by an equivalent amount—through the use of carbon offsets and clean energy technology”); see also DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 9 (stating that this effort by large internet companies is motivated by pressure from environmental organizations, cost, and publicity).

energy and money.<sup>56</sup> Additionally, Facebook recently opened a new data center in Lulea, Sweden, to take advantage of the cold climate by using arctic air to help cool the facility.<sup>57</sup> Facebook claims the facility is “one of the most efficient and sustainable data centers in the world.”<sup>58</sup> The data center saves energy by using local hydro-electric energy for power and using excess heat from the servers to heat employee offices.<sup>59</sup> Other companies have also attempted to make their data centers more efficient by upgrading their technology and shutting down servers when they are not needed.<sup>60</sup> While these improvements are significant, the internet continues to grow, and these changes may not be enough to make a difference if there is not more oversight of data centers’ energy usage.

## II. LEGAL FRAMEWORK FOR ENERGY REGULATION

The existing legal framework for energy regulation in the United States reveals the parameters by which an agency may establish any new regulation of internet company and data center energy usage. Generally, the United States Department of Energy (DOE) is the federal agency responsible for most matters involving energy.<sup>61</sup> Founded by the Department of Energy Organization Act of 1977,<sup>62</sup> DOE is responsible for nuclear material maintenance, nuclear material defense, and various energy-related programs throughout the

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56. Cade Metz, *Mystery Google Device Appears in Small-Town Iowa*, WIRED (Sept. 10, 2012, 6:30 AM), <https://www.wired.com/2012/09/pluto-switch> (describing the “Pluto Switch,” which is a piece of hardware built by Google that is designed to improve data center operations and reduce costs).

57. Rich Miller, *Live in Lulea: Facebook Goes Global and Gets Greener*, DATA CTR. KNOWLEDGE (June 12, 2013), <http://www.datacenterknowledge.com/archives/2013/06/12/facebook-status-update-live-in-lulea-on-the-arctic-circle> (noting that the new facility also allows Facebook to use seventy percent fewer backup generators).

58. *Id.*

59. *Id.* For pictures of the facility, see Benjamin Goggin, *Inside Facebook’s Enormous Arctic Data Center*, DIGG (Sept. 28, 2016, 5:35 PM), <http://digg.com/2016/facebook-arctic-data-center-mark-zuckerberg>.

60. Sverdlik, *supra* note 40. *But see* DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 9 (observing that “[m]ost segments of the industry have yet to adopt best practices and are failing to capture the majority of efficiency opportunities”).

61. *A Brief History of the Department of Energy*, DEP’T OF ENERGY, <https://energy.gov/node/%20362173> (last visited Oct. 23, 2017) [hereinafter *A Brief History*] (providing a historical overview of the regulation of energy by the DOE).

62. Department of Energy Organization Act of 1977, Pub. L. No. 95-91, 91 Stat. 565 (codified as amended at 42 U.S.C. § 7131 (2012)).



federal government.<sup>63</sup> However, regulation of the sale and transmission of energy is reserved for another agency, FERC.<sup>64</sup> Although DOE is an important agency with regard to most federal energy regulation, this Comment focuses on FERC and its delegated powers because FERC is the best-suited agency to regulate internet data centers.<sup>65</sup>

*A. The FPA and FERC: Congress's Efforts to Regulate the Transmission and Sale of Energy*

FERC is an independent federal agency generally responsible for the regulation of the transmission and sale of energy in interstate commerce, as well as the facilities for such transmission.<sup>66</sup> The FPA grants FERC most of its regulatory authority.<sup>67</sup> Under the FPA, FERC is delegated the authority to regulate the “transmission of electric energy in interstate commerce” and the “sale of electric energy at wholesale in interstate commerce.”<sup>68</sup> FERC also possesses limited authority over the “facilities for such transmission or sale of electric

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63. See *A Brief History*, *supra* note 61 (explaining how DOE's priorities over time have shifted from developing and regulating energy to nuclear weapons research in order to ensure “the nation's security and prosperity by addressing its energy, environmental and nuclear challenges”).

64. *What FERC Does*, FED. ENERGY REG. COMMISSION, <https://www.ferc.gov/about/ferc-does.asp> (last updated May 24, 2016) (describing the functions that FERC does and does not perform).

65. While there are no federal efficiency regulations, there are some basic guidelines for data center energy efficiency. See *infra* Section II.B.

66. FED. ENERGY REGULATORY COMM'N, AN OVERVIEW OF THE FEDERAL ENERGY REGULATORY COMMISSION AND FEDERAL REGULATION OF PUBLIC UTILITIES IN THE UNITED STATES 9 (2010) [hereinafter FERC OVERVIEW], <https://ferc.gov/about/ferc-does/ferc101.pdf> (listing FERC's role as regulating electric transmission and wholesale rates, licensing hydroelectric dams and their safety, and setting natural gas and oil pipeline transportation rates and safety).

67. 16 U.S.C. § 824 (2012); see also *FERC v. Elec. Power Supply Ass'n*, 136 S. Ct. 760, 767 (2016) (describing the historical framework that led to FERC's regulation of energy under the FPA). The FPA originally established the Federal Power Commission, but the Commission was reorganized as FERC with the creation of DOE in 1977. FERC OVERVIEW, *supra* note 66, at 8.

68. § 824(b)(1).

energy,”<sup>69</sup> including actions undertaken by a public utility.<sup>70</sup> Public utility is defined broadly as “any person who owns or operates facilities subject to the jurisdiction of the Commission,” or “‘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.’”<sup>71</sup> FERC has the exclusive authority to regulate these areas, but any powers not granted to FERC by the statute are left up to the states to regulate.<sup>72</sup>

A close reading of the language of the Act is generally sufficient to explain FERC’s general jurisdiction. The language relating to the sale of energy in interstate commerce is not exactly applicable to data centers, but the statute’s language regarding the transmission of energy is relevant. In addition to the plain language of the FPA, several court cases provide guidance to help understand the meaning of the FPA’s language.<sup>73</sup> Two Supreme Court cases, *New York v. FERC* and

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69. *Id.* Under the limitations for transmission facilities, FERC does not have jurisdiction “over facilities used in local distribution or only for transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter.” *Id.* FERC also has the authority to regulate the corporate activities, accounting, reliability, and transactions of public utilities. *Id.*; §§ 824(b)–(c), (o), 825.

70. § 824(b), (e) (stating that FERC has jurisdiction over all facilities which transmit and sell energy in interstate commerce, including public utilities, which is defined as “any person who owns or operates facilities subject to [FERC’s] jurisdiction”); FERC OVERVIEW, *supra* note 66, at 11.

71. FERC OVERVIEW, *supra* note 66, at 11 (quoting 16 U.S.C. § 824(e)).

72. See 16 U.S.C. § 824(a); see also *Elec. Power Supply Ass’n*, 136 S. Ct. at 767 (explaining that while the FPA does grant FERC certain jurisdiction, “the [FPA] also limits FERC’s regulatory reach, and thereby maintains a zone of exclusive state jurisdiction”).

73. See generally *Elec. Power Supply Ass’n*, 136 S. Ct. at 773, 777 (holding that FERC has the authority to regulate wholesale electricity rates, but cannot directly regulate retail rates); *New York v. FERC*, 535 U.S. 1, 20 (2002) (affirming that FERC did not exceed its jurisdiction by including unbundled retail transmissions of electricity within the purview of its open access requirements for interstate transmission); *Miss. Power & Light Co. v. Mississippi*, 487 U.S. 354, 375–76 (1988) (holding that FERC may require a utility company to purchase the outputs of nuclear power at rates set by FERC, which preempts state agencies from setting retail rates that do not recognize FERC-mandated payments); *Conn. Light & Power Co. v. Fed. Power Comm’n*, 324 U.S. 515, 536 (1945) (holding that the Federal Power Commission’s (FPC) jurisdiction extends to all interstate transmission under the FPA); *Jersey Cent. Power & Light Co. v. Fed. Power Comm’n*, 319 U.S. 61, 76 (1943) (affirming that the FPA establishes jurisdiction over the regulation of public utility securities); *Pub. Utils. Comm’n v. Attleboro Steam & Elec. Co.*, 273 U.S. 83, 89–90 (1927) (holding that a state regulatory body could not regulate the sale of interstate electricity); *Utah v. FERC*, 691 F.2d 444, 446–47 (10th Cir. 1982) (holding that FERC had exclusive jurisdiction over a

*FERC v. Electric Power Supply Ass'n*, provide guidance for understanding whether data centers comport with FERC's jurisdictional authority.

### 1. New York v. FERC

In *New York v. FERC*, the Supreme Court analyzed whether FERC had the authority to issue an order that regulated the transmission of energy when a utility “unbundled” its retail sales.<sup>74</sup> Order No. 888 required utilities that unbundled the cost of transmission and generation of electricity to allow competitors to use the same transmission lines on the same terms as their own transmission.<sup>75</sup> In reviewing whether FERC had the authority under the FPA to issue the order, the Court relied on the plain language of the Act. The Court reasoned that “[s]ection 201(b) of the FPA states that FERC’s jurisdiction includes ‘the transmission of electric energy in interstate commerce’ and ‘the sale of electric energy at wholesale in interstate commerce.’”<sup>76</sup> The Court went on to state that the transmissions at issue in this case were “indeed . . . electric energy in interstate commerce, because of the nature of the national grid.”<sup>77</sup> Additionally, although there is a limit on FERC’s authority to regulate the sale of electricity, the FPA does not limit FERC’s jurisdiction in regulating transmission to only wholesale markets.<sup>78</sup>

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wholesale agreement between two power companies to interconnect their interstate transmission lines); *Hartford Elec. Light Co. v. Fed. Power Comm’n*, 131 F.2d 953, 963 (2d Cir. 1942) (reasoning that the term “facilities” as used in the FPA is a broad term that encompasses any building that supports the transmission of power); *Appalachian Power Co. v. Pub. Serv. Comm’n of W. Va.*, 630 F. Supp. 656, 664 (S.D. W. Va. 1986) (rejecting West Virginia’s attempt to assert jurisdiction over several utility companies that sought to agree to terms of interstate transmission with one another), *aff’d*, 812 F.2d 898 (4th Cir. 1987). The FPC was FERC’s predecessor; “[i]n 1997, Congress reorganized the FPC as FERC and the responsibilities of the Commission continued to expand.” *History of FERC*, FED. ENERGY REG. COMMISSION, <https://www.ferc.gov/students/ferc/history.asp> (last visited Oct. 23, 2017).

74. *New York*, 535 U.S. at 4 (describing unbundling as public utilities separating “the cost of transmission from the cost of electrical energy when billing . . . retail customers”).

75. *Id.* at 5. Order No. 888 requires that “[e]very public utility that . . . transm[its] . . . electric energy in interstate commerce, and that is a member of a power pool, . . . must file a joint pool-wide or system-wide open” access transmission pro forma tariff. *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities*, Order No. 888, 75 FERC ¶ 61,080, at 780 (1996); see also 18 C.F.R. § 35.28(c)(3) (2017)).

76. *New York*, 535 U.S. at 16–17 (quoting 16 U.S.C. § 824(b)).

77. *Id.* at 17 (internal quotation marks omitted).

78. 535 U.S. at 17.

The Court also looked to the legislative history of the FPA to determine whether Congress intended for FERC to regulate transmission of energy in this matter.<sup>79</sup> First, the Court looked at the creation of the Federal Power Commission (FERC's predecessor before the creation of the DOE), which Congress created via the FPA in response to what is referred to as the "Attleboro gap."<sup>80</sup> The Court's analysis was in response to the plaintiff's argument that the 1935 Congress, which passed the FPA, did not intend to intrude on traditionally state-held jurisdiction.<sup>81</sup> This argument was bolstered by the language of sections 201(a) and 201(b), which provide, respectively, that federal regulations should "extend only to those matters which are not subject to regulation by the States"<sup>82</sup> and that FERC has no jurisdiction "over facilities used for the generation of electric energy or over facilities used in local distribution or only for the transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter."<sup>83</sup> The Court concluded that although this language limits FERC's jurisdiction, the Order at issue did not reasonably affect state jurisdiction over the areas excluded by the statute because FERC has authority over interstate transmissions, irrespective of whether the recipient is an end user or reseller.<sup>84</sup> Therefore, the Court declared

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79. *Id.* at 20.

80. *Id.* The "Attleboro gap" refers to a Supreme Court decision that declared that one state did not have the authority to regulate the rates of a company selling to residents in another state. *See* *Pub. Utils. Comm'n v. Attleboro Steam & Elec. Co.*, 273 U.S. 83, 89 (1927). This authority, the Court declared, was left up to the federal government under the Commerce Clause of the Constitution. *Id.* The "gap" was a space that the Court stated should be regulated by the government, but the government had not yet done so; Congress filled the gap with the enactment of the FPA. *New York*, 535 U.S. at 20.

81. *See New York*, 535 U.S. at 20 ("Attempting to discredit this straightforward analysis of the statutory language, *New York* calls our attention to numerous statements in the legislative history indicating that the 1935 Congress intended to do no more than close the 'Attleboro gap.'").

82. *Id.* (quoting 16 U.S.C. § 824(a) (2012)).

83. *Id.* at 20 (quoting 16 U.S.C. § 824(b)).

84. *Id.* at 22–24 (distinguishing between the regulation of transmission over which FERC has jurisdiction with the sale of energy over which FERC only has jurisdiction over wholesale transactions).

that FERC had the authority to regulate transmission in the way it did under Order No. 888.<sup>85</sup>

An ancillary issue raised by the statutory language argument and analyzed by the Court concerned FERC's ability to regulate actual transmission facilities.<sup>86</sup> Section 201(b) of the FPA provides:

The Commission shall have jurisdiction over all facilities for such transmission or sale of electric energy, but shall not have jurisdiction . . . over facilities used for the generation of electric energy or over facilities used in local distribution or only for the transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter.<sup>87</sup>

The Court explained that FERC did "not even arguably affect the States' jurisdiction" regarding the area of exclusion because the specific order did not "attempt[] to control" any of the facilities prohibited by the statute.<sup>88</sup> Additionally, the Court noted that FERC had set forth a seven-factor test by which it identifies the type of facilities that fall outside of its jurisdiction, categorized as local distribution facilities.<sup>89</sup> Thus, the Court affirmed FERC's jurisdiction and deferred to the Commission's self-regulation.

## 2. FERC v. Electric Power Supply Ass'n

The most recent case, *Electric Power Supply Ass'n*, addressed the correct statutory interpretation of the sale of energy language in the FPA and decided a jurisdictional challenge to FERC's authority.<sup>90</sup> The

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85. *Id.* at 23–24 (declaring that the FPA "unquestionably supports FERC's jurisdiction to order unbundling of wholesale transactions, . . . [and] to regulate the unbundled transmissions of electricity retailers").

86. *Id.* at 22 (agreeing with New York's point that "the legislative history is replete with statements describing Congress's intent to preserve state jurisdiction over local facilities").

87. 16 U.S.C. § 824(b).

88. *New York*, 535 U.S. at 22.

89. *Id.* at 23. Order No. 888 listed the seven factors as:

(1) Local distribution facilities are normally in close proximity to retail customers; (2) Local distribution facilities are primarily radial in character; (3) Power flows into local distribution systems; it rarely, if ever, flows out; (4) When power enters a local distribution system, it is not reconsigned or transported on to some other market; (5) Power entering a local distribution system is consumed in a comparatively restricted geographical area; (6) Meters are based at the transmission/local distribution interface to measure flows into the local distribution system; (7) Local distribution systems will be of reduced voltage.

*Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities*, Order No. 888, 75 FERC ¶ 61,080, at 402 (1996).

90. *FERC v. Elec. Power Supply Ass'n*, 136 S. Ct. 760, 767 (2016).

Supreme Court considered whether FERC had the authority to regulate “demand response transactions,”<sup>91</sup> which occur when an operator of a wholesale market pays an electricity consumer for its commitment that it will not use electricity during certain peak times.<sup>92</sup> Electricity cannot be properly stored and must be produced constantly to meet demand, so these types of transactions allow market operators<sup>93</sup> to ensure consistent delivery and protect the electrical grid by reducing the flow of electricity at peak times.<sup>94</sup> The petitioners, wholesale market operators participating in the demand response market, challenged FERC Order No. 745,<sup>95</sup> which required the operators to charge the same price to those purchasing electricity as the price it paid users to not use electricity.<sup>96</sup>

The Court held that FERC had the authority to promulgate Order No. 745 based on the language of the FPA and because it did not exceed FERC’s jurisdiction.<sup>97</sup> The Court reasoned that the FPA delegated “responsibility to FERC to regulate the interstate wholesale market for electricity—both wholesale rates and the panoply of rules and practices affecting them.”<sup>98</sup> FERC’s actions “directly” affected the wholesale rates, and under the demand response practice, compensation affects wholesale prices.<sup>99</sup>

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91. *Id.*; see also 18 C.F.R. § 35.28(b)(4) (2017) (“Demand response means 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 . . . induce lower consumption of electric energy . . .”).

92. *Elec. Power Supply Ass’n*, 136 S. Ct. at 767 (explaining that FERC wished to promote “demand response” pricing to add a secondary mechanism, rather than only paying producers to increase production to lessen the consumption of energy during peak times).

93. Sixty percent of the U.S. energy supply is managed by ten Regional Transmission Organizations (RTOs), which in turn manage supply and wholesale electric demand bids. *About 60% of the U.S. Electric Power Supply Is Managed by RTOs*, U.S. ENERGY INFO. ADMIN. (Apr. 11, 2011), <http://www.eia.gov/todayinenergy/detail.php?id=790>. RTOs are made up of generators, transmission companies, LSEs, and energy traders. *Id.*

94. See *Elec. Power Supply Ass’n*, 136 S. Ct. at 768–69 (“[W]hen wholesale buyers’ demand for electricity increases, the price they must pay rises correspondingly; and in those times of peak load, the grid’s reliability may also falter.”).

95. *Demand Response Competition in Organized Wholesale Energy Markets*, Order No. 745, 134 FERC ¶ 61,187, at 2 (2011) (codified at 18 C.F.R. § 35.28(g)(1)(v) (2017)).

96. *Elec. Power Supply Ass’n*, 136 S. Ct. at 773.

97. *Id.* (holding that FERC had the power to promulgate the Order and that the Order was well reasoned).

98. *Id.*

99. See *id.* at 774–75 (“Compensation for demand response thus directly affects wholesale prices. Indeed, it is hard to think of a practice that does so more.”).

Additionally, the Court found that the Order did not violate the bar on retail rate regulation, which is left up to the states.<sup>100</sup> FERC's regulation of the wholesale market will inevitably affect retail rates, but the Court held that the Order did not automatically intrude on state authority simply because it affects retail sales.<sup>101</sup> The Court reasoned that only a direct attempt to regulate retail markets constituted an intrusion on state authority.<sup>102</sup> The Court's holding expanded FERC's jurisdiction to include regulation of certain rates that were previously considered reserved for state regulation, thereby sanctioning FERC's attempts to regulate overall energy efficiency of the markets through equal rates for production and non-production.

### 3. *Additional statutes from which FERC derives authority*

While the FPA is the most significant law affecting FERC's authority, there are several other laws that help shape the legal framework in which FERC operates. After the passage of the Department of Energy Organization Act of 1977, the next major legislation that affected FERC's authority was the Public Utilities Regulatory Policies Act of 1978 (PURPA).<sup>103</sup> PURPA was designed to encourage, among other things, conservation of energy, increased efficiency of electric utilities, equitable retail rates for consumers, and conservation of natural gas.<sup>104</sup> After PURPA, it was more than a decade later until Congress passed another significant law affecting FERC.<sup>105</sup> The Energy Policy Act of

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100. *Id.* at 775. Wholesale means a market that is made for the purpose of reselling, typically across state lines. *Id.* at 767. Retail sales, by contrast, are sales within a state made directly to the user. *Id.* at 768.

101. *See id.* at 776 (explaining how affecting retail sales alone does not violate state authority because “[i]t is a fact of economic life that the wholesale and retail markets in electricity, as in every other known product, are not hermetically sealed from each other” and “[w]hen FERC sets a wholesale rate . . . it has some effect, in either the short or the long term, on retail rates”).

102. *Id.* at 880.

103. 16 U.S.C. § 2601 (2012).

104. *What Is a Qualifying Facility?*, FED. ENERGY REG. COMMISSION, <https://www.ferc.gov/industries/electric/gen-info/qual-fac/what-is.asp> (last updated Nov. 18, 2016).

105. Congress did pass the Electric Consumers Protection Act (ECPA) in 1986, but it mostly focused on expanding FERC jurisdiction in hydroelectric licensing. 16 U.S.C. § 791a. *See generally* ELECTRICITY REGULATION: ELECTRIC CONSUMERS PROTECTION ACT'S EFFECTS ON LICENSING HYDROELECTRIC DAMS, GOV'T ACCOUNTABILITY OFF. 2 (1992), <http://www.gao.gov/assets/160/152518.pdf> (providing a review of FERC's licensing processes for hydroelectricity power projects, temporary licenses process, and public safety procedures at hydroelectricity projects).

1992<sup>106</sup> amended PURPA and the FPA by providing efficiency standards for commercial buildings and regulatory reform for electric and gas companies, and it authorized FERC to create the framework for a competitive wholesale market by creating new categories of electricity producers.<sup>107</sup> Lastly, the most recent statute, the Energy Policy Act of 2005,<sup>108</sup> directed FERC to oversee the reliability of the nation's electricity transmission grid. The Energy Policy Act of 2005 also tightened thermal efficiency standards for cogeneration facilities under PURPA.<sup>109</sup> Together, these statutes, combined with the FPA and FERC's orders, make up the majority of FERC's legal authority to regulate energy.

### *B. Efficiency Standards*

While FERC's legal framework dictates its power to regulate internet data centers, existing efficiency standard frameworks provide guidance and examples of how the current framework is lacking. Current federal energy efficiency standards and non-binding legal frameworks that specifically proscribe efficiency standards for data centers give context to what an efficient data center looks like. This Section describes examples of federal government efficiency standards, such as the Energy Star program, and efficiency standards for data centers introduced by other governments and private businesses.

#### *1. Energy Star efficiency standards*

The Energy Star program is a joint initiative between the EPA and DOE that aims to protect the environment and save businesses and consumers money through the adoption of energy efficient products and practices.<sup>110</sup> The program sets efficiency standards for appliances, electronics, commercial equipment, houses, and commercial

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106. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (codified as amended at 42 U.S.C. §§ 13201–13574 (2012)).

107. *Energy Policy Act of 1992*, AM. COUNCIL FOR ENERGY-EFFICIENT ECON., <http://aceee.org/topics/energy-policy-act-1992> (last visited Oct. 23, 2017) (finding that many of the comprehensive energy efficiency provisions were voluntary and largely ignored); *Energy Policy Act of 1992*, U.S. ENERGY INFO. ASS'N, [http://www.eia.gov/oil\\_gas/natural\\_gas/analysis\\_publications/ngmajorleg/energypolicy.html](http://www.eia.gov/oil_gas/natural_gas/analysis_publications/ngmajorleg/energypolicy.html) (last visited Oct. 23, 2017) (noting EPACT's contribution to the rise of natural gas).

108. Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (codified as amended in scattered sections of 42 U.S.C.).

109. *Fact Sheet: Energy Policy Act of 2005*, FED. ENERGY REG. COMMISSION (Aug. 8, 2008), <https://www.ferc.gov/legal/fed-sta/epact-fact-sheet.pdf>.

110. *Energy Star*, U.S. DEP'T OF ENERGY, <http://energy.gov/eere/buildings/energy-star> (last visited Oct. 23, 2017).



buildings.<sup>111</sup> The focus of the program is voluntary labeling that helps identify and promote energy-efficient products to help reduce greenhouse gas emissions.<sup>112</sup> DOE is responsible for testing and verifying that these products meet certain efficiency standards.<sup>113</sup> Once a product has met the proscribed rules of the verification process, the manufacturer may indicate on its product that it has met the efficiency requirements.<sup>114</sup> A subset of Energy Star is the Commercial Building Energy Asset Score program that sets standards by which business owners can rate the efficiency of their own buildings.<sup>115</sup> Furthermore, Energy Star provides efficiency recommendations for data centers<sup>116</sup> and Energy Star certification for data center buildings that meet a certain score on their assessment.<sup>117</sup>

## 2. *Non-binding legal frameworks*

While the existing energy efficiency programs in the federal government provide important programs, other governments have already implemented programs directed specifically at data centers. The European Commission has developed voluntary reporting standards for data centers, and the state of California has passed laws regulating the energy efficiency of data center facilities. These non-binding legal frameworks provide insight into the approaches other governments have taken to address the issue of data center energy consumption.

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111. See *id.* (highlighting the success of the program by describing the energy savings in 2010 as “enough energy to avoid greenhouse gas emissions equivalent to those from 33 million cars, while saving nearly \$18 billion on utility bills”).

112. See *About ENERGY STAR*, ENERGY STAR, <https://www.energystar.gov/about> (last visited Oct. 23, 2017) (providing an overview of the Energy Star program).

113. *Energy Star Test Procedures and Verification*, U.S. DEP’T OF ENERGY, <https://energy.gov/eere/buildings/energy-star-test-procedures-and-verification> (last visited Oct. 23, 2017).

114. *Id.*

115. See *Building Energy Asset Score*, U.S. DEP’T OF ENERGY, <https://energy.gov/eere/buildings/building-energy-asset-score> (last visited Oct. 23, 2017) (defining the Energy Asset Score as “a national standardized tool for assessing the physical and structural energy efficiency of commercial and multifamily residential buildings”).

116. See *generally* ENERGY STAR ET AL., RECOMMENDATIONS FOR MEASURING AND REPORTING OVERALL DATA CENTER EFFICIENCY (2010), [https://www.energystar.gov/ia/partners/prod\\_development/downloads/Data\\_Center\\_Metrics\\_Task\\_Force\\_Recommendations.pdf](https://www.energystar.gov/ia/partners/prod_development/downloads/Data_Center_Metrics_Task_Force_Recommendations.pdf).

117. See *Benchmark Your Data Center’s Energy Efficiency*, ENERGY STAR, [https://www.energystar.gov/index.cfm?c=prod\\_development.server\\_efficiency](https://www.energystar.gov/index.cfm?c=prod_development.server_efficiency) (last visited Oct. 23, 2017) (noting that data centers that score at least 75 out of 100 on the Energy Star Portfolio Manager assessment may receive Energy Star certification). Additionally, the benchmark test allows data center operators to see how they are performing relative to other data centers nationwide. *Id.*

*a. The European Code of Conduct for Energy Efficiency in Data Centres*

The European Code of Conduct for Energy Efficiency in Data Centres is a voluntary program that focuses on energy savings for data centers in the areas of information technology (IT) load and facilities load.<sup>118</sup> The goal of the program is to educate data center operators and help them reduce energy consumption in a cost-effective manner without decreasing operations.<sup>119</sup> The program includes an initial energy measurement and energy audit to identify potential energy savings, an action plan submission from the data center, and an implementation of the action plan.<sup>120</sup> As part of the plan, the energy savings focus is on reducing both IT load and facilities load.<sup>121</sup> The purpose of the program is to respond to “increasing energy consumption among data centres and the need to reduce the related environmental, economic[,] and energy supply impacts.”<sup>122</sup> As an added incentive to potential participants, the guidelines set forth in the program are designed to meet the aspirational efficiency goals “without jeopardising the reliability and operational continuity of the services provided by data centres.”<sup>123</sup>

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118. EUROPEAN COMM’N, CODE OF CONDUCT ON DATA CENTRES ENERGY EFFICIENCY: VERSION 1.0 3 (2008) [hereinafter EUROPEAN COMM’N, CODE OF CONDUCT], [http://ec.europa.eu/information\\_society/activities/sustainable\\_growth/docs/datacenter\\_code-conduct.pdf](http://ec.europa.eu/information_society/activities/sustainable_growth/docs/datacenter_code-conduct.pdf); see also *Code of Conduct for Energy Efficiency in Data Centres*, EUROPEAN COMMISSION, <https://ec.europa.eu/jrc/en/energy-efficiency/code-conduct/datacentres> (last visited Oct. 23, 2017) [hereinafter *Code of Conduct Data for Centres*] (“This Code of Conduct has been created in response to the increasing energy consumption in data centres and the need to reduce the related environmental, economic and energy supply security impacts.”).

119. *Code of Conduct Data for Centres*, *supra* note 118.

120. *Id.*

121. EUROPEAN COMM’N, CODE OF CONDUCT, *supra* note 118, at 5 (defining “IT load” as “the consumption efficiency of the IT equipment in the data centre” and “facilities load” as “the mechanical and electrical systems that support the IT electrical load”).

122. *Id.* at 3.

123. *Id.* at 4 (noting that the program is a voluntary program, and any voluntary participant also agrees to “follow the intent of [the] Code of Conduct and abide by a set of agreed commitments”).

*b. State of California Title 24 Energy Code*

In 2013, California revised Title 24 of the California Energy Code to provide regulations for data centers that mostly focused on heating and cooling of facilities.<sup>124</sup> The regulations aimed to increase the energy efficiency of data center cooling by focusing on the spacing of computer equipment and the efficiency of the fans.<sup>125</sup> While the regulations do not directly relate to the energy efficiency of the actual data server technology, they do provide a net overall reduction in energy consumption by data centers.<sup>126</sup> In response to the 2013 revisions, several business organizations joined together to draft the Energy Efficient Baselines for Data Centers report, which provides model efficiency baseline standards for data center developers.<sup>127</sup> This report set standards companies should use in the construction of data centers, as well as standards for retrofitting existing data centers to be more energy efficient.<sup>128</sup>

To meet the cooling standards under Title 24, the report provides guidance relating to data center loads, redundancy, space design conditions, air delivery systems, hydronic systems, cooling systems, heating systems, humidity control systems, and process systems.<sup>129</sup> The authors of the report claim that there is “ample opportunity to significantly reduce the energy budget for data center facilities by incorporating non-standard but well proven design strategies,” which could be achieved by following the recommendations.<sup>130</sup> Overall, Title 24, combined with the guidance of the Energy Efficient Baselines for Data Centers report, could help internet data centers reduce their energy consumption and costs.

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124. Ty Colwell, *What the New California Title 24 Requirements Mean for Your Data Center*, DATA CTR. J. (July 22, 2015), <http://www.datacenterjournal.com/california-title-24-requirements-data-center>.

125. *Id.*

126. *Id.* (highlighting that the new Title 24 rules require air-side and water-side economization techniques instead of traditional computer-room air conditioners, which reduce the total amount of energy loss from data centers).

127. INTEGRAL GRP., ENERGY EFFICIENT BASELINES FOR DATA CENTERS: STATEWIDE CUSTOMIZED NEW CONSTRUCTION AND CUSTOMIZED RETROFIT INCENTIVE PROGRAMS 6 (2013), [https://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/data\\_center\\_baseline.pdf](https://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/hightech/data_center_baseline.pdf) (noting that the report “describes the design expectations for an industry standard practice data center”).

128. *Id.* at 1.

129. *Id.* at 10.

130. *Id.* at 1.

### III. APPLYING THE LEGAL FRAMEWORK TO DATA CENTERS

FERC has the authority under the FPA to address the environmental and energy challenges posed by internet data centers by implementing policies and rules that standardize the energy efficiency of those data centers. This Part first analyzes the plain language of the FPA and court decisions interpreting the FPA to show that FERC has general jurisdiction over data centers. Next, this Part analyzes existing efficiency standard models and FERC's authority to implement efficiency standard regulations. Ultimately, this Part shows that the plain language of the FPA and current legal precedent provides the justification for FERC to mandate energy efficiency standards for internet data centers.

#### A. *The Existing Legal Framework for Energy Regulation Can Be Applied to Data Centers*

FERC can apply its existing legal framework for energy regulation to data centers because the plain language of the FPA allows for such regulation and such a regulation would not violate traditional notions of federalism. Consistent court affirmation of the FPA's plain language supports FERC's authority to regulate the transmission of energy. Additionally, because regulation of data centers would likely not impede on areas under the police power of the states and would remove a current vacuum of authority, a court would find data center regulations within FERC's jurisdiction.

##### 1. New York v. FERC: "*Transmission of energy*" in the FPA

The plain language of the FPA allows FERC to regulate data centers. The premise is actually quite simple: the term "transmission of energy" under the FPA can include the transmission of energy/data through internet cables from consumers to internet companies; thus, FERC has jurisdiction over the transmission facilities, or internet data centers in this case.<sup>131</sup> The FPA states that FERC has jurisdiction to regulate the transmission of energy in interstate commerce.<sup>132</sup> Over the years, multiple courts have analyzed the phrase "transmission of energy," but

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131. See 16 U.S.C. § 824(b) (2012) ("The provisions of this subchapter shall apply to the transmission of electric energy in interstate commerce and to the sale of electric energy at wholesale in interstate commerce . . . . [FERC] shall have jurisdiction over all facilities for such transmission or sale of electric energy.").

132. *Id.*

the most relevant case is *New York v. FERC*.<sup>133</sup> In that case, the Court ruled that the plain language of the FPA “gives FERC jurisdiction over the ‘transmission of electric energy in interstate commerce.’”<sup>134</sup> The Court went on to explain that the transmissions that FERC attempted to regulate were indeed the subject of the FPA for two reasons: the national grid is interconnected and the national grid’s transmissions inevitably cross state lines.<sup>135</sup> The Court concluded by noting that the parts of the FPA that limit FERC’s jurisdiction generally refer to the sale of electric energy, not the transmission.<sup>136</sup>

Applying this logic to data centers, internet companies clearly transmit electric energy in interstate commerce. The nature of the internet is such that a user connects a computer to the internet and sends electronic communications over state lines via cables.<sup>137</sup> The user requests information from the internet company, the data is converted to electric signals, and then those signals are transmitted to the internet user.<sup>138</sup> The connection between the internet company and the user is similar to the connections of the electrical grid because both connect entities across state lines.<sup>139</sup> The electrical grid and the internet also both involve the transmission of electric energy in interstate commerce. Thus, because the internet transmits electrical signals over state lines, under the FPA, FERC should have authority over it.<sup>140</sup>

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133. *Supra* Section II.A.2 (discussing the Court’s analysis in *New York v. FERC*, 535 U.S. 1 (2002)); *see also* *Conn. Light & Power Co. v. Fed. Power Comm’n*, 324 U.S. 515, 523 (1945) (citing the definition of “transmission” in the context of the FPA and noting that the “sale of electric energy at wholesale means ‘a sale of electric energy to any person for resale’”).

134. *New York*, 535 U.S. at 15 (quoting 16 U.S.C. § 824(b)(1)).

135. *Id.* at 17.

136. *See id.* (describing how the FPA limits the regulation of electricity sales to wholesale markets); *cf.* *Fed. Power Comm’n v. La. Power & Light Co.*, 406 U.S. 621, 636 (1972) (noting that the transportation of natural gas falls under the FPA regardless of whether it is sold at retail or wholesale).

137. *See* Streiff, *supra* note 18, at 38 (outlining how users communicate with internet companies by sending electronic signals).

138. Shuler, *supra* note 23.

139. *See Electricity Explained*, *supra* note 32 (describing the nature of the national grid and the interconnectivity of the U.S. electrical systems).

140. The FPA stipulates that FERC’s authority to regulate applies to public utilities. *See* 16 U.S.C. § 824(e) (2012). However, public utility is broadly defined as “any person who owns or operates facilities subject to the jurisdiction of the Commission.” FERC OVERVIEW, *supra* note 66, at 10 (quoting 16 U.S.C. § 824(e)). In other words, “‘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.’” *Id.* Thus, because data centers operate facilities that transmit electrical

Because the language of the FPA allows regulation of internet companies that transmit energy in interstate commerce, FERC can regulate the relevant transmission facilities, or internet data centers.<sup>141</sup> Section 201(b) of the FPA does mandate certain limitations on FERC's authority to regulate transmission facilities;<sup>142</sup> however, these limitations do not apply to data centers. Section 201(b) states that FERC may regulate transmission facilities, but FERC does not have jurisdiction "over facilities used in local distribution or only for the transmission of electric energy in intrastate commerce, or over facilities for the transmission of electric energy consumed wholly by the transmitter."<sup>143</sup> The Court in *New York v. FERC* took up the question of when these limitations apply and concluded that the plain language of the statute controls and deferred to FERC's seven-factor self-assessment of what constitutes a local facility.<sup>144</sup> The Court reasoned that because FERC had not "attempted to control local distribution facilities," had not claimed jurisdiction over transmission in intrastate commerce, and had not attempted to regulate transmission consumed by the transmitter, the limitations of section 201(b) were irrelevant.<sup>145</sup>

Internet data centers transmit electric signals in interstate commerce and do not fall under the 201(b) limitations. First, internet data centers do not transmit only in intrastate commerce because the nature of the internet is such that, unless it is a local network, it cannot

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signals in interstate commerce, which is consistent with the definition of a public utility under the statute, FERC could categorize them as such.

141. See 16 U.S.C. § 824(b) ("The Commission shall have jurisdiction over all facilities for such transmission or sale of electric energy."); see also *Hartford Elec. Light Co. v. Fed. Power Comm'n*, 131 F.2d 953, 961 (2d Cir. 1942) (stating that the FPA gave the FPC jurisdiction over interstate transmission facilities); *Appalachian Power Co. v. Pub. Serv. Comm'n of W. Va.*, 630 F. Supp. 656, 663 (S.D. W. Va. 1986), *aff'd*, 812 F.2d 898 (1987) (describing FERC's authority to regulate transmission facilities under the FPA as a "clear and specific grant" from Congress (quoting *Conn. Light & Power Co. v. Fed. Power Comm'n*, 324 U.S. 515, 527 (1945))).

142. 16 U.S.C. § 824(b).

143. *Id.*

144. *New York v. FERC*, 535 U.S. 1, 23 (2002); see also *supra* note 89 (providing the seven-factor test from Order No. 888).

145. *New York*, 535 U.S. at 22–23; see also *Jersey Cent. Power & Light Co. v. Fed. Power Comm'n*, 319 U.S. 61, 72 (1943) (noting that the FPC's authority to regulate transmission facilities extends to facilities that actually transmit energy in interstate commerce and "[m]ere connection determines nothing").

be limited to a single state.<sup>146</sup> Second, they do not transmit solely for the consumption of the facility because the purpose of data centers is to store information to transmit to internet users.<sup>147</sup> Third, the transmissions are not used only for local distribution because internet data centers are connected to the global internet.<sup>148</sup> Additionally, under the seven factors identified in Order No. 888, internet data centers do not qualify as local facilities, and regulation by FERC would not indicate an “attempt to control” a local facility under state jurisdiction.<sup>149</sup> Therefore, because internet data centers are transmission facilities under the FPA, case law and statutory language support FERC’s ability to regulate them.

2. FERC v. Electric Power Supply Ass’n: *Expanding FERC’s jurisdiction beyond traditional notions of federalism*

While *Electric Power Supply Ass’n* does not involve data centers or internet companies, it is one of the most recent cases where the Supreme Court relied on the plain language of the FPA to affirm FERC’s jurisdiction.<sup>150</sup> As explained above, the case involved a challenge to FERC’s jurisdiction regarding a new rule, Order No. 745, which regulated demand response pricing in wholesale markets.<sup>151</sup> The Court explained that the FPA limits FERC’s regulatory reach,

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146. See Shuler, *supra* note 23 (identifying the internet as a global network of computers and servers accessible around the world); see also Andy Greenberg, *It’s Been 20 Years Since This Man Declared Cyberspace Independence*, WIRED (Feb. 8, 2016, 9:58 AM), <https://www.wired.com/2016/02/its-been-20-years-since-this-man-declared-cyberspace-independence> (quoting John Perry Barlow’s declaration “that cyberspace is naturally immune to sovereignty and always would be”).

147. See Kaestner, *supra* note 6, at 742 (noting that data centers “enable just about every task that involves the internet”).

148. See DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 8 (describing data centers as the “backbone” of the internet).

149. See *supra* notes 89–94 and accompanying text. Internet data centers do not meet any of the seven factors listed in Order No. 888: (1) they are nowhere near retail customers, (2) they are not “radial in character,” (3) they allow inward and outward information flows, (4) they recognize and transport information to other markets, (5) they are not restricted to a geographical area with for information distribution, (6) they do not meter information flow at the center, and (7) they do not reduce information flow but rely on the consumer to dictate information flow.

150. FERC v. Elec. Power Supply Ass’n, 136 S. Ct. 760, 773 (2016) (“Taken together, those conclusions [that the Order directly affects wholesale rates and that the Order does not regulate retail sales] establish that the Rule complies with the FPA’s plain terms.”).

151. See *supra* Section II.A.1.

reserving certain regulations to the states.<sup>152</sup> However, the Court upheld the rule as being within FERC's authority.<sup>153</sup> In doing so, it relied on the plain language of the FPA and the nature of the rule itself.<sup>154</sup> The purpose of the rule was to improve wholesale markets by increasing reliability, reducing prices, and reducing overall energy consumption.<sup>155</sup> These aims did not impede on state authority because the rule did not aim to regulate retail markets or retail mechanisms.<sup>156</sup> Applying this logic to internet data centers, so long as the regulatory approach FERC takes does not impede on state authority, it is likely that FERC can regulate here as well.<sup>157</sup>

Additionally, and perhaps most important to FERC's jurisdiction regarding internet data centers, the Court summarized its logic by describing the vacuum of authority created without federal regulation. The Court declared: "If neither FERC nor the States can regulate wholesale demand response, then by definition no one can. But under the [FPA], no electricity transaction can proceed unless it is regulable by someone . . . . Congress passed the FPA precisely to eliminate vacuums of authority over the electricity markets."<sup>158</sup>

There is currently a similar vacuum of authority over internet companies and data centers.<sup>159</sup> Internet transmissions cross state and

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152. *Elec. Power Supply Ass'n*, 136 S. Ct. at 767–68 (stating that under the FPA, "the Commission may not regulate either within-state wholesale sales or . . . retail sales of electricity").

153. *Id.* at 784 ("FERC's statutory authority extends to the Rule at issue here addressing wholesale demand response.").

154. *See id.* ("FERC set the terms of transactions occurring in the organized wholesale markets, so as to ensure the reasonableness of wholesale prices and the reliability of the interstate grid—just as the FPA contemplates.").

155. *See id.* at 776–77 (discussing FERC's justifications for promulgating the rule regulating demand response).

156. *Id.* at 777. The Court discussed how in some sense wholesale markets will invariably affect retail markets; however, FERC's rule did not set actual retail rates, and the Court declared that merely altering a consumers' incentives did not equate to rate setting. *Id.*

157. *See supra* Section III.A.1 (arguing that regulating internet data centers does not impede on state authority because regulating internet data centers does not fall under a Section 201(b) exception).

158. *Elec. Power Supply Ass'n*, 136 S. Ct. at 780.

159. *But see* DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 8–9 (noting that the EPA and DOE have recommended "implementation of energy efficiency efforts by issuing guidance, identifying best practices, and developing standards"); U.S. DEP'T OF ENERGY, BEST PRACTICES GUIDE FOR ENERGY-EFFICIENT DATA CENTER DESIGN 1 (2011), <https://energy.gov/sites/prod/files/2013/10/f3/eedatacenterbestpractices.pdf> (providing energy efficiency guidance for data centers); *supra* notes 110–17 and accompanying text (describing the Energy Star program as it relates to data centers).



national lines,<sup>160</sup> and leaving regulation solely up to the states would create fragmented regulation.<sup>161</sup> One solution for this problem is to have a federal agency regulate internet data centers because it would result in a uniform system. Therefore, to ensure proper use of electricity by internet data centers, it is important for FERC to develop possible regulations.

*B. Extending Energy Efficiency Standards to Internet Data Centers*

There are many existing efficiency standards implemented by various agencies and organizations,<sup>162</sup> but the effect of the court decisions interpreting the FPA allow FERC to implement efficiency standards for internet data centers. Although most efficiency standards are voluntary or incentive based,<sup>163</sup> FERC can require mandatory standards, or, in the alternative, can implement incentive-based efficiency standards.<sup>164</sup> Current efficiency standards under the Energy Star program, PURPA, and the Energy Policy Act of 2005 provide examples of instances where government agencies, including FERC, have regulated the efficiency of commercial buildings.<sup>165</sup> Additionally,

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160. See Streiff, *supra* note 18, at 38 (explaining that the internet is a global network made up of multiple networks and computers).

161. Cf. Nathan Bomey & Thomas Zambito, *Regulators Scramble to Stay Ahead of Self-Driving Cars*, USA TODAY (June 25, 2017, 12:02 AM), <https://www.usatoday.com/story/money/cars/2017/06/25/regulators-scramble-stay-ahead-self-driving-cars/100963150> (providing opinions regarding state regulation versus federal regulation when dealing with self-driving cars, including the “patchwork of rules” created by states possibly harming and confusing owners); Judith Germano, *Proposed NY Cybersecurity Regulation: A Giant Leap Backward?*, FORBES (Dec. 2, 2016, 2:32 PM), <https://www.forbes.com/sites/realspin/2016/12/02/proposed-ny-cybersecurity-regulation-a-giant-leap-backward> (arguing in favor of federal regulations instead of independent state legislation to solve current cybersecurity concerns).

162. See *supra* Section II.B (discussing existing efficiency standards such as Energy Star, the European Code of Conduct for Energy Efficiency in Data Centres, and California Title 24 Energy Code).

163. See *supra* Section II.B.

164. See *FERC v. Elec. Power Supply Ass’n*, 136 S. Ct. 760, 777, 784 (2016); *U.S. Supreme Court Approves FERC Regulations that Offer Incentives to Customers that Cut Energy Consumption*, LEDINSIDE (Jan. 26, 2016), [http://www.ledinside.com/news/2016/1/nrdc\\_us\\_supreme\\_court\\_rules\\_in\\_favor\\_of\\_ferc](http://www.ledinside.com/news/2016/1/nrdc_us_supreme_court_rules_in_favor_of_ferc) (reviewing the Supreme Court’s holding in *Elec. Power Supply Ass’n*, which upheld FERC’s authority to create incentives).

165. See *Fact Sheet: Energy Policy Act of 2005*, FED. ENERGY REG. COMMISSION (Aug. 8, 2008), <https://www.ferc.gov/legal/fed-sta/epact-fact-sheet.pdf> (describing how the Energy Policy Act of 2005 allowed FERC to tighten thermal efficiency requirements for specific types of power plants); *What Is a Qualifying Facility?*, *supra* note 104 (noting

while the efficiency standards implemented in California could provide some guidance,<sup>166</sup> the standards implemented by FERC should likely focus on upgrading the actual technology of the data servers.

While it seems obvious that FERC would be able to regulate efficiency standards for internet data centers based off of FERC's power to regulate data centers generally, the main argument against such action is that FERC has never regulated in such a way.<sup>167</sup> However, by FERC's own admission, it has the authority to regulate beyond just the rates of electric utilities and their transmissions.<sup>168</sup> This deviation from the expected range of regulation creates space for FERC to regulate in a new way. If FERC has regulated areas such as reliability, corporate transactions, and energy transmission, it makes sense for FERC to be able to regulate the energy efficiency of a transmission facility like data centers. Therefore, based off a common-sense understanding of FERC's authority, a court would likely find that FERC has the authority to regulate internet data centers and implement efficiency standards for those facilities.

Courts need not rely solely on regulation of reliability and corporate activities to sanction efficiency standards because, as seen in *Electric Power Supply Ass'n*, FERC has already used market rates to regulate efficiency.<sup>169</sup> The Court in that case upheld FERC's power to regulate

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how PURPA was designed in part to help encourage efficiency by electric utilities); *supra* Section II.B.

166. See *supra* Section II.B.2.b (explaining how the data center efficiency standards under California Title 24 mostly regulate the efficiency of data center buildings rather than the servers).

167. See FERC OVERVIEW, *supra* note 66, at 10 (listing the areas FERC has regulated under the FPA, which do not include energy efficiency of transmission facilities). This counterargument is exemplified by Justice Antonin Scalia's opinion in *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014), where he stated: "When an agency claims to discover in a long-extant statute an unheralded power to regulate 'a significant portion of the American economy,' . . . we typically greet its announcement with a measure of skepticism." 134 S. Ct. at 2444 (quoting *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 159 (2000)). However, the regulation in that case would have resulted in an overwhelming ability of the EPA to regulate a large swath of the American economy. Data centers, by contrast, only make a marginal economic impact even though they contribute significantly to the overall national energy output. Thus, Scalia's concerns do not sufficiently manifest in this Comment's reading of the FPA regarding FERC's authority.

168. See FERC OVERVIEW, *supra* note 66, at 3, 9 (outlining FERC's regulatory activities, which include corporate activities of public utilities, accounting by public utilities, and reliability).

169. *Elec. Power Supply Ass'n*, 136 S. Ct. at 777 (listing FERC's justifications for demand response regulation, which include creating "well-functioning competitive

demand response markets and in turn affirmed and expanded FERC's jurisdiction.<sup>170</sup> The regulation of prices in demand response markets under Order No. 745 are in essence a form of regulating energy efficiency.<sup>171</sup> By requiring wholesale market operators to pay the same price to both energy generators and energy consumers, FERC is using market rates to make the whole system more efficient.<sup>172</sup> The Order helps to achieve an overall reduction of energy consumption, which results in a more energy efficient market.<sup>173</sup> This type of regulation provides a standard on which FERC could rely in the future when regulating internet data centers. By regulating the rates of consumption of the demand response market, FERC is essentially implementing a regulation focused on energy efficiency. Therefore, because FERC likely has the authority to regulate internet data centers<sup>174</sup> and FERC's regulation of energy consumption was recently upheld in *Electric Power Supply Ass'n*, FERC likely has the authority and jurisdiction to regulate the energy efficiency of data centers.

The questions that remain, however, are what form the regulations might take, whether they would be mandatory or incentive-based, and what exactly FERC would regulate. A 2013 study by the National Resources Defense Council (NRDC) regarding data center efficiency provides guidance on this point.<sup>175</sup> The recommendations in the NRDC report focus on three areas: (1) adopting simplified processing metrics to address underutilization of servers, (2) increasing energy

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wholesale electric energy market[s] . . . with reduced wholesale power prices and enhanced reliability" (internal quotations omitted)).

170. *Id.* at 773.

171. See Kelsey Bagot, *FERC and the Future of Energy Efficiency*, HARV. ENV'T L. REV. (Aug. 21, 2013, 5:10 PM), <http://harvardelr.com/2013/08/21/ferc-and-the-future-of-energy-efficiency> (discussing the implications of Order No. 745 and how it could create a precedent for FERC to regulate energy efficiency).

172. See *Elec. Power Supply Ass'n*, 136 S. Ct. at 782 (describing the rule as requiring operators to pay identical prices for energy conservation bids); Bagot, *supra* note 171 (noting that while "FERC's introduction of demand response does not exactly equate to energy conservation . . . . [I]t may pave the way for increased participation and generation of electricity by new renewable sources").

173. See Bagot, *supra* note 171 (explaining that interested parties view demand response as a reduction in energy consumption induced by incentive payments).

174. See *supra* Section III.A (arguing that FERC has the authority to regulate internet data centers).

175. See generally DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 5 (noting that "[d]ata center electricity consumption is projected to increase to roughly 140 billion kilowatt-hours annually by 2020, . . . costing American businesses \$13 billion per year in electricity bills" and recommending various changes to slow electricity consumption).

and carbon disclosures, and (3) aligning decision making incentives regarding efficiency.<sup>176</sup>

Processing simplification metrics are an “adequate, simple, and inexpensive-to-monitor” solution that promotes transparency and leads to more energy efficient data centers.<sup>177</sup> Carbon and energy disclosures help raise awareness and engage stakeholders to address and improve energy efficiency.<sup>178</sup> These disclosures might take the form of reports on annual energy consumption and carbon emissions; power, carbon, and water usage; and even average server utilization analyses.<sup>179</sup> Finally, aligning efficiency decision making incentives can help eliminate comatose servers and obtain more efficient hardware.<sup>180</sup> Realistically, the regulations by FERC would likely take the form of the first two recommendations, either requiring the implementation of certain processing metrics, carbon and energy reporting, or potentially a combination of the two. Together these regulatory efforts would work to reduce data center energy consumption even in the face of continuously rising internet usage.

### CONCLUSION

The rapid growth of the internet will likely continue for the foreseeable future, and with it, the demand for energy and potential consequences will increase. Internet data centers are the backbone of the internet, and as the internet grows, so will the number of data centers and their frequency of use. As the number and size of facilities increase, so too do their impact on the environment through energy consumption. One solution to the problem is through mandatory or incentive-based efficiency standards, which can help reduce data center energy consumption. This solution is easy to implement and

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176. *See id.* at 22–26.

177. *Id.* at 22. Processing simplification metrics, however, may be complicated to implement with consistency while still being cost-effective. *Id.* But see *Efficiency: How We Do It*, GOOGLE, <https://www.google.com/about/datacenters/efficiency/internal> (last visited Oct. 23, 2017) (highlighting how Google’s PUE metrics has allowed it to reduce its overhead energy to just twelve percent, which makes its data centers some of the most efficient in the world).

178. DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 24; see also Pichette, *supra* note 6, at 431 (arguing that internet companies should report their scope 2 emissions).

179. *See* DATA CENTER EFFICIENCY ASSESSMENT, *supra* note 4, at 24–25 (noting that for multi-tenant data centers, reporting may allow them to create a carbon footprint summary for each tenant).

180. *Id.* at 25 (highlighting the “disconnect between IT and facilities operations” and how it “continues to challenge the data center industry”).

low-hanging fruit when it comes to identifying areas where greenhouse gas emissions can be reduced to meet our ethical and international climate change obligations. FERC is the likely federal agency to address these issues through regulating the energy efficiency of data centers because its authority involves regulation of the transmission and sale of electric energy in interstate commerce.

The FPA provides the statutory authority for much of what FERC regulates, and the FPA, combined with the Supreme Court decisions in *Electric Power Supply Ass'n* and *New York*, provide the justification for FERC's regulation. The plain language of the FPA allows FERC to regulate transmission facilities that transmit electric energy in interstate commerce, which, apart from data storage, is the main function of internet data centers. Additionally, FERC's regulation of demand response markets to reduce consumption sets the stage for increased activity by FERC in regulating energy efficiency. Together, these elements provide a new realm of regulation that can help reduce the load on the national energy grid while simultaneously saving data center operational costs. Thus, based on these factors, FERC can implement efficiency standards for internet data centers, and a court will likely uphold the regulation because the FPA, as interpreted by case law and this Comment, gives FERC the authority to regulate data centers.

While this Comment does not contend to know the best regulations for all parties involved, it does endorse much of what the NRDC recommends.<sup>181</sup> By increasing reporting from data centers, maximizing computer processing performance through standardized metrics, and incentivizing communications between operators, investors, and companies, significant progress will be made in reducing the energy burdens of the internet. Ultimately, the form these regulations take remains to be seen, but through a welcoming notice and comment procedure, FERC can synthesize the interests of all into a manageable rule. FERC and the business community can work together to reduce our environmental impact through these efficiency standards or perhaps even by replacing traditional energy sources with renewable energies. With an open mind and dialogue, great results can be achieved for a healthy and energy-secure future.

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181. See *supra* notes 175–80 and accompanying text.