RECONSIDERING REGULATORY UNCERTAINTY: MAKING A CASE FOR ENERGY STORAGE

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ABSTRACT

This Article begins the complex dialogue that must take place to address the emerging technologies providing energy storage for our electricity grid. Energy storage has the capacity to be a game-changer for many facets of our grid, providing better integration of renewable energy, enhanced reliability, and reduced use of carbon-intensive fuels. Energy storage faces a number of obstacles, however, including technological, financial, and regulatory uncertainty. This Article focuses on the regulatory uncertainty, and defends the proposition that not all regulatory uncertainty is created equal. It argues for differential treatment of this uncertainty, depending on its context, scope, and source, and applies this framework to the uncertainty surrounding the classification of energy storage. It finds that this uncertainty operates against high baseline levels of uncertainty in the energy industry, is limited in its scope, and is intentionally embraced by the federal regulators in an effort to realize the benefits of regulatory uncertainty. This Article asserts that this form of uncertainty is one that can be managed in a way to avoid stifling the development of this important technology. This Article sets forth strategies for regulators and regulated entities to continue to function, even within this zone of regulatory uncertainty.

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I. INTRODUCTION

Few people think about electricity and grid reliability until they lose power. “There have been five massive [electricity] blackouts [in the United States] over the past 40 years, three of which have occurred in the past nine years.”¹ In 2003, the United States suffered its largest blackout in history, affecting about forty-five million people and costing approximately six billion dollars in losses.² Nine nuclear power plants shut down, cities were left without water, flights were grounded, and traffic chaos ensued in rush hour without traffic signals.³ In the summer of 2011, Texas barely avoided rolling blackouts, and only by paying up to thirty times the normal price of electricity.⁴ The Department of Energy (DOE) estimates that power outages and interruptions cost Americans more than 150 billion dollars each year.⁵ Extreme weather events associated with climate change, combined with aging energy infrastructure, suggests that the frequency of such blackouts is likely to increase before it decreases.⁶

In addition to power disruptions, our grid is plagued by a number of inefficiencies. Within our current grid, electricity must be used instantaneously, meaning there is tremendous pressure on our nation’s grid operators to ensure that the demand (or load) is constantly in equal balance with the supply.⁷ This has led to a


². Id. at 8-9.


⁵. Litos Strategic CommCN, supra note 1, at 5.


preference for baseload sources that can run at near one-hundred percent capacity and expensive construction and maintenance of “peaker plants,” which are power plants that are only called upon for a few hours each day to cover the large disparity between off-peak and on-peak electricity demands.\textsuperscript{8} Additionally, millions of potential megawatt-hours of electricity generation from intermittent renewable energy resources like wind and solar are wasted due to transmission constraints.\textsuperscript{9} This wasted renewable energy is particularly ironic, given our nation’s efforts to better integrate renewable energy into our electricity portfolio\textsuperscript{10} and to reduce the conventional pollutants and greenhouse gas emissions emitted from fossil fuels.\textsuperscript{11}

Although these costs and inefficiencies are diverse, they all can be addressed through one technology: energy storage. Energy storage in this context refers not to the storage of a primary fuel such as natural gas, but the energy storage of previously generated electric energy (potential, kinetic, chemical, or thermal energy) to be released at a later time. The Federal Energy Regulatory Commission (FERC) defines an energy storage asset as “property that is interconnected to the electrical grid and is designed to receive electrical energy, to store such electrical energy as another energy form, and to convert such energy back to electricity and deliver such electricity for sale, or to use such energy to provide reliability or economic benefits to the

cannot be stored. It must be generated as it is needed, and supply must be kept in balance with demand.

\textsuperscript{8} See, e.g., Abby Gruen, ‘Peakers’ Plants Provide Electricity When It’s Hot, but at the Highest Price, STAR-LEDGER (July 20, 2010, 2:51 PM), http://www.nj.com/business/index.ssf/2010/07/peakers_plants_provide_electri.html (explaining that “peakers” are comparatively expensive to operate, costing ratepayers thirteen million dollars annually to keep a single peaker plant in New Jersey operational).

\textsuperscript{9} See, e.g., William Pentland, Transmission Bottlenecks Bad News for Renewable Energy, FORBES (May 3, 2011, 11:33 PM), http://www.forbes.com/sites/williampentland/2011/05/03/transmission-bottlenecks-bad-news-for-renewable-energy/ (“In some areas where the constraints are especially acute like Oregon and Washington State, the lack of spare transmission capacity could force wind farms that have already been built to shut down on a rolling basis in the near future.”).

\textsuperscript{10} See, e.g., Barack Obama, President of the United States of America, Remarks by the President on Climate Change at Georgetown University (June 25, 2013), available at http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change (“Today, I’m directing the Interior Department to green light enough private, renewable energy capacity on public lands to power more than 6 million homes by 2020.”).

grid.” 12 By eliminating the historical limitation of the grid requiring instantaneous use, energy storage has the potential to drastically alter the way the electricity grid functions. 13

Some forms of energy storage, such as pumped hydropower storage, have been the historic face of bulk energy storage 14 for over a hundred years. 15 But the world is bracing for the next generation of bulk energy storage to address reliability, economic efficiency, and environmental issues plaguing the electric grid. In addition to pumped hydropower storage, this next generation will expand to include some combination of batteries, flywheels, fuel cells, superconducting magnets, and compressed air energy storage.

While these emerging technologies bring great promise, they also bring great uncertainty. There is uncertainty about the specific technologies that will be cost-effective for the grid, the market forces that will drive energy investments, the legal and regulatory

12. Third-Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies, Order No. 784, 144 FERC ¶ 61,056, ¶ 172 (July 18, 2013) [hereinafter FERC Order No. 784]; see also CAL. PUB. UTILS. COMM’N, ELECTRIC ENERGY STORAGE: AN ASSESSMENT OF POTENTIAL BARRIERS AND OPPORTUNITIES 2-3 (2010), available at http://www.cpuc.ca.gov/NR/rdonlyres/71859AF5-2D26-4262-BF52-62DE85C0 E942/0/CPUCStorageWhitePaper7910.pdf (“[Electric energy] storage can be defined as: a set of technologies capable of storing previously generated electric energy and releasing that energy at a later time. EES technologies may store electrical energy as potential, kinetic, chemical, or thermal energy, and include various types of batteries, flywheels, electrochemical capacitors, compressed air storage, thermal storage devices and pumped hydroelectric power.”).

13. In fact, some utilities view energy storage as a “disruptive force.” PETER KIND, EDISON ELEC. INST., DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS 3 (2013), available at http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf. Although one could only imagine utilities as obsolete if there was a fully viable distributed energy alternative, a prospect that does not seem feasible in the short-term, the same was probably said about telephone customers not being able to “cut the cord” from their telephone company, yet now many have chosen to go completely cellular. Id. at 5. There are many similarities between the energy grid and the telecommunications network, see Amy L. Stein, THE TIPPING POINT OF FEDERALISM, 45 CONN. L. REV. 217 (2012), and plummeting profits on the road to such “disruptive” transitions is one similarity that they may not choose to share.


environment into which energy storage will be thrust, and their integration into resource adequacy and transmission planning. This Article does not purport to tackle all of this uncertainty, but focuses on the regulatory uncertainty facing energy storage entities. To simplify syntax, however, this Article will refer to “regulatory uncertainty” as “uncertainty” wherever possible.

One of the most fundamental uncertainties surrounds whether energy storage is treated as a generation, transmission, or distribution asset, a classification that affects jurisdictional and cost-recovery determinations. Such uncertainties are regularly cited as barriers to energy storage development, as they are in many other

16. For instance, grid operators may be most affected by the technological uncertainty of the response time, duration, and availability of energy storage and their integration into resource adequacy and transmission planning.

17. Christian Engau & Volker H. Hoffmann, Corporate Response Strategies to Regulatory Uncertainty: Evidence from Uncertainty About Post-Kyoto Regulation, 44 POLY SCI. 53, 54 (2011) (“[T]he term ‘regulatory uncertainty’ . . . refer[s] to uncertainty associated with the actions of governmental agencies that create and enforce regulations and [is] define[d] . . . as a firm’s ‘inability to predict the future state of the regulatory environment.’ ” (internal citations omitted)); Frances J. Milliken, Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty, 12 ACAD. OF MGMT. REV. 133, 136 (1987). This definition is not entirely unsatisfactory, proposing to encompass almost any situation where regulated entities cannot predict the future. A better definition may be ambiguity caused by agency inaction, delays, changes in leadership, inconsistencies, vagueness, or similar actions.

18. The traditional public utility model operates on a system of cost-of-service ratemaking, whereby a public utility commission (PUC) approves a rate that a utility may charge its customers based on a base rate, multiplied by a rate of return and operating costs. See FED. ENERGY REGULATORY COMM’N, COST OF SERVICE RATES MANUAL 6-7 (1999), available at http://www.ferc.gov/industries/gas/gen-info/cost-of-service-manual.doc. Energy assets receive unusual regulatory treatment in most states because they are regulated as a natural monopoly, in which energy providers charge customers in their territory a rate set by the state (or, for wholesale transmission, FERC), and the state must approve decisions about what infrastructure and other costs the providers may recover through the rates. See infra Part III.

emerging technology contexts. For instance, the DOE notes that “[r]egulatory issues at the federal and state level may limit the value proposition for energy storage and removing them may be necessary to level the playing field with other technologies.” Overall, the value of storage is highly system-dependent, location-dependent, and subject to risk and uncertainty; technical, regulatory, and financial.” State legislators and regulators make similar statements, as exemplified by California’s recent energy storage bill and accompanying California Public Utility Commission orders.

Instead of clarifying this uncertainty, FERC explicitly embraced it, pointing to the fact-specific nature of the inquiry required of energy storage technologies, technologies that are capable of performing any and all of the functions traditionally attributed to generation, transmission, and distribution assets. Stakeholders criticize the resulting uncertainty and argue that lingering ambiguity surrounding such fundamental issues can stifle investments in


22. Id. at 3.


24. Cal. Pub. Util. Comm’n, Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Rulemaking 10-12-007 at 3 (Dec. 16, 2010), available at http://docs.cpuc.ca.gov/PublishedDocs/Edoc/G000/M065/K706/65706057.PDF (identifying the “[l]ack of cohesive regulatory framework” as one of the primary barriers to energy storage).

energy storage and disrupt the long-term planning involved in such capital-intensive endeavors.\textsuperscript{26}

Investment in energy storage need not be stifled by regulatory uncertainty. In fact, FERC’s embrace of ambiguity with respect to energy storage provides an opportunity to reconsider the role of this uncertainty. This evaluation demonstrates that there are multiple varieties of uncertainty with differing degrees of impacts. This multifaceted view of uncertainty—along a spectrum—suggests that the responses may be similarly varied. This Article does not claim to resolve the uncertainty associated with energy storage, but instead argues that the uncertainty is manageable, and perhaps even beneficial to an emerging technology. To this end, this Article also sets forth a path toward resolving the uncertainty.

Part II of this Article explores the fundamentals of energy storage and its attendant uncertainty. This Part provides a flavor for the various energy storage technologies that make up this catchall term. It explains the multiple functions and value streams of energy storage that contribute to their complicated legal status. It then analyzes the fundamental uncertainty surrounding FERC’s treatment of bulk energy storage as a generation or a transmission asset and the resulting jurisdictional and cost recovery implications.

Part III defends the proposition that not all uncertainty is created equal. For instance, some uncertainty is the result of coordination problems involving multiple actors, some uncertainty is the result of a single actor, some uncertainty surrounds whether an activity will be regulated at all, and some uncertainty surrounds how an activity will be regulated. It explores situations where uncertainty is particularly troublesome and those situations where the law has embraced uncertainty. It creates a new framework for evaluating and characterizing these different varieties of uncertainty along a spectrum, depending on three critical features: (1) the context, (2) the scope, and (3) the source of the uncertainty. Whereas high levels of uncertainty may justify avoiding the uncertainty, low levels of uncertainty associated with an activity are more deserving of efforts to resolve the uncertainty.

Applying this framework to the uncertainty facing energy storage reveals a level of uncertainty that can be managed in a way to avoid stifling the development of this important technology. When the critical features of energy storage uncertainty are analyzed, it becomes clear that this uncertainty is consistent with the general uncertainty that surrounds the energy industry, the scope is narrower than other types of uncertainty, and the source of the

\textsuperscript{26} See infra notes 264-67 and accompanying text.
uncertainty is one federal agency intentionally seeking to reap the advantages of energy storage in a world where the law is struggling to keep up with the technology.

Given its place on the uncertainty spectrum, Part IV proposes strategies for stakeholders and regulators to continue to function within this zone of uncertainty. This is particularly important for an emerging technology that is required to compete against entrenched incumbent fossil fuel generators. It explains how regulated entities can harness the benefits of federalism by encouraging state initiatives, developing precedent through FERC orders, and continuing to acquire important information necessary for eventual resolution of the uncertainty. Part IV describes how regulators can help narrow the range of uncertainty as well. Public utility commissions can craft creative cost recovery mechanisms, and FERC can develop a framework for its decisionmaking process that will guide and provide consistency for future case-by-case determinations. These efforts can establish gradual norms that narrow the range of uncertainty so that it does not paralyze the deployment of energy storage technologies.

The hope is that, similar to other emerging technologies, “the relative novelty of these [new emerging] technologies . . . suggests that the interests on different sides of each issue are less likely to have ossified into permanent resistance to compromise,” allowing more room for both the regulator and the regulated to work together to resolve uncertainty. Such strategies can have implications for emerging technologies operating in the shadow of uncertainty that extend far beyond energy storage.

II. ENERGY STORAGE AND ITS REGULATORY UNCERTAINTY

Most individuals are surprised to learn about the extent of energy storage projects that are already functioning on a commercial level. They may be even more surprised to learn that the federal government has identified over seventeen different applications of energy storage for the electricity grid. This Part begins by providing


an introduction to various types of energy storage technologies. It then explains the various benefits of energy storage for our electrical grid. It concludes by analyzing the primary uncertainty facing energy storage: how to classify energy storage assets according to the existing taxonomy that was designed for more traditional energy sources.

A. Energy Storage Technologies

Bulk energy storage consists of a suite of technologies used to hold the energy from previously generated electricity at times of low demand until demand is high or transmission lines are freed up to transmit the electricity. Bulk energy storage in the United States is dominated by pumped-storage hydropower (PSH), a century-old technology that uses cheaper off-peak electricity to pump water from a lower to an upper reservoir and then releases the water to turn turbines to generate electricity during on-peak hours. Although it has the capacity to provide price advantages, PSH has generated its share of controversy over the years, with critics pointing to energy inefficiencies and adverse environmental impacts of damming water. There are approximately twenty-two gigawatts (GW) of PSH deployed in the United States across forty sites, much of which was built between 1970 and 1990. Pumped storage developers have

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30. “Bulk” storage or “grid-scale” storage is to be distinguished from “distributed” energy storage, which involves a smaller, customer-specific application. Included in this form of energy storage are electric vehicle batteries and on-site generators. Compare InterContinental Hotels Group, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT'L LABS., http://www.energystorageexchange.org/projects/356 (last visited June 14, 2014) (detailing distributed energy storage projects at two San Francisco hotels that utilize Lithium ion batteries to avoid high demand charges), with KCP&L SmartGrid Innovation Park, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT'L LABS., http://www.energystorageexchange.org/projects/1297 (last visited June 14, 2014) (deploying similar battery storage technology to support grid-scale energy delivery at peak demand times of day in Kansas City). Tesla’s plans for a new $5 billion “gigafactory” has a projected output of 35 GW per year, which would exceed the worldwide production of lithium ion batteries in 2013. Thomas Overton, The Year Energy Storage Hit Its Stride, POWER MAG. (May 1, 2014), http://www.powermag.com/the-year-energy-storage-hit-its-stride.


32. E.g., Eric Wesoff, Update: California Energy Storage Bill AB 2514 Signed Into Law by Governor, GREENTECHMEDIA (Sept. 29, 2010), http://www.greentechmedia.com/articles/read/ve-cmeas-gunderson-on-utility-scale-storage (“In California, ‘we’re taking down dams not putting them up.’”).

33. Pumped Storage, supra note 15 (“There are 40 pumped storage sites operating in the United States . . . totaling more than 22 gigawatts (GW) of storage capacity, roughly 2% of U.S. generating capacity.”); see also DEHOLM ET AL., supra note 15, at 7-8 & n.14 (“To place these values in perspective, between 1993 and 2008, more than 320 GW of conventional capacity was constructed in the United States. With the exception of the
refined the technology to increase efficiency, and the international interest in PSH is growing. Nevertheless, this form of storage is geographically constrained.

The next generation of grid-scale energy storage includes compressed air energy storage (CAES), a technology that uses off-peak energy to drive compressors that inject air into an underground storage cavern. The air heats as it is compressed, and this heat energy is later released to turn turbines and generate electricity back onto the grid during on-peak hours. Only one large CAES 110 megawatt (MW) commercial facility has been constructed in the United States in McIntosh, Alabama, but it is leading the way for future projects. CAES projects are planning to move forward in both Ohio and Texas, and Nebraska may not be far behind. Recent completion of previously started PHS facilities and a few demonstration projects, no significant storage capacity was added.


37. The first CAES plant, a 290 megawatt facility, was built in Huntorf, Germany in 1978. Thirteen years later, the 110 megawatt McIntosh CAES plant began operations in Alabama. The plants have a combined 50-year-plus lifetime. Id. at 5-11.


40. In late 2011, the Nebraska Public Power District announced that it planned to buy the rights to store compressed air in sandstone formations in the western part of that state. Dan Haugen, SCRAPPED IOWA PROJECT LEAVES ENERGY STORAGE LESSONS, MIDWEST ENERGY NEWS, (Jan. 19, 2012) http://www.midwestenergynews.com/2012/01/19/scraped-iowa-project-leaves-energy-storage-lessons/. However, Iowa Stored Energy Park, a cooperative in Iowa funded in part by the Department of Energy, was abandoned after data revealed that the geology would not properly support a compressed air storage facility. Id.
demonstration projects are even trying to break CAES free from its geological shackles by storing air in existing pipelines and steel air storage tanks instead of underground, an advance that would render CAES much more mobile.

Other storage generally takes three additional forms: (1) electrochemical (batteries), (2) mechanical (flywheels), and (3) thermal energy. Batteries can take many forms (Li-ion, NaS, NiCd, Metal Air, lead acid, liquid, etc.), each with their own strengths and weaknesses depending on whether they are evaluated based on energy, power, or dischargeability. But many other types are racing to the commercial finish line. The primary limitations associated with batteries, however, are the costs and the size of the battery required to store a meaningful amount of electricity. One of the world’s largest battery storage facilities is operating in Fairbanks, Alaska. The Alaskan battery is larger than a football field, yet can only provide enough electricity for 12,000 residents for seven minutes.

Efforts to develop smaller, more effective batteries are slowly taking hold. Duke Energy has installed a thirty-six MW advanced-lead acid battery at the Notrees Wind Farm in Texas, connecting to Texas’ grid operator, Electric Reliability Council of Texas (ERCOT). AES Energy Storage owns and operates an eight MW lithium-ion battery plant in Johnson City that provides rapid frequency regulation services to New York’s grid operator, New York Independent Service Operator (NYISO) and the world’s largest

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lithium-ion battery farm (thirty-two MW) in West Virginia. Primus Power is on track to deliver EnergyPodsTM to California’s Modesto Irrigation District starting in 2014. Xtreme Power deployed about seventy-eight MW of energy storage projects by the time this Article went to print, including several in Hawaii. The financial press has ever-increasing numbers of press releases, with different institutions touting their respective breakthroughs on battery energy storage. Similar discussions surround fuel cells, a technology that functions like batteries through electrochemical processes. Battery storage is expanding on an international level as well, with Japan, India, and China coupling storage with telecommunications towers. Flywheels reflect yet another form of energy storage. Flywheels accelerate a rotor to a very high speed and maintain the energy in the system as rotational energy—energy that is available instantly when needed by slowing down the flywheel. New York is home to the first flywheel storage plant. With help from the New York State Energy Research and Development Authority (NYSERDA), Beacon Power has developed a twenty MW flywheel energy storage plan in Stephentown, New York. Although it has been successful in


51. See, e.g., Luoma, supra note 45 ("Early this year, IBM revealed that it was launching a major research program into what looks like an even more promising technology—the lithium metal-air battery. Last month, a company called PolyPlus announced that it had already succeeded in developing one."); Kevin Bullis, TR10: Liquid Battery, MIT TECHNOLOGY REV. (Mar./Apr. 2009), http://www2.technologyreview.com/article/412190/tr10-liquid-battery/ (MIT suggesting that liquid batteries are going to make it to commercialization first). Bill Gates invested in Aquion, a new environmentally sound battery made with saltwater instead of lithium that can create environmental disposal problems. Andrew Herndon, Bill Gates Invests in Battery Maker Aquion Energy, BLOOMBERG (Apr. 2, 2013), http://www.bloomberg.com/news/2013-04-02/bill-gates-invests-in-battery-maker-aquion-energy.html.

52. Haugen, supra note 40 (proposing a technology that would convert excess wind energy at night to hydrogen used in a fuel cell).


providing frequency regulation to New York’s grid and “[i]ts performance has influenced both regulatory and legislative initiatives.”\(^\text{56}\) Beacon Power recently filed for Chapter 11 bankruptcy and needed to be restructured to continue development.\(^\text{57}\)

A last form of energy storage, generally not used for bulk system storage, is thermal energy storage. A common thermal energy storage system “chills a storage medium [usually water, ice, or a phase-change material] during periods of low cooling demand and then uses the stored cooling later to meet air-conditioning load or process cooling loads.”\(^\text{58}\) California, for instance, recently began installing fifty-three MW in distributed ice storage across rooftops.\(^\text{59}\) Although it is unclear which form of “new generation” energy storage will ultimately prevail for widespread commercialization, it is becoming clear that some form of energy storage is on the horizon.

**B. Value of Energy Storage**

Energy storage has varied benefits, depending on its type and purpose.\(^\text{60}\) Many types of energy storage are able to provide multiple services, and therefore yield multiple benefits.\(^\text{61}\) A productive economy requires significant amounts of electricity, and demand is

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\(^{56}\) Roberts, supra note 55, at 50.

\(^{57}\) Jeff Postelwait, Beacon Power Emerges From Bankruptcy With New Energy Storage Project, ELEC. LIGHT & POWER (June 24, 2013), http://www.elp.com/articles/2013/06/beacon-power-emerges-from-bankruptcy-with-new-energy-storage-project.html (noting the company was acquired by Rockland Capital, which assumed 25 million dollars of its outstanding DOE-guaranteed load plus provided additional cash and equity to finance a second flywheel plant).


\(^{60}\) ELEC. ADVISORY COMM., 2012 STORAGE REPORT: PROGRESS AND PROSPECTS RECOMMENDATIONS FOR THE U.S. DEPARTMENT OF ENERGY 13 (2012) (These benefits can be felt in different degrees by various actors in the energy regime. The ISO/RTO transmission operators can benefit from energy storage through a number of mechanisms: ancillary services, real time energy balancing, energy price arbitrage, and resource adequacy. Generators can use it for intermittent resource integration for wind and solar, and supply firming. Transmission/Distribution can use it for peak shaving, to defer upgrade, provide relief from congestions, and transmission operation. End users/customers can use it for outage mitigation in microgrids, time of use energy management, power quality, and back-up power.).

\(^{61}\) One of the main benefits of energy storage is its ability to provide multiple services, including load leveling (and associated benefits such as a reduction in cycling-induced maintenance) along with regulation and contingency reserves and firm capacity. DENHOLM ET AL., supra note 15; see Strifling, supra note 28.
only projected to increase in the future. Nearly every modern convenience—like computers, cell phones, machinery, and lights—is at the mercy of adequate electricity flows. The energy demand (or load) becomes even greater in the summertime, when air conditioning units in at least half of the country are running full-time. Although the market and regulators are still coming to grips with how to properly quantify these values without double-counting, investors should take confidence in the government’s recognition of the four primary categories of energy storage benefits involving resource adequacy planning, adapting to changing public policy goals, and continuing to provide safe and cost-effective electricity: (1) reliability, (2) lower costs, (3) efficient production, and (4) environmental benefits.

1. Reliability

A first benefit of energy storage is its ability to enhance the reliability of the grid. These reliability benefits can come in the form of backup electricity in times of power outages, enhanced power quality to prevent outages, and frequency regulation that adjusts for differences between grid operators’ predictions and actual demand.

Backup Electricity. The concept of backup electricity is far from novel. Hospitals and other emergency service providers have been relying on back-up generators for many years. Santa Rita jail in California, one of the largest inmate facilities, has taken steps to insulate itself from the risk of power outages by being one of the first microgrids capable of isolating itself from the traditional grid, in


63. “In its 2009 Smart Grid Policy proposed policy statement, the FERC justified giving energy storage a high priority in smart grid standards development and cost recovery, based in large part on the benefits energy storage affords in integrating what the FERC termed ‘unprecedented’ amounts of variable generation resources. It pointed to the ability of energy storage to address three issues it saw attending large amounts of variable generation on the grid: resource adequacy concerns (the loss of variable generation during peak periods or critical times), resource management (the potential for over-generation during off-peak, low-load periods), and system stability concerns (that occur when there is high penetration of variable resources with low inertia properties). The FERC also noted the potential for energy storage to optimize bulk power production and facilitate power system balancing, among other benefits.” Margaret Caffey et al., Report of the Renewable Energy Committee, 32 ENERGY L.J. 405, 427-29 (2011) (citing Smart Grid Policy, 126 FERC ¶ 61,253, ¶¶ 18-20 (Mar. 19, 2009)); see also ELEC. ADVISORY COMM., supra note 60.

part based on the energy storage onsite.\textsuperscript{65} This type of distributed storage also is particularly useful in times of power outages due to weather-related disruptions, which are often sporadic and short-lived. For instance, Hurricane Sandy provided a platform for a few energy storage facilities operating in New York to demonstrate their success.\textsuperscript{66}

**Power Quality.** Energy storage also can assist in a general class of services referred to as power quality and system stability. The National Renewable Energy Laboratories describes it well:

Power quality refers to voltage spikes, sags, momentary outages, and harmonics. Storage devices are often used at customer load sites to buffer sensitive equipment against power quality issues. Electric power systems also can experience oscillations of frequency and voltage. Unless damped, these disturbances can limit the ability of utilities to transmit power and affect the stability and reliability of the entire system. System stability requires response times of less than a second, and can be met by a variety of devices including fast-responding energy storage.\textsuperscript{67}

**Frequency Regulation.** Grid operator projections of supply and demand do not always mirror reality. In fact, most days require some last-minute injections or withdrawals to correct for the gaps between supply and demand. “Frequency regulation service is the injection or withdrawal of real power by facilities capable of responding appropriately to a transmission system’s frequency deviations or interchange power imbalance . . .”\textsuperscript{68}

Maintaining the frequency of the transmission system within an acceptable range is critical to reliable operations. When generation dispatch does not equal actual load and losses on a moment-by-moment basis, the imbalance will result in the grid’s frequency deviating from the standard (sixty Hertz). Minor frequency deviations affect energy consuming devices; major deviations cause generation and transmission equipment to separate from the grid, in the worst case leading to a cascading blackout.


\textsuperscript{67} DENHOLM ET AL., supra note 15, at 13.

\textsuperscript{68} Frequency Regulation Compensation in the Organized Wholesale Power Markets, Order No. 755, 137 FERC ¶ 61,064, ¶ 4 (Oct. 20, 2011) [hereinafter FERC Order No. 755].
“Frequency regulation service can help to prevent these adverse consequences by rapidly correcting deviations in the transmission system’s frequency to bring it within an acceptable range.”

Although fossil fuel generators have traditionally been used to regulate or correct frequency deviations, energy storage can join other emerging technologies like demand response to help provide this service. The faster a resource can ramp up or down, the more accurately it can respond to the correction signal, which places these emerging technologies at a distinct technological advantage over fossil fuel generators.

2. Lower Costs

A second benefit of energy storage is its ability to reduce electricity prices. Electricity prices vary depending on its time of use, and prices are generally highest during "on-peak" periods, when the majority of our population is awake and “plugged in.” Where energy storage can reduce the amount of peak electricity needed, costs are projected to decrease. Although these on-peak periods represent only a small proportion of the total time electricity is needed, resource planners cannot base their decisions on the average load. Instead, energy resources are developed based on the peak loads. Generation, transmission, and distribution systems also must be sized for peak demand; as demand grows, new systems (both lines and substations) must be installed, often only to meet the peak demand for a few hours per year. Without wide scale energy storage, these peak demands are addressed primarily through peaker power.

69. See id. at 67,261.

70. Id. ("Provision by other resources is emerging, as technologies develop and tariff and market rules [are appropriately] adapt[ed] to accommodate new resources. For example, the Texas Interconnection and MISO currently use controllable demand response in addition to generators to provide frequency regulation service.").

71. “‘Ramping’ or the ability to ‘ramp’ is traditionally defined as the ability to change the output of real power from a generating unit per some unit of time, usually measured as megawatts per minute (MW/minute). A generator ramps up to produce more energy and ramps down to produce less. A storage device ramps up by discharging energy and ramps down by charging.” Id. at 67,260 n.3.

72. Id. at 67,265. But see discussion infra Part III.2.b. FERC has noted that current compensation for frequency regulation services is inadequate to accommodate these new resources like energy storage. Under the current compensation rules, slow-ramping and fast-ramping resources are provided the same amount.


plants. Peaker plants are those generators that are able to ramp up and down rapidly to respond to a need from the grid operator. Furthermore, peaker plants also bring with them significant capital cost requirements, additional emissions, and usually a need to construct additional transmission lines to connect to the existing grid. Instead of building additional generation to satisfy peak loads, energy can be generated and stored during off-peak periods and discharged during peak periods to satisfy increased load.

In addition to ensuring adequate on-peak resources and reducing or eliminating the need for peaking facilities, this type of action also could reduce the need to construct additional transmission and distribution lines. New lines may be difficult or expensive to build, often involving high capital costs and generating significant siting controversy. These expenses and controversies can be avoided or deferred by deploying energy storage located near the load. Bringing the energy storage closer to the source also may alleviate the high line-loss rates that occur during peak demand. Energy storage may be able to reduce or eliminate some of these costs, reducing rates for consumers. “Storage improves system efficiency and return on investment (ROI) by shifting peak load to off-peak hours and potentially reducing new investment in transmission infrastructure – if the storage is properly located with respect to transmission system constraints.”

3. Efficiency

A third benefit of energy storage lies in its ability to address potential over-generation during off-peak periods. Under the current constraints requiring instantaneous electricity use, significant amounts of electricity are wasted. This waste occurs for a number of reasons, including the generation of electricity during off-peak hours without demand to satisfy the supply and constraints along transmission lines. Renewable resources like wind, for instance, are

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75. Michael Kanellos, *Is Energy Storage a Product or Service*, Greentech Media (Mar. 8, 2010), http://www.greentechmedia.com/articles/read/is-energy-storage-a-product-or-service (“A 1.2-megawatt sodium sulfur storage facility in West Virginia commissioned in 2006 trimmed peak power in the region by 10% to 15% and postponed the need to erect another plant . . . .”).


generally strongest during winter, off-peak hours. This disconnect between supply and demand can result in excess electricity that could be captured through energy storage.

For example, the Bonneville Power Association (BPA) has been faced with “too much of a good thing” with ample wind resources and water flows for hydropower. Its transmission lines can only transmit so much electricity, and this has forced the agency to choose between providing wind or hydropower to the grid. Were BPA to allow the excess water to spill over the dams, it would send hyper-oxygenated water into the Columbia River's vital salmon runs, subjecting it to potential Clean Water Act violations. Consequently, BPA agreed to supply the power obligations of their thermal generators without charge, a plan that was not as appealing to wind generators, who were not concerned with saving fuel costs and were instead concerned with generating wind to obtain the useful production tax credits (PTCs) and Renewable Energy Credits (RECs) associated with wind generation. The dispute resulted in a FERC order requiring a new BPA curtailment protocol in which BPA agreed to compensate the wind generators for any PTC and unbundled RECs lost due to non-generation.

Energy storage would have alleviated this problem, allowing for the electricity generated from both wind and hydropower to eventually make it to the grid. Additional energy storage would minimize the curtailment of renewable energy during these times of generator or transmission constraints, improve the capacity factors of generators, and reduce the pressure on minimum load requirements for conventional generators. Similar efforts to enhance the efficiency of existing renewable generators can be seen in places like New Jersey, where the legislature has recently proposed funding cuts for renewables at the expense of increased funding for energy storage.

80. See id. at 4-5.
82. Fossil fuel plants indicate a level below which they cannot easily ramp down (often fifty percent). Renewable energy is therefore curtailed to prevent disruption of the efficiency of the fossil fuel plants. “One of the major conclusions of wind integration studies looking at higher penetrations is that minimum load points will need to be lowered substantially below their current annual minimums.” DENHOLM ET AL, supra note 15, at 27-28.
4. Environmental

A fourth benefit of energy storage is found in the reduced environmental impact that is realized by relying on more renewable energy to supply our nation’s increasing electricity demand. Fossil fuel combustion is the number one contributor of our nation’s greenhouse gas (GHG) emissions, as well as a number of other air pollutants. Renewable energy by itself is not interchangeable with the baseload sources of fossil fuel energy like coal. Yet, by pairing energy storage with renewable energy, it firms the renewable energy generation, and may be able to displace some fossil fuel generators, as well as avoid their corresponding GHG and pollution emissions.

More precisely, it could displace polluting peaker plants and the ancillary services that are traditionally provided by fossil fuel generators. “[L]arge-scale electricity storage promises [to] be an energy game-changer, unshackling alternative energy from the constraints of intermittence.”

The use of energy storage to provide energy services as opposed to traditional fossil fuel generation will also minimize the market risks associated with different primary fuel sources. Natural gas looks quite attractive at the present time, with vast shale discoveries and...
low natural gas prices. But an adjustment of our energy economy away from coal towards natural gas will result in a less diversified supply than presently exists, increasing the risk of supply disruptions due to future congestion in natural gas pipelines or price increases.

C. Regulatory Uncertainty Surrounding Energy Storage

Despite these substantial benefits, energy storage still comprises a mere two percent of the energy generated in the United States. As discussed above, although technical and financial uncertainty surely play a role, stakeholders repeatedly point to regulatory uncertainty as one of the primary barriers to energy storage’s further deployment. This section analyzes the primary regulatory uncertainty surrounding energy storage: FERC’s approach to energy storage classification and the resulting inability of stakeholders to predict the future state of the regulatory environment.

These classifications are important, because much of energy law is premised on the labels provided to various energy transactions and assets. The two primary regulatory uncertainties associated with energy storage are (1) ambiguities about how to label the purchase and sale of electricity coming in and out of an energy storage device, resulting in jurisdictional uncertainty, and (2) ambiguities about how to label the energy storage assets, resulting in cost recovery uncertainty. The answers to these questions have substantial jurisdictional and cost recovery implications for developers, as is described below.

1. Jurisdictional Uncertainty

A first type of uncertainty is whether sales of power into and out of an energy storage facility constitute wholesale or retail power. The Federal Power Act (FPA) provides FERC with jurisdiction over wholesale transactions but reserves the authority over retail transactions to the states. Wholesale transactions are sales for resale and would fall to FERC and competitive markets. Retail transactions are sales to an end user and would fall to the states, which use a mixture of regulated cost-of-service formulas and restructured markets.

89. U.S. DEPT OF ENERGY, supra note 43, at 4 (“[T]he U.S. has about 24.6 GW (approx. 2.3% of total electric production capacity) of grid storage, 95% of which is pumped storage hydro.”).

90. See supra note 16.

FERC has consistently held that electricity coming in and out of pumped storage hydropower facilities constitutes a wholesale transaction that falls under FERC jurisdiction. Similarly, the Texas Public Utility Commission (PUC) has been involved in a complicated jurisdictional question about whether the purchase and sale of electricity coming in and out of an energy storage facility should be treated as wholesale or retail transactions. Although Texas law would have treated the electricity charged and discharged from an energy storage facility as a retail sale, the Texas PUC made a special amendment to their rules that allowed a large-scale battery storage facility to pay wholesale rates when using electricity off the grid.

It is likely that there is not one answer to this uncertainty, given that the answer depends where the facility is located and who is managing it. For instance, the answer would differ depending on whether it is a merchant generator or an Exempt Wholesale Generator (EWG) selling into wholesale markets (wholesale transactions), or whether the energy storage facility is located with a utility for self-supply or supply directly to consumers (retail transactions). As a result, energy storage might support both retail and wholesale markets, meaning it could be subject to both state and federal regulators. Characterization of energy storage as generation or transmission can even impact the ability to realize tax credits, as was demonstrated by a recent private IRS ruling that allows a wind farm to claim a thirty percent investment tax credit on energy

92. FERC has previously rejected classifying energy storage as “station power,” resulting in a wholesale classification subject to FERC jurisdiction. Station power is used for operating the electric equipment on the site of a generation facility or associated buildings, and a station power designation renders the electricity used for that purpose a retail transaction since the generating facility is then the end user. PJM Interconnection, L.L.C., 132 FERC ¶ 61,203, slip op. at 2-3 (Sept. 3, 2010). FERC found that “[l]ike pumping energy and compression energy, the energy used to charge Energy Storage Resources will be stored for later delivery and not used for operating the electric equipment on the site of a generation facility or associated buildings as Station Power is used.” Id. at 4.

93. Project Number 39917, DOE GLOBAL ENERGY STORAGE DATABASE, SANDIA NAT’L LABS., http://www.energystorageexchange.org/policies/16 (last visited June 14, 2014) (“The Commission recognized that a distinction of wholesale electrical load for storage devices was reasonable where a storage device… takes power from the grid, converts it to potential energy, and at a more opportune time transforms this potential energy back into electric energy, which is returned to the grid…. Storage devices thus differ fundamentally from other loads because the power taken from the grid is not consumed…. In this respect, there is a clear distinction between storage assets and other types of load when taking energy from the grid.”); see also Tex. Pub. Util. Comm’n, Order Adopting Amendments to § 25.192 and § 25.501 as Approved at the March 7, 2012 Open Meeting (Mar. 29, 2012), available at http://www.puc.texas.gov/industry/projects/rules/39917/39917adt.pdf.

94. See, e.g., Tex. Pub. Util. Comm’n, supra note 93, at 2-12 (debating classification of electricity sales as wholesale or retail depending upon the location and operator of the energy storage facility).
storage batteries in part because the device was not treated as transmission equipment for regulatory purposes.95

2. Cost Recovery Uncertainty

A second type of uncertainty surrounds the difficulties of classifying energy storage assets into a legal regime premised on three traditional categories of assets: (1) generation, (2) transmission, and (3) distribution. Traditional energy resources fit relatively neatly into only one of these three categories, but energy storage is a particularly sticky problem because of its ability to perform more than one of these traditional energy functions.96 In fact, it can perform all three.97 This causes regulators and developers uncertainty about how the costs will be recovered, whether all of the value streams associated with energy storage will be able to be realized, and how to prevent double-counting associated with the cost recovery for energy storage. The most notable source of contention is whether energy storage constitutes a generation or a transmission asset. This section is not intended to argue for one or the other.98 Instead, it analyzes the multi-functional nature of energy storage technologies and provides a flavor for the resulting cost recovery implications for these two classifications.

(a) Energy Storage as Generation

In one sense, energy storage is a generator of electricity. Generation of electricity is defined as “[t]he process of producing electric energy by transforming other forms of energy.”99 Most energy


96. It is not the first time that the same facility could fall under two different jurisdictions, depending on its function. Report of the Judicial Review Committee, 22 ENERGY L.J. 195, 206-07 (2001) (“The court affirmed the FERC’s two-pronged analysis of its jurisdiction over local distribution facilities: (1) if the facilities are used to effect a sale for resale in interstate commerce (wholesale sale), then the FERC has clear jurisdiction over them; and (2) if the facilities are used for unbundled retail sales (retail wheeling), then the FERC will use a seven-part functional test to determine whether the facilities are transmission facilities (subject to the FERC’s jurisdiction) or local distribution facilities (subject to state jurisdiction). The court held that the FERC’s two different statutory grants of jurisdiction (sales for resale v. transmission in interstate commerce) justify this differing treatment of what otherwise would be identical facilities.” (citing Transmission Access Policy Study Grp. v. FERC, 225 F.3d 667, 694 (D.C. Cir. 2000))).

97. Id. at 206-08.

98. For analyses of the competing classifications, see LUONG, supra note 19.

storage technologies are not actually storing electricity, but are storing the kinetic, potential, mechanical, or thermal energy and converting that energy back to electricity at a specified time. Technically, this process may be viewed as “generating” electricity.

The bulk storage of electricity, for example, if used by a utility to time-shift the generation of electricity from a time of low-cost generation, such as in the middle of the night, to a time of high-cost generation, such as during peak use, would be seen as similar to generation.100 This practice would allow for energy arbitrage, where entities can generate electricity when prices are low and hold the electricity until prices are high.101

On the other hand, some argue that an entity may only qualify as a generator if it is providing a net increase of electricity into the grid.102 In this sense, energy storage facilities are merely converters of energy. Energy storage facilities use the energy from previously generated electricity to convert it back to electricity at a prescribed time. In so doing, they are providing no net increase in electricity onto the grid and therefore should not be treated as a generator.103

Many different types of energy storage have already earned the title of generation from FERC. The large, geographic-specific types of energy storage, pumped-storage hydropower and CAES, are treated as generation.104 FERC defines a pumped storage hydropower facility as that which “stores and generates electricity” and regularly treats it as such.105 FERC has even denied a pumped hydro storage developer’s request to include their costs in transmission rates, pointing out it would be discriminatory to roll the costs into transmission rates when other pumped storage hydro owners


103. In fact, there may even be a net loss of energy, as some forms of energy storage are quite inefficient. See, e.g., Pumped Storage Provides Grid Reliability Even with Net Loss, supra note 15.


collected revenues as other forms of generation—only by succeeding in the wholesale power markets.\footnote{106}

Some state regulators have also embraced energy storage as generation. New York is treating a proposed CAES facility as a “generation facility.”\footnote{107} The Seneca Compressed Air Energy Storage Project would be linked with a 115 kilovolts (kV) transmission system, which currently serves generators powered by fossil fuels, small hydro, and wind farms.\footnote{108} CAES is regularly referred to as a generator, including in scholarly treatises\footnote{109} and patents filed with the U.S. Patent Office.\footnote{110} Texas similarly treats CAES as generation but has also extended the generation logic to smaller-scale energy storage. In 2011, it passed a landmark bill that defines energy storage, including batteries and flywheels, as generation when offering services on the competitive market employed in that state.\footnote{111}

In further support of energy storage as generation, many states that have passed renewable portfolio standards (RPS), which require utilities to procure a certain amount of their electricity generation from renewables, also include energy storage as an eligible “source.”\footnote{112} Many of these RPS only allow energy storage to be used if

\begin{footnotes}
\item[106] Nevada Hydro Co., 122 FERC ¶ 61,272, at 32-33 (2008).
\item[108] Id.
\item[110] U.S. Patent No. 20110094212 A1, at [0003] (filed Oct. 28, 2009) (“In this scheme, the [CAES system] functions as a generator, providing power to a power grid, for example.”).
the electricity input into the storage device originated from a renewable source.\textsuperscript{113} In California, only pumped-storage hydroelectric (a traditional renewable source) and “fuel cells using a renewable fuel” qualify for the state’s RPS,\textsuperscript{114} and some local districts, such as the Truckee Donner Public Utility District, require that energy storage projects be sourced from renewable generators.\textsuperscript{115} Massachusetts’s RPS qualifies energy storage facilities only if they store “useful thermal energy,” or basically heat energy that would have otherwise been wasted in electricity generation, transmission, and distribution.\textsuperscript{116} Utah has proposed allowing compressed air energy storage only if the electricity compressing the air was produced using a renewable source or with a renewable energy credit.\textsuperscript{117} Hawaii’s limited energy storage integration excludes energy from fossil fuel facilities.\textsuperscript{118} Finally, Michigan’s RPS includes energy generated by renewable sources that is kept for later transmission in a storage facility.\textsuperscript{119}

The label of generator has both jurisdictional and cost recovery implications. First, as noted above, the Federal Power Act provides states with jurisdiction over “facilities used for the generation of electric energy.”\textsuperscript{120} Being classified as a generator also allows the

\textsuperscript{113} This is consistent with FERC’s rejection of energy storage as a “Qualified Facility (QF)” under PURPA where there was no demonstration that the amount of power provided came from sufficient “renewable resources.” Luz Dev. & Fin. Corp., 51 FERC ¶ 61,078, at 5 (1990). “[E]nergy storage facilities such as the proposed Luz battery system are a renewable resource for purposes of QF certification. However, such facilities are subject to the requirement that the energy input to the facility is itself biomass, waste, a renewable resource, a geothermal resource, or any combination thereof or a demonstration that any fossil fuel-fired input constitutes no more than 25 percent of the total energy input to the facility and such uses are consistent with those enumerated in section 3(17)(B) of the FPA.” Id. at 9-10.

\textsuperscript{114} CAL. ENERGY COMM’N, RENEWABLES PORTFOLIO STANDARD ELIGIBILITY 8 (4th ed. 2011).

\textsuperscript{115} TRUCKEE DONNER PUB. UTIL. DIST., RENEWABLE ENERGY RESOURCES PROCUREMENT PLAN 5 (2013).

\textsuperscript{116} 225 MASS. CODE REGS. 16.05(2) (2008).

\textsuperscript{117} S.B. 104, 58th Leg., Gen. Sess. (Utah 2010).

\textsuperscript{118} HAW. REV. STAT. § 269-91 (2003).


\textsuperscript{120} 16 U.S.C. § 824(b)(1) (2012). However, The Supreme Court has upheld FERC authority over generating facilities, so long as the regulated activity can be characterized as “the sale of power created by that facility.” Steven Ferrey, Sustainable Energy, Environmental Policy, and States’ Rights: Discerning the Energy Future Through the Eye of
energy storage facility to have the same status and benefits associated with facilitating interconnection with the grid.\textsuperscript{121} Second, and perhaps more importantly, by designating energy storage as generation, the provider commits to participation in a complicated cost recovery regime.

At the wholesale level, FERC continues to foster competition and monitor generators and marketers that charge market-based rates to ensure that they do not have market power or engage in prohibited behavior.\textsuperscript{122} Wholesale markets exhibit regional differences, with two-thirds of the country operated by sophisticated regional markets and one-third of the country operated by individual entities. Two-thirds of the country is operated by seven Regional Transmission Operators or independent system operators (RTO-ISOs),\textsuperscript{123} which operate highly organized wholesale markets in which the energy resources are bid and dispatched in hourly and daily auctions. Although the availability and rules applicable to these markets differs by the seven RTO-ISOs,\textsuperscript{124} an energy storage facility will recoup its cost through bidding into one or more of the three relevant

\textsuperscript{121} See Roberts, supra note 49, at 46, 48-49.

\textsuperscript{122} See 16 U.S.C. § 824s(d) (2012). FERC also established rules that allowed for market-based prices to satisfy the “just and reasonable” standard that Congress had imposed upon it. \textit{Id.}


\textsuperscript{124} RTOs may distinguish the availability of various markets based on whether the energy storage technology can function in the long-term or the short-term. For instance, “MISO currently accommodates long-term storage resources in its markets in the form of pumped hydro storage (PHS).” \textit{MISO ENERGY STORAGE REPORT, supra} note 78, at 1-2. “Short-term storage is accommodated as a regulating reserve resource in the MISO ancillary services market (ASM).” \textit{Id.} at v. The Southwest Power Pool operates a market design that combines a day-ahead market with unit commitment and a co-optimized energy and ancillary services markets. \textit{See About The Marketplace, Sw. POWER POOL, http://www.spp.org/section.asp?pageid=143} (last visited June 14, 2014).
markets: (1) energy,125 (2) capacity,126 and (3) ancillary services.127 In non-RTO jurisdictions, individual, non-regionalized transmission owners “base trades exclusively on bilateral sales negotiated directly between suppliers.”128

At the retail level, the United States is divided into a mixture of traditional cost-of service (regulated) jurisdictions and restructured (competitive) jurisdictions.129 In cost-of-service jurisdictions, the utilities remain vertically integrated, meaning the utility owns the generation, transmission, and distribution facilities servicing the area. In these jurisdictions, a PUC approves the rates that utilities can charge their customers based on a rate base multiplied by a rate of return, then adding operation and maintenance costs, administrative and general expenses, depreciation, income and non-income taxes, minus revenue credits.130 Due to the multiplier effect applied to the rate base, an important factor in such determinations is whether a particular asset would be included in the utility’s base rate, receiving the benefit of a multiplier effect, whether the costs can only be included as a pass-through charge without the multiplier effect, or whether only partial costs of the energy storage will be allowed.131 Without such clarification, investors may be unwilling to invest as large an amount of up-front capital. In these areas, “the role of power markets is limited to wholesale purchases or sales of power,

125. Energy markets establish a market clearing price for the electricity that balances load and generation at designated points on the transmission system.

126. Capacity markets provide payments to generators to ensure that sufficient capacity is built and maintained to serve system peak loads. Three of the seven RTO/ISOs have functioning capacity markets (PJM, NYISO and ISO-NE).

127. Ancillary services are specialized energy and capacity services that allow the ISO to operate the transmission grid and to respond to unanticipated contingencies such as the loss of a generator or transmission line. Glossary and Acronyms, ISO NEW ENGLAND, http://www.iso-ne.com/support/training/glossary/ (last visited June 14, 2014) (Ancillary markets facilitate transfer of those “services that support electricity transmission and reliable operations of the grid, such as load regulation, spinning reserve, non-spinning reserve, replacement reserve, and voltage support” and are only beginning to emerge as renewables gain traction in the markets). AM. PUB. POWER ASS’N, A BRIEF DESCRIPTION OF THE SIX REGIONAL TRANSMISSION ORGANIZATIONS (RTOS) 1 (2012) (In regions with operating RTOs or ISOs, “market participants buy and sell a variety of electricity products and services,” which has facilitated the creation of markets for electricity, capacity, and ancillary services).


130. FED. ENERGY REGULATORY COMM’N, supra note 18, at 6-7.

which utilities undertake to supplement their cost-based generation activities. These wholesale power transactions contribute to but are generally not needed to allow regulated utilities to recover capacity-related costs.\footnote{132}

In restructured regions where there is retail competition, however, utilities are no longer vertically integrated, and generating facilities need to operate on a “merchant” basis.\footnote{133} These generating facilities no longer recover costs through cost-of-service rates, but “through market-based (short- or long-term) bilateral contracts or spot market sales” in energy, ancillary, and capacity markets, where available.\footnote{134}

\textbf{(b) Energy Storage as Transmission}

In another sense, energy storage can be considered a transmission asset. Transmission assets aid in the reliability of the grid, provide voltage support, frequency regulation, and other load leveling functions.\footnote{135} As discussed supra in Part II.B, energy storage can be a critical asset for providing exactly these functions, leading some to argue that it should be classified as such. As with a generation label, a transmission label carries with it jurisdictional and cost recovery implications—namely FERC jurisdiction and recovery under FERC-approved rates.

\footnote{132. J\textsc{ohannes} P\textsc{feifenberger} et \textsc{al.}, A \textsc{comparison of PJM’s RPM with Alternative Energy and Capacity Market Designs} 13 (2009), \textit{available at} http://www.brattle.com/system/publications/pdfs/000/004/859/original/A_Comparison_of_PJM’s_RPM_with_Alt_Energy_and_Capacity_Mkt_Designs_Pfeifenberger_et_al_Sep_2009.pdf?1379014789.}

\footnote{133. \textit{Id.} In states that allow competition, the PUC still regulates distribution wires and oversees structured programs for competitive electric energy suppliers. \textsc{Regulatory Assistance Project, Electricity Regulation in the US: A Guide} 27-28 (2011), \textit{available at} www.raponline.org/documents/download.id/\textit{.} In addition, some restructured state programs require incumbent utilities to provide energy service at regulated rates to customers as a default provider. \textit{See, e.g., Barbara R. Alexander, The Transition to Retail Competition in Energy Markets: How Have Residential Consumers Fared? Part One: An Analysis of Residential Energy Markets in Georgia, Massachusetts, Ohio, New York and Texas} 30 (2002) (noting the retention of incumbent utilities as Default Service providers in Ohio’s retail electric restructuring program); \textit{see also Barbara R. Alexander, Default Service for Retail Electric Competition: Can Residential and Low Income Customers Be Protected When the Experiment Goes Awry? 3} (2002) ("[E]very state that has adopted electric restructuring has provided [Default Service]. . . . [I]t is viewed as a regulated service . . . in every state and its price, and terms and conditions are subject to regulation by the state regulator of electric utilities.").}

\footnote{134. P\textsc{feifenberger}, \textit{supra} note 132, at 13.}

\footnote{135. A\textsc{bdurrahman} \textit{et \textsc{al.}, supra} note 119, at 3; \textit{see also Dhruv Bhatnagar & Verne Loose, Evaluating Utility Procured Electric Energy Storage Resources: A Perspective for State Electric Utility Regulators} 25-27, 37 (2012), \textit{available at} http://www.sandia.gov/ess/publications/SAND2012-9422.pdf (discussing the different definitions and classifications of energy storage and explaining that FERC assesses the classification of energy storage devices on a case-by-case basis).}
Using its authority under the FPA, FERC had previously embarked on a series of rulemakings to realize the benefits of enhanced competition. It required unbundling of historically vertically integrated utilities into separate generation, transmission, and distribution facilities in restructured areas.\textsuperscript{136} As discussed previously, FERC created wholesale markets for generators and only retained control over those aspects of the utility industry at risk of monopolistic behavior, namely transmission assets.\textsuperscript{137} FERC established transmission tariffs that require open and non-discriminatory rates and service for all generators.\textsuperscript{138} FERC tariffs determine how much money transmission system owners can earn from their transmission system, determine the structure of the transmission rates, and often determine who pays for upgrades to the transmission system.\textsuperscript{139}

In 2005, Congress amended the FPA by adding § 219, directing FERC to develop incentive-based rate treatments for transmission “for the purpose of benefiting consumers by ensuring reliability and reducing the cost of delivered power by reducing transmission congestion.”\textsuperscript{140} Congress also expressly made clear that energy storage was an “advanced transmission technology” eligible for incentive-based rate treatment, and directed FERC to encourage these technologies “as appropriate.”\textsuperscript{141} The amendment defined an “advanced transmission technology” as that which “increases the

\begin{footnotes}
\item[136] Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Order No. 888, 75 FERC ¶ 61,080 (Apr. 24, 1996) [hereinafter FERC Order No. 888].
\item[138] Preventing Undue Discrimination and Preference in Transmission Service, Order No. 890-C, 126 FERC ¶ 61,228 (Mar. 19, 2009) (This “Order on Rehearing and Clarification” codified FERC Order No. 890 and supplemented Order Nos. 888 and 889 in order to clarify “certain revisions to its regulations and the pro forma open-access transmission tariff, or OATT, adopted in Order Nos. 888 and 889 to ensure that transmission services are provided on a basis that is just, reasonable, and not unduly discriminatory” and to increase transparency in the rules applicable to planning and use of the transmission system.); see also FERC Order No. 888, supra note 136.
\end{footnotes}
capacity, efficiency, or reliability of an existing or new transmission facility, including . . . energy storage devices.”

FERC complied with this directive in 2006 with Order No. 679, which embraced a more flexible approach to transmission rates. It allows “any transmitting utility or electric utility transmitting electric energy in interstate commerce that joins a Transmission Organization” to be eligible for incentive-based rate treatments. FERC stated:

Thus, for the Nation to be able to integrate the next generation of resources, we must encourage investors to take the risks associated with constructing large new transmission projects that can integrate new generation and otherwise reduce congestion and increase reliability. Our policies also must encourage all other needed transmission investments, whether they are regional or local, designed to improve reliability or to lower the delivered cost of power.

Many types of energy storage qualify as “other needed transmission investments . . . designed to improve reliability or to lower the delivered cost of power.” In its final rule on incentive-based rates, FERC expressly embraced advanced transmission technologies like energy storage as being “illustrative of the kinds of technologies that Congress sought to encourage . . . that may be employed and considered for incentive ratemaking treatment.”

The label of an “advanced transmission technology” is far from dispositive as to its asset classification, however, as is evidenced from FERC’s treatment of a California pumped storage hydro facility. Even though FERC acknowledged that the 500 MW Lake Elsinore Advance Pumped Storage (LEAPS) project was an “advanced transmission technolog[y]” under the 2005 Energy Policy

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143. FERC Order No. 679, supra note 141, ¶ 4.
144. Id. ¶ 25.
145. Id.
146. Id. ¶ 290.
147. The other relevant analysis would be to determine whether the energy storage entity seeking to take advantage of these rate incentives is a public utility, a question that turns on whether the entity is selling electric energy. 16 U.S.C. § 796(22) (Supp. 2005) (The Federal Power Act defines an electric utility as “a person or State agency (including [any municipality]) that sells electric energy. The term ‘electric utility’ includes the Tennessee Valley Authority and each Federal power marketing administration.”). Although this may not be a substantial issue for many energy storage developers because utilities are developing many of them, it may be particularly relevant for merchant energy storage facilities seeking to compete on a level playing field with incumbent utilities.
Act (EPAct),\textsuperscript{148} it declined to treat the facility as a transmission asset to be included in the CAISO Transmission Access Charge,\textsuperscript{149} saying it cannot support treating LEAPS differently than existing, similar generating units.\textsuperscript{150} But this Congressional amendment and subsequent FERC rulemakings mean that if energy storage is designated as transmission, it may be a FERC jurisdictional facility subject to transmission tariffs and eligible for market incentives.\textsuperscript{151} A transmission designation will also involve it in critical forthcoming transmission planning required by FERC’s recent Order No. 1000, which requires transmission providers to consider transmission needs driven by public policy requirements established by state or federal laws or regulations.\textsuperscript{152} As will be discussed \textit{infra}, some states are already including energy storage into such “public policy requirements.”

Importantly, the label of transmission asset can also serve to limit the energy storage facility, both in terms of access to markets and ownership. First, if energy storage is treated as a transmission asset, market rules prohibit it from participating in wholesale energy and ancillary service markets, markets that have historically been served by generators to “maintain the independence of grid operators and avoid the potential for market manipulation, whether real or

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\textsuperscript{148} Nevada Hydro Co., Order on Rate Request, FERC Doc. Nos. ER06-278-000 to -004, at 12 (Nov. 17, 2006), \textit{available at} \url{http://www.ferc.gov/whats-new/comm-meet/111606/E-5.pdf}.

\textsuperscript{149} See \textit{id}.

\textsuperscript{150} \textit{Id}. at 5-6. Complicating matters was the fact that developers proposed to retain ownership of the facility but cede operational control to the transmission operator (in this case CAISO) and rely primarily on transmission system rights provided through transmission tariffs for their compensation). \textit{Id}. at 3. Many rejected this proposal as presenting a conflict of interest for the ISO that was charged with neutrality as grid operator, including CAISO and FERC. Nevada Hydro Co., Order on Rate Incentives and Compliance Filings, 122 FERC \textit{¶} 61,272, \textit{¶¶} 59-63 (2008). In these systems, the RTOs and ISOs do not own any of the generation or transmission assets, but develop the rules to administer the markets, decide which generators will run at what levels, provide the transmission services needed for transactions to occur, and run the billing systems for payments for power. ROBERT H. SCHULTZ ET AL., LESSONS FROM IOWA: DEVELOPMENT OF A 270 MEGAWATT COMpressed AIR ENERGY STORAGE PROJECT IN MIDWEST INDEPENDENT SYSTEM OPERATOR: A STUDY FOR THE DOE ENERGY STORAGE SYSTEMS PROGRAM 79 (2012), \textit{available at} \url{http://www.sandia.gov/ess/publications/120388.pdf}.

\textsuperscript{151} BROWN & SEDANO, \textit{supra} note 139, at 53 (“If the transmission facilities fall under federal jurisdiction, [however,] the state commission generally must allow the utility to include its transmission costs in [its] rates.”).

\textsuperscript{152} Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000, 136 FERC \textit{¶} 61,051 (July 21, 2011) (requiring each public utility transmission provider to participate in a regional transmission planning process that produces a regional transmission plan) [hereinafter FERC Order No. 1000].
perceived.” 153 Second, this asset classification may also have implications for ownership of the energy storage facility. For instance, in restructured regimes, the law requires utilities to divest their generation from their transmission and distribution, 154 as is evidenced by ERCOT’s retail choice areas, where “a company cannot own both generation and transmission/distribution, except through separate affiliates under stringent code of conduct restrictions.” 155 The American Physical Society similarly concluded that “the ability of energy storage technologies to “cross traditional boundaries of generation, transmission and distribution . . . paradoxically . . . could restrict its deployment [ ] due to the limitations placed on ownership.” 156

Regulators are starting to make these classification determinations with respect to energy storage that performs only one function. For instance, both the Wisconsin and Texas PUCs have approved energy storage projects that serve transmission functions. 157 In both cases, the PUCs made sure to prohibit double-counting, allowing the provider to recover transmission rates, but not participate in wholesale markets. 158 Yet it is unclear how they will treat an energy storage facility that performs multiple functions. Energy storage developers may find themselves in a catch-22

153. CHALLENGES AND OPPORTUNITIES, supra note 34, at 11-12 (“Furthermore, FERC requires market power studies to be performed when third parties provide ancillary services at market-based rates to transmission providers . . . .”).


155. ELIZABETH DREWS, REGULATORY DEVELOPMENTS AND IMPACTS INVOLVING ELECTRICITY STORAGE IN TEXAS 5 (2012).

156. AM. PHYSICAL SOC., CHALLENGES OF ELECTRICITY STORAGE TECHNOLOGIES 18 (2007).


158. See Order Approving Electric Transmission’s Application, supra note 157, at 11 (stipulating that the battery storage project at issue was correctly classified as a transmission asset alone, and not a generating facility capable of competing in wholesale markets, because “the . . . battery is a reactive device” that “does not generate electric power by converting another source of energy . . . into electricity,” but rather its “source of energy is power from the electric grid from which it stores and to which it later discharges”).
situation, since policymakers argue that for energy storage to reach its full market potential, its multiple functions all along the value stream need to be recognized. At the same time, employing multiple functions may generate more controversy and opposition to the project for fear of double-counting through both cost-based rate treatment and market-based rate treatment. The American Public Power Association, whose members are often wholesale customers of public utilities taking service under FERC-regulated wholesale and transmission rates, argued that storage projects “should not be able to recover their full costs of service through cost-based rates and then earn additional revenues through sales in other markets that are pocketed by project participants.” Opponents also argue that improperly characterizing energy storage as transmission is a back-door attempt to socialize the fixed costs of generation.

David Pomper has argued that FERC exercises jurisdiction over energy storage on the basis of its transmission services as opposed to wholesale transaction authority. He subscribes to longstanding jurisprudence about the bounds of transmission services, describing transmission as extending from where generation is complete to where the energy is subdivided to serve ultimate consumers. Under this interpretation, FERC would have jurisdiction over all the functions of energy storage, a result that might not occur if FERC exerted its jurisdiction based on whether the electricity entering or

159. Dhruv Bhatnagar, Sandia Nat’l Labs., Regulatory Challenges to the Integration of Energy Storage 4 (2013) (Powerpoint presentation) (identifying “functional classification restrictions” (“[b]lurring of the line between [asset] classifications”) as a challenge to energy storage and suggesting that “clarity and transparency in procedures to allow revenue recovery under multiple classifications” could serve as a solution). Additionally, without an apples to apples costs and benefits comparison, an energy storage project may not look cost-effective next to a new peaking generation facility or transmission line.


163. Id. at 7.
exiting the storage facility is wholesale or retail. Pomper also argues that the jurisdictional and cost recovery aspects are not necessarily linked, providing an example of jurisdictional transmission facilities that have their cost allocated to generation customers or markets. In fact, Pomper goes as far as to argue that we should “recognize that storage is a form of transmission that, generally, should be regulated like generation.”

In sum, cost recovery turns primarily on whether the energy storage facilities are labeled as generation, transmission, or distribution facilities. Generators are able to bid their electricity and sometimes their ancillary and capacity services into wholesale markets. Transmission operators, however, are subject to FERC-regulated rates through established tariffs. To further complicate matters, some energy storage developers would not want to be pigeon-holed into one asset category or the other. In fact, some forms of energy storage will only be cost-effective if they can realize all of the benefits that energy storage can provide, benefits that spread across all three of these asset categories. For energy storage to maximize its value, however, it may be necessary for energy storage developers to seek cost recovery in both regulated cost-of-service and market-based regimes, subjecting it to both state and federal jurisdiction. The result can be both jurisdictional struggles of overlap and gaps, as well as risks of double-counting and inadequate compensation.

III. CHARACTERIZING THE REGULATORY UNCERTAINTY

Significant organizational theory literature exploring regulatory uncertainty exists. These scholars have spent decades defining uncertainty, differentiating various types of uncertainty, and

164. Id. at 8.
165. Id.
166. Id.
167. See, e.g., Market Products and Services Help Meet Demand, CAL. INDEP. SYS. OPERATOR, http://www.caiso.com/market/Pages/ProductsServices/Default.aspx (last visited June 14, 2014) (explaining that “[s]cheduling coordinators can offer energy into the market from generating units” and “may participate in the ancillary services market”).
169. See EYER & COREY, supra note 29, at 18-21 (listing out seventeen applications for energy storage).
170. See, e.g., Milliken, supra note 17, at 134, 136 (citing different definitions of “environmental uncertainty,” meaning external to the organization, not environmental of the natural world variety).
assessing organizational strategic responses to such uncertainty.\textsuperscript{172} Of these efforts, only a subset addresses regulatory uncertainty specifically, and few, if any, identify criteria that are helpful in distinguishing between the different degrees of regulatory uncertainty that exist.\textsuperscript{173} This Part embarks on this mission—to begin a framework for characterizing different degrees (as opposed to types) of uncertainty. By degree, it means the relative state of the uncertainty, along a spectrum, that suggests that all regulatory uncertainty is not created equal. To do this, this Part uses the uncertainty associated with energy storage to identify factors that are important to assessing the degree of uncertainty.

Uncertainty runs the risk of alienating energy storage developers and impeding the deployment of the affected technologies.\textsuperscript{174} The most common reaction to such uncertainty is one of risk avoidance. This is understandable, as predictability is one of the cornerstones of the rule of law, providing stability and certainty for the regulated community.\textsuperscript{175} The risk averse nature of humans further contributes
to a desire for certainty. 176 A wealth of literature supports the common sense notion that firms are less willing to invest where the returns are uncertain. 177 Firms that cannot accurately predict future regulatory conditions are naturally more hesitant to invest significant amounts of capital. As has been noted in judicial proceedings, “[t]he general proposition that uncertainty about regulatory requirements affects market value is so intuitively obvious as to require no expert support.” 178 Such reluctance to invest also can stifle innovation. 179 “Regulatory uncertainty directly impacts innovation by hampering investment, and, therefore decreasing the amount of available capital that can be used for research and development.” 180 Not surprisingly, therefore, uncertainty often is

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176. Daniel A. Farber, Uncertainty, 99 GEO. L.J. 901, 908 (2011) (“People are often risk averse—that is, they prefer not to gamble.”); Donald T. Hornstein, Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis, 92 COLUM. L. REV. 562, 588 (1992) (“When substantial risk is involved, most people are risk averse; they tend to avoid gambles that pose the chance of catastrophic loss even when the chances of favorable outcomes are as great (or even greater) than the chances of catastrophic ones.”); Diane Klein, Distorted Reasoning: Gender, Risk-Aversion and Negligence Law, 30 SUFFOLK U. L. REV. 629, 636 (1997) (“A person is risk-averse . . . if he strictly prefers a certainty consequence to any risky prospect whose mathematical expectation of consequences equals that certainty.”) (citation omitted)).


repeatedly blamed for inaction on a variety of matters. Energy storage is no exception.

In certain instances, blaming uncertainty for inaction is valid, particularly where the uncertainty reaches a degree where the scope of the uncertainty is paralyzing for both those internal and external to the situation and where eventual resolution is outside of the control of the stakeholders. But in other circumstances, uncertainty appears to be an undeserving scapegoat for inaction.

Given the uncertainty surrounding energy storage, it seems important to develop a framework for assessing the degree of the uncertainty and to apply this framework to energy storage. This part asserts that uncertainty is far from a singular concept. Instead, it encompasses a spectrum of activity with varying causes,

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181. See, e.g., Lyon & Li, supra note 19, at 2-3 (noting a number of examples of utilities decreasing price targets and declining investments due to regulatory uncertainty); Jess Davis, Dallas’ Inaction on Fracking Regs Driving Away Drillers, LAW360 (Jan. 23, 2013, 5:07 PM), http://www.law360.com/articles/408939/dallas-inaction-on-fracking-regs-driving-away-drillers (describing how several exploration and production companies have withdrawn permit applications because of the city’s delay in issuing fracking regulations); Patricia Fleischauer, Regulatory Uncertainty Hindering Offshore Wind Development, ELECTRIC LIGHT & POWER (Mar. 1, 2010), http://www.epi.org/publication/regulatory-uncertainty-effects-offshore-wind-development/ (reporting that investment in new renewable generating assets in states with RPSs has been significantly lower in states with histories of regulatory repeal than those with no history of repealing restructuring legislation), Bill Frezza, Regulatory Uncertainty Drives a Fish Farmer to Foreign Waters, FORBES (Nov. 25, 2012, 5:55 PM), http://www.forbes.com/sites/billfrezza/2012/11/25/regulatory-uncertainty-drives-a-fish-farmer-to-foreign-waters/ (chronicling a business owner’s decision to move his offshore deep water fish farming business to Panama in order to avoid the confusion and stress of overlapping state and federal regulations that would apply to his business in the United States, none of which acknowledge a lead agency or authority); See also discussion of Cape Wind, infra note 257.

182. See, e.g., Kira R. Fabrizio, The Effect of Regulatory Uncertainty on Investment: Evidence from Renewable Energy Generation, 29 J.L. ECON. & ORG. 765, 766 (2012) (finding that investment in new renewable generating assets in states with RPSs has been significantly lower in states with histories of regulatory repeal than those with no history of repealing restructuring legislation), Bill Frezza, Regulatory Uncertainty Drives a Fish Farmer to Foreign Waters, FORBES (Nov. 25, 2012, 5:55 PM), http://www.forbes.com/sites/billfrezza/2012/11/25/regulatory-uncertainty-drives-a-fish-farmer-to-foreign-waters/ (chronicling a business owner’s decision to move his offshore deep water fish farming business to Panama in order to avoid the confusion and stress of overlapping state and federal regulations that would apply to his business in the United States, none of which acknowledge a lead agency or authority); See also discussion of Cape Wind, infra note 257.

characteristics, and consequences. Implicit in this concept is an understanding that there are multiple varieties of uncertainty with differing degrees of impacts. Few examples of uncertainty are either “all bad” or “all good,” with most varieties reflecting some degree of both. An analysis of a specific variety of uncertainty will require a balancing of the drawbacks and virtues of that uncertainty in any specific situation.

To assist in categorizing uncertainty into places along a spectrum, this part identifies three variables critical to developing a useable framework for characterizing the different varieties of uncertainty: (1) the context surrounding the uncertainty, (2) the scope of the uncertainty, and (3) the source of the uncertainty, each of which is discussed below. 184 This part applies this framework to energy storage uncertainty and advances a more accepting notion of uncertainty when three factors are present. Uncertainty is less troubling when it is operating in the context of high baseline levels of uncertainty, when it is limited in scope, and when the power to resolve the uncertainty resides in discrete sources, particularly when a federal source has intentionally chosen to embrace it and allows states to act to fill the void.

A. Context for Energy Storage Uncertainty

The first relevant factor to consider when categorizing uncertainty is the context of other uncertainty surrounding it. As Professor Milliken has explained, “[U]ncertainty . . . is likely to be partially a function of the characteristics of the environment in which the organization is operating.” 185 Those organizations that function in a volatile and complex environment may perceive more uncertainty than those in simpler and more stable environments. 186 Instead of a blanket reason for inaction, whether a specific uncertainty is likely to result in inaction depends in part on how risky that endeavor looks compared to the expected future value of other outcomes. Where all the alternatives have questionable expected future value, the marginal difference may be less relevant than where the uncertainty of one alternative is compared against options with more certain

184. “Some other elements of regulatory uncertainty that could be worth considering include: frequency of potential policy change (frequent or infrequent), type of compliance requirements (flexible/inflexible), and potential penalties for non-compliance (punitive or benign).” Adam R. Fremeth & Brian K. Richter, Profiting from Environmental Regulatory Uncertainty: Integrated Strategies for Competitive Advantage, 54 CALIF. MGMT. REV. 145, 163 n.5 (2011).

185. Milliken, supra note 17, at 137.

186. Id.
future value. Therefore, the first parameter to be explored when trying to characterize uncertainty is the context within which that uncertainty operates.

In assessing context, this framework posits that uncertainty should be characterized through a comparison with a baseline level. Courts have acknowledged the importance of baseline levels of uncertainty in assessing elements of claims. For instance, in order to establish the element of causation, the plaintiff must show more than the existence of uncertainty after the taking; it must show that the 1998 taking, as distinct from those other events, brought about a measurable change in the level of uncertainty, so as to affect market value.

Implicit in this assessment is an acceptance that uncertainty that exists against a high baseline level of uncertainty is not as troublesome as uncertainty amidst a relatively low baseline level of uncertainty. It is also important to remember that regardless of risks that regulations can eliminate, “a great deal of exogenous” risk—risk outside of what regulations can eliminate—will always exist.

For these reasons, context is important for making more realistic decisions about the proper response to the uncertainty.

The rest of this section assesses the uncertainty of energy storage against the baseline level of uncertainty surrounding the energy industry generally, with a specific focus on jurisdiction and cost recovery. It argues that these are two areas rife with high baseline


189. See, e.g., Nupur Chowdhury, Common Market but Divergent Regulatory Practices: Exploring European Regulation and the Effect on Regulatory Uncertainty in the Marketing Authorization of Medical Products, 35 J. EUR. INTEGRATION 635, 645 (2013) (comparing the regulatory uncertainty of pharmaceutical guidelines to that of the advanced therapy products and characterizing the level of uncertainty through comparison with a baseline level).

190. See generally Mordecai Kurz, Endogenous Uncertainty and Rational Belief Equilibrium: A Unified Theory of Market Volatility, in GENERAL EQUILIBRIUM: PROBLEMS & PROSPECTS 246, 246-48 (Fabio Petri & Frank Hahn eds., 2005) (distinguishing the “exogenous” from “endogenous” uncertainty as risk and volatility that arises from external, uncontrollable causes, including “weather conditions, earthquakes, technological changes, fire destruction etc.”).
levels of uncertainty—uncertainty that exists for all participants, not just those associated with emerging technologies.

1. Jurisdictional Context

Energy is a dynamic and often volatile field, resulting in regulatory uncertainties for all players involved. First, despite almost eighty years of FPA jurisprudence, the energy field is wrought with significant jurisdictional uncertainty. Under the FPA, FERC retains jurisdiction over wholesale electricity transactions and transmission rates, and states retain jurisdiction over retail electricity transactions and generation and distribution facilities.\(^\text{191}\) Despite this seemingly bright line drawn by Congress, there is no shortage of litigation that has ensued over line-drawing exercises between retail and wholesale classifications.\(^\text{192}\)

Electric utilities dealing primarily with fossil fuel-related energy sources are far from immune from uncertainty.\(^\text{193}\) One example can be found in the latest jurisdictional struggle between FERC and the Commodity Futures Trading Commission (CFTC) over energy derivative “swap deals.”\(^\text{194}\) Both agencies are claiming jurisdiction, and commentators have suggested that “the routine use of swaps to hedge market volatility due to weather, unforeseen demand, and other factors would be severely disrupted if regulated by the

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\(^{191}\) Section 201(a) grants FERC jurisdiction over “the transmission of electric energy in interstate commerce” and, therefore, over transmission rates. 16 U.S.C. § 824(a) (2012).

\(^{192}\) Electricity transactions are considered wholesale or retail, depending on whether the sale is sold for resale (wholesale) or whether it is sold directly to an end user (retail). See, e.g., Pub. Util. Comm’n v. Atteleboro Steam & Elec. Co., 273 U.S. 83 (1927) (holding that while states could regulate retail sales of electricity via the Commerce Clause, they could not regulate wholesale sales); S. Cal. Edison Co. v. FERC, 603 F.3d 996 (D.C. Cir. 2010) (holding that FERC failed to establish jurisdiction over CAISO netting rates); Cascade Natural Gas Corp. v. FERC, 955 F.2d 1412 (10th Cir. 1992) (rejecting the notion that if the state commission cannot have exclusive jurisdiction, it should, at minimum, have concurrent jurisdiction due to the “local” nature of the distribution); Brief for Respondent, Electric Power Supply Ass’n v. FERC, No. 11-1486 (D.C. Cir. Oct. 25, 2012), available at http://www.ferc.gov/legal/court-cases/briefs/2012/DC11-1486ElecPowerSupplyAssoc.pdf (defending FERC’s characterization of demand response as a wholesale transaction subject to federal jurisdiction).

\(^{193}\) Although not jurisdictional regulatory uncertainty, another example of traditional energy sources being subject to regulatory uncertainty is coal. Although EPA has insofar only issued final carbon regulations for new fossil fuel plants, there is enough chatter about regulations for existing fossil fuel plants to generate regulatory uncertainty surrounding more traditional forms of energy products. Joanna M. Foster, EPA Publishes First Rule Limiting Carbon Pollution from New Power Plants, THINKPROGRESS (Jan. 9, 2014, 12:48 PM), http://thinkprogress.org/climate/2014/01/09/3139921/epa-carbon-rule-power-plants.

CFTC."\(^{195}\) In addition to statutory and regulatory uncertainty, constitutional preemption principles can wreak havoc with local authorities’ exertion of authority over energy issues. This is well-illustrated by the recent controversies surrounding local authorities’ bans on hydraulic fracturing that are being challenged by states under preemption grounds.\(^{196}\) Indeed, these few examples demonstrate that the jurisdictional uncertainty in the energy field is far from limited to emerging technologies.

Emerging technologies merely present ideal vehicles to challenge the jurisdictional limits. One recent example of an emerging energy service that has created jurisdictional uncertainty is demand response, customer-side curtailments in response to requests from grid operators. Because demand response occurs on the customer side of the meter, where states retain jurisdiction, many argue for state jurisdiction over demand response charges.\(^{197}\) FERC, however, has recently exerted jurisdiction over demand response charges through Order No. 745.\(^{198}\) In that Order, FERC treats demand response as the functional equivalent of producing energy for sale at wholesale, rates that are under FERC authority.\(^{199}\) Creating another layer of regulatory uncertainty, the D.C. Circuit vacated FERC’s Order No. 745 as ultra vires regulation of the retail market in May 2014, a decision for which FERC is seeking en banc review.\(^{200}\)

\(^{195}\) Id.


\(^{197}\) In EnergyConnect, Inc., 130 FERC ¶ 61,031 (2010), FERC determined that it “do[es] not regard agreements to provide services from only demand response resources to be jurisdictional facilities because they involve agreements to reduce demand, i.e., agreements not to purchase electric energy under certain circumstances, rather than agreements to sell electric energy at wholesale.” See Demand Response Compensation in Organized Wholesale Energy Markets, Order No. 745, 134 FERC ¶ 61,187 (Mar. 15, 2011) [hereinafter FERC Order No. 745]; see also Wholesale Competition in Regions with Organized Electric Markets, Order No. 719, 125 FERC ¶ 61,071 (Oct. 17, 2008) (requiring ISO/RTOs to accept bids from demand response resources in markets for certain ancillary services on a basis comparable to other resources).

\(^{198}\) See FERC Order No. 745, supra note 197.

\(^{199}\) Id.

2. Cost Recovery Context

Second, cost recovery is governed by a complex web of both regulated and restructured mechanisms, all of which are laden with inherent uncertainty. Traditional cost-of-service can involve a substantial risk of cost recovery of capital expenditures. As discussed above, public utility commissions allow utilities to recover under cost-of-service formulas based on the fixed and variable costs, coupled with a profit. Utilities are generally expected to make investments before they know how much will be recovered and how quickly. In fact, recovery of these investments usually does not begin until after the facility is operational.201 Much like the FPA, most state regulation of utility rates incorporates a statutory “just and reasonable” standard, a vague standard imbued with uncertainty itself.202 Recovery is governed by one or a mixture of a “prudent investment” and a “used and useful” standard, which has led to varying disallowed costs.203

Years of failed investments in nuclear power facilities, for instance, led to a body of law on stranded investments, as did the transition of some states from regulated to restructured retail electricity regimes.204 Although FERC Order No. 888 now grants the measures, holding that the PUC had not met its burden of proof that the tariff impermissibly blurred the line between state and federal jurisdiction under the Federal Power Act); Hon. Jon Wellinghoff & David L. Morenoff, Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation, 28 ENERGY L.J. 389, 405 (2007) (“[T]o the extent that demand response can be characterized as involving such a wholesale sale of electric energy, it would fall within the Commission’s jurisdiction under the FPA . . . [and] the Commission may facilitate demand response in wholesale markets because demand response directly and significantly affects wholesale rates.”).


202. See, e.g., CAL. PUB. UTIL. CODE § 451 (West 2013) (“All charges demanded or received by any public utility . . . shall be just and reasonable.”); KAN. STAT. ANN. § 66-101(b) (2012) (“Every electric public utility governed by this act shall be required . . . to establish just and reasonable rates . . . .”); S.C. CODE ANN. § 58-27-810 (2012) (“Rates shall be just and reasonable.”).

203. See, e.g., Duquesne Light Co. v. Barasch, 488 U.S. 299 (1989) (disallowing millions of dollars invested in nuclear plants that were never completed due to changing market conditions).

204. See, e.g., FERC Order No. 888, supra note 136 (noting that “the construction of nuclear and other capital-intensive baseload facilities—actively encouraged by federal and
right to recovery of stranded costs associated with wholesale transmission and distribution of electricity, there is still uncertainty about the legitimacy and valuation of such costs. On one hand, neither regulation nor the Constitution guarantee utilities a right to profits; on the other hand, consumers may pay high retail prices where regulators approve expensive utility actions.

The uncertainty faced by energy storage is not so far above the baseline level of cost recovery uncertainty in the industry such as to render it a complete obstacle to its development. For instance, FERC has expressly noted that the possibility of stranded costs caused by administrative errors is not unique to energy storage. “This possibility exists throughout the utility industry and is not uniquely attributable to utilities with energy storage operations.”

In fact, an argument can be made that the likelihood of cost recovery for energy storage is even more likely. Although some forms of energy storage like CAES may be as expensive as or more expensive than traditional forms of energy infrastructure to construct, other forms of energy storage can cost significantly less than the alternatives. One example can be found in Wisconsin, where the PUC installed a magnetic energy storage system to upgrade its transmission line for stability, where the energy storage “provided the very short duration needed at roughly one tenth the cost and a faster, less intrusive installation” than alternative transmission upgrades. Although this project sought cost recovery through FERC-regulated transaction rates, such a shorter start-up time means there is even less chance for the rules to change, and it is less likely that they could become “un-used” and “un-useful” prior to cost recovery in traditional regulated regimes.

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205. FERC Order No. 888, supra note 136.
207. FERC Order No. 784, supra note 12, ¶ 134.
208. ABDURRAHMAN ET AL., supra note 119, at 3.
In sum, energy stakeholders operate in a world with a significant baseline level of uncertainty, one in which investors nonetheless see fit to move forward with energy infrastructure. The uncertainty caused by an emerging technology like energy storage is not sufficiently outside the range of reasonable uncertainty that exists for many players in the energy industry.

B. Scope of Energy Storage Uncertainty

A second relevant factor to aid in the characterization of uncertainty is the scope of the uncertainty involved. Scope refers to the extent of the impact caused by the uncertainty, which can include an assessment of short-term and long-term uncertainty. The varying scope and time-scale relevance has been recognized by Professor Hoffman, who has divided uncertainty into three categories that encompass “current implementation, medium-term measures and rules, and long-term political direction.”209 The narrower the range of impacts to the regulated entities, the less troublesome the scope.210

In one sense, the scope of the uncertainty faced by energy storage is expansive. The classification of energy storage affects not only the return on investment, but whether the project can even proceed. In this manner, the uncertainty of emerging technologies is distinct from that of existing technologies. Although one could characterize it as how cost recovery will proceed, the fact that there are multiple value streams incompatible with both regulated and market-based recovery means that there is also a chance that energy storage developers will not be able to obtain any cost recovery for certain aspects of a given energy storage technology.211 But this uncertainty can be classified as short-term “current implementation” uncertainty, one that must be compared with the longer-term uncertainty.

In another sense, the scope of uncertainty faced by energy storage developers is continually being narrowed. Beyond the federal

209. Hoffman et al., supra note 172, at 1237.

210. J.R. DeShazo & Jody Freeman, Timing and Form of Federal Regulation: The Case of Climate Change, 155 U. Pa. L. Rev. 1499, 1509-10 (2007) (“Regulatory uncertainty that are broad in scope may impose substantial costs.”). As an example, pollution control statutes like the Clean Air Act mandate an agency to develop air quality standards for six specific criteria pollutants, but there may be regulatory uncertainty about how exactly those standards will be determined and what exactly those standards will be. The cost differential between one type of standard and another type of standard may be substantial, but narrower than the difference between complying with a standard and not having to comply at all. See Clean Air Act, 42 U.S.C. § 7408 (1990).

classification of energy storage, investors can look to other proxies to provide confidence in the federal regulatory treatment of energy storage. There are many other signals that investors should take into account beyond whether a federal agency will conclusively determine the proper asset classification label for an emerging technology. This is particularly important in determining the longer-term political direction. “To the extent that waiting leads to the resolution of some of the relevant regulatory uncertainty, the firm may face an option value to delaying investment.”

But where a primary reason is to gather further assurances about the “state’s commitment” to the cause, other proxies are important. \( ^{213} \) In this case, it is relevant whether FERC is taking any other action, positive or negative, with respect to energy storage. \( ^{214} \) This evaluation reveals that FERC is moving forward in ways that demonstrate its market support for energy storage, effectively narrowing the scope of uncertainty. As a government report indicated:

If the entity is in a centrally dispatched market like MISO, the ISO needs to have sufficient tariffs and other market mechanisms in place to enable the storage owner to achieve the full value of the benefits available from all of the storage facility’s attributes. In the absence of such tariffs and market mechanisms, many of the potential benefits of the storage facility will go un-monetized, or will accrue to the benefit of market participants other than the storage owners.\(^ {215} \)

Effective market treatment for energy storage is particularly important since “much of the nation’s energy infrastructure is now owned or being developed by independent power producers who lack utility-rate base cost recovery structures” and rely exclusively on market-based rates for recovery of their costs.\(^ {216} \) Accordingly, FERC has claimed jurisdiction over some of these energy storage services,


\(^ {213} \) Id.


\(^ {215} \) SCHULTE ET AL., supra note 150, at 79; see also DENHOLM ET AL., supra note 15, at 9 (The government has suggested that “perhaps the single greatest motivation for proposals to build new energy storage is the creation of markets for both energy and ancillary services including regulation, contingency reserves, and capacity.”).

issuing important rulemakings to enhance facilitation of energy storage services onto the grid.

First, in 2007, FERC issued Order No. 890, which required wholesale markets to consider non-generation resources (including storage and distributed resources) for grid services. The order required that these non-generation resources be evaluated on a comparable basis to services provided by generation resources in meeting mandatory reliability standards, providing ancillary services, and planning the expansion of the transmission grid. This was an important recognition of the importance of non-traditional resources like energy storage, demand response, combined heat and power, and variable energy resources (renewables).

Second, in 2011, FERC issued Order No. 755, requiring jurisdictional utilities to pay a premium for “faster-ramping resources” for regulation service, citing energy storage as an example of a technology that is not currently valued appropriately. In the ISO and RTO markets, compensation for frequency regulation service is presently based on several complicated components. FERC has found that “current frequency regulation compensation practices of RTOs and ISOs result in rates that are unjust, unreasonable, and unduly discriminatory or preferential” and has finalized new rules for frequency regulation services intended to level the playing field for energy storage. In response to this order, a number of market operators have created new tariffs allowing storage to participate in ancillary service markets that resulted in expanded deployment of “124 MWs of energy storage by the end of 2012.”


218. Comments of the Electricity Consumer Resource Council, FERC Dkt. No. AD10-13-000, at 3, available at http://www.elcon.org/Documents/FERCFilings/2010/FERC8-9-10.pdf (“The threshold issue before FERC is the need to retool resource eligibility standards and to adopt the tariff and market rule changes that will enable access to wholesale power markets by non-traditional resources.”).

219. See FERC Order No. 755, supra note 68, ¶¶ 5, 11.

220. Id. ¶¶ 6-10.

221. Id. ¶ 2; FERC has noted that “current compensation methods for regulation service in RTO and ISO markets fail to acknowledge the inherently greater amount of frequency regulation service being provided by faster-ramping resources.” Id. With the exception of ISO-NE, the RTOs and ISOs limit compensation to frequency regulation resources to a capacity payment and net energy balancing. Id. ¶¶ 6-10. Until recently, the rate paid for frequency regulation services supplied by traditional fossil-fuel plants and gas-fired turbines was the same as the rate paid to fast-ramping storage systems such as batteries and flywheels. Id. ¶ 2.

222. ELEC. ADVISORY COMM., supra note 60, at 15. For example, Midwest ISO created a stored energy resources tariff. Midwest Indep. Transmission Sys. Operator, Inc., Order Conditionally Accepting Stored Resources Compliance Filing, 131 FERC ¶ 61,128 (May 10, 2010), available at http://www.ferc.gov/EventCalendar/Files/20100510142914-ER09-1126-
Additional steps are being taken to address these potential problems in lieu of regulatory clarity on classifications. In July 2013, FERC expanded its rulemakings affecting energy storage with Order No. 784.\footnote{FERC Order No. 784, supra note 12.} In addition to payment premiums provided for in Order No. 755, Order No. 784 now requires each public utility transmission provider to take into account the speed and accuracy of regulation resources in its determination of reserve requirements, two parameters where energy storage excels.\footnote{Id. ¶ 1; see supra text accompanying notes 71-72.} It also amends a historical restriction to now allow energy storage to provide ancillary services to transmission providers at market-based rates where appropriate.\footnote{Id. ¶ 9, 13.} Despite its embrace of uncertainty with respect to the classification of energy storage, FERC explicitly found that “there is a need for certainty in the accounting and reporting treatment for energy storage assets and operations, especially in instances where utilities seek to recover costs of energy storage operations in cost-based rates.”\footnote{Id. ¶ 124.} In response, FERC issued a final accounting rulemaking that requires separate accounts for energy storage within each of the traditional asset categories to better allow FERC to “monitor these utilities’ operations to prevent and discourage cross-subsidization between cost-based and market-based activities.”\footnote{Id. ¶ 125 (Comments on the notice of proposed rulemaking demonstrate a wariness for increased administrative burdens, and alternative suggestions were to record the cost of an energy storage asset in a single plant account and allocate its cost to the various functions it performs using current ratemaking methods.).}

Most recently, FERC issued Order No. 792, which revised the pro forma Small Generator Interconnection Agreement and Procedures to specifically include energy storage devices.\footnote{Small Generator Interconnection Agreements and Procedures, Order No. 792, 145 FERC ¶ 61,159, ¶ 1 (Nov. 22, 2013) [hereinafter FERC Order No. 792].} The revisions are designed to establish terms and conditions for public utilities to provide just and reasonable interconnection service for small generators.\footnote{Id. ¶ 2.} This amendment to the original Order No. 2006 adds energy storage to the category of resources that are authorized to use these procedures or a fast track interconnection process and provides clarification on the sizing of storage devices.\footnote{Id. ¶ 227-31.}
Despite FERC’s embrace of uncertainty with respect to asset classification, FERC’s actions taken as a whole are not representative of an agency that is sitting on its hands, generating inconsistent outcomes, or otherwise fostering a high-risk, unsupportive environment for energy storage. On the contrary, as energy storage counsel has indicated that “[t]he main message that FERC is sending . . . is that we need these technologies, and markets should send signals that say we need them, we’re going to pay for them. If companies are making money and can repay their shareholders, then more will invest.” Uncertainty in some short-term and long-term areas should be weighed against each other. For instance, although there is uncertainty about “current implementation” surrounding energy storage, these efforts demonstrate there is less uncertainty about the “long-term political direction” of energy storage. This suggests that investment in energy storage should come despite uncertainty in some areas, so long as there are other signals that provide them some comfort.

C. Source of Energy Storage Uncertainty

A third factor to assist in the characterization of uncertainty is the source of the certainty. Regulatory uncertainty can result from a wide variety of sources, including vague regulations, agency inaction, inconsistency in agency positions, and agency changes in regulatory

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232. Hoffman et al., supra note 172, at 1237.

233. The Supreme Court, for example, was recently obliged to resolve regulatory vagueness under the Clean Water Act in *Decker v. Northwest Environmental Defense Center*, 133 S. Ct. 1326, 1337 (2013), where it overturned a Ninth Circuit determination that logging road ditches and culverts are point sources that require a permit under the Clean Water Act. Justice Scalia, in dissent, delivered a powerful indictment of vague agency regulations, arguing that agencies are incentivized to issue vague rules because “the power to prescribe is augmented by the power to interpret . . . .” *Id.* at 1341 (Scalia, J., concurring in part and dissenting in part).


235. See, e.g., Adler, supra note 179, at 39 (noting regulatory uncertainty that can result from governmental commitments of questionable credibility that had been previously revoked); see also United States v. Magnesium Corp. of Am., 616 F.3d 1129, 1141 (10th Cir. 2010) (explaining that an agency “remains free to hear new arguments,
goals, changes in agency administrators, judicial action reviewing agency action or rulemakings, and some combination of the above. Governmental actors can even be both the source and the recipient of uncertainty, depending on the circumstances. Furthermore,

make adjustments, and change directions” without having to undergo notice and comment because it “commits itself to a particular interpretation of its own regulation only when it adopts that interpretation definitively . . . .”). John Miller, EPA Reverses Course, Nixes Idaho Pollution Rule, ASSOCIATED PRESS (July 25, 2013, 10:43 AM), http://news.yahoo.com/epa-reverses-course-nixes-idaho-144345912.html (discussing the reversal of a state water quality rule that was approved by EPA two years prior).


238. Patrick MacElroy, Four Keys to Managing Regulatory Uncertainty, BLACK & VEATCH, http://bv.com/Home/news/thought-leadership/security-and-risk-management-issues/four-keys-to-managing-regulatory-uncertainty (last visited June 14, 2014) (“Regulatory risk can take many forms, including legislation, court action or changes in regulatory goals.” (citation omitted)); see also Chowdhury, supra note 189, at 637 (“Sources of ambiguity may include the structure and substance of the norms themselves, or the institutional mechanisms that enforce those norms, the lack of a clear adjudicatory mechanism in case of dispute over interpretation of those norms, etc. Herein it is important to underline that, since regulations change over time—it is a dynamic activity—uncertainty is therefore endemic to every regulatory system.”). In addition, see the D.C. Circuit’s recent reversal of FERC’s order regarding demand response supra note 200.

239. Shapiro, supra note 183, at 10 (describing the federal legislature’s bill that would add 2 to 2.5 years to the rulemaking ossification, thereby increasing regulatory uncertainty).

uncertainty is not a static concept. Even those seemingly certain regulations run the risk of becoming uncertain.241

Other scholars point to the failure of law to keep pace with technology, creating lags that generate pockets of uncertainty.242 A survey of utility leaders, for instance, indicated that “regulatory uncertainty most often is caused by lack of longer-term direction and progression of regulatory decisions, unanticipated actions by regulators and their impact upon a utility’s current business strategies, ... the potential for costs disallowances,” inconsistent application of policies by state regulators, and lack of regulator understanding of key issues facing utilities.243 Uncertainty can be the result of one or more of these circumstances.

The source of uncertainty affects its treatment in at least two key respects. First, uncertainty may be less troublesome in cases where the regulator has intentionally embraced the uncertainty to harness its positive virtues than where the uncertainty has been thrust upon the regulated community due to a confluence of multiple circumstances. This is consistent with the biases that taint our

241. For instance, consider the EPA’s proposed rule on the treatment of air pollution that migrates across state borders. The agency strived to reduce the uncertainty of the rule, engaged in notice and comment rulemaking, and issued a final rule. Rule To Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25,162 (May 12, 2005) (to be codified at 40 C.F.R. pts. 51, 72, 73, 74, 77, 78 and 96). Despite this illusion of certainty, the D.C. Circuit struck down the rule just three years later. North Carolina v. EPA, 550 F.3d 1176 (D.C. Cir. 2008). The EPA’s second attempt at a revised rule in 2011 was again struck down by the same court. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (Aug. 8, 2011) (to be codified at 40 C.F.R. pts. 51, 51, 72, 78 and 97); EME Homer City Generation, L.P. v. EPA, 696 F.3d 7 (D.C. Cir. 2012); see also Kenneth Colburn, Least-Risk Planning, PUB. UTIL. FORTNIGHTLY, Nov. 2012, at 38, 41, available at http://mag.fortnightly.com/display_article.php?id=1241684&_width= (The D.C. Circuit’s rejection of the EPA’s cross-state air pollution rule served “to perpetuate the profound regulatory uncertainty clouding the future of the electric power sector. At a time of great change in the energy industry, when substantial energy infrastructure investments are needed nationally and energy technology is a growing basis for international competitiveness, chronic regulatory uncertainty can have sclerotic economic consequences.”).

242. See, e.g., Gary E. Marchant et al., What Does the History of Technology Regulation Teach Us About Nano Oversight?, 37 J.L. MED. & ETHICS 724, 726-27 (2009) (“Lyria Bennett Moses has identified four potential problems that may result from the failure of law to keep pace with technology, including: (1) the failure to impose appropriate legal restrictions and precautions to control the risks of new technologies; (2) uncertainties in the application of existing legal frameworks to new technologies; (3) the potential for existing rules to either under- or over-regulate new technologies; and (4) the potential for technology to make existing rules obsolete.”); see also Feingold, supra note 201, at 53 (“Interestingly, more than 90 percent of survey respondents either strongly agreed or agreed with the proposition that regulatory uncertainty is caused by the energy market changing at a faster pace than the related regulatory policies that establish the rules of the game in the marketplace.”).

243. Feingold, supra note 201, at 53.
decisionmaking. For instance, one bias is a tendency to discount risks that are undertaken voluntarily and to exaggerate risks that are imposed upon us.244 Similarly, stakeholders may discount the risks of uncertainty that are intentionally and voluntarily embraced. But such intentional, structured uncertainty may be partially justified by an agency’s efforts to harness some of the advantages of uncertainty, including flexibility and the allowance of market-driven development.

Arguably the largest benefit of uncertainty is its ability to be flexible and responsive to varied facts and changing circumstances. Courts and agencies have repeatedly embraced agency case-by-case analyses in a number of contexts, driven largely by a desire to be flexible yet narrowly tailored to prevent a broadly applicable alternative that could both under-regulate and over-regulate.245 Case-by-case treatment allows states and federal regulators to experiment with decisions that have individual impacts instead of risking an entire industry through sweeping regulations.246

The flexibility that accompanies this type of uncertainty is consistent with scholars who have emphasized the importance of adaptive mechanisms when dealing with emerging technologies. As Professor Buzbee has noted, although legal stability and knowable legal obligations are essential, there is a “stability-innovation

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244. Cass R. Sunstein, A Note on “Voluntary” Versus “Involuntary” Risks, 8 DUKE ENVT'L. L. & POL'Y F. 173, 173-74 (1997) (noting that even though car accidents are more likely than airplane crashes, people discount the risk of car accidents because they have a greater sense of control over that risk); see also Nat’l Petroleum Refiners Ass’n v. FTC, 482 F.2d 672 (1973). See generally Lennart Sjöberg, Factors in Risk Perception, 20 RISK ANALYSIS 1, 2-3 (2000).

245. See, e.g., SEC v. Chenery Corp., 332 U.S. 194, 203 (1947) (articulating the importance of both agency decisionmaking processes) (“[T]he agency must retain power to deal with the problems on a case-to-case basis if the administrative process is to be effective. There is thus a very definite place for the case-by-case evolution of statutory standards. And the choice made between proceeding by general rule or by individual, ad hoc litigation is one that lies primarily in the informed discretion of the administrative agency.”); Wis. Elec. Power Co. v. Reilly, 893 F.2d 901, 910, 919 (7th Cir. 1990) (affirming EPA’s use of a case-by-case analysis under the Clean Air Act to determine the RMRR under PSD modifications).

tradeoff.” In this case, even if innovations and improved results are possible, “legal strategies and resulting obligations” become solidified and are “seldom revisited.” Professor Mandel has suggested that “[o]ne method for achieving adaptability and flexibility is for emerging technology governance to include mechanisms that allow for incremental changes in governance as the need arises.” He highlights one of the benefits of emerging technologies in that it “often means that interests and organizations have not yet fully vested around a particular system or become wedded to a status quo.” Professor Mandel recommends that “[a] particular system of governance should be developed, followed by data gathering, followed by result evaluation, followed by modifications to the system as warranted, in a continuing cycle until industry and scientific understanding has matured.”

Another benefit of uncertainty may be its ability to yield to the market. This is particularly important where an emerging technology is at issue. These technologies involve extremely high capital intensity and infrastructure dependence, an uncertain revenue stream that depends on regulatory decisions, uncertainties about the technology’s performance and the regulatory context at scale, and a complex value-chain needing coordinated action from multiple relevant parties. If the government were to intervene with a precise classification before the technology has matured, developers might tailor their investment decisions to the regulations as opposed to the market. For instance, they might shape their investment

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248. Id.


250. Id. at 81; Belinda Bennett, Expanding Horizons: Scientific Frontiers, Legal Regulation, and Globalization, 19 IND. J. GLOBAL LEGAL STUD. 507, 524 (2012) (“[I]t is important to accept that a legal solution may only be temporary. This means accepting that laws may need to be subject to regular review, and possibly regular change, in response to new needs and new knowledge.”).

251. Mandel, supra note 249, at 89 (proposing options in final rules to avoid Administrative Procedure Act limitations on evolving regulations).


decisions to avoid certain classifications or invest in those technologies that are treated more favorably by the agency. Regulating with too much specificity also has the potential to favor known existing technologies at the potential expense of unknown future technologies. In short, choosing a classification at this early point in the commercialization of energy storage may influence firm behavior in a way that is not the most beneficial.

Using traditional regulatory tools to drive technological innovation requires detailed knowledge about the desired course of technological change and what sorts of innovations are likely or foreseeable. But government regulators rarely have the necessary information or foresight to drive innovation this way. Where the government is uncertain of either the technology or the best future use of the technology, it may make sense to allow other factors to drive these decisions. “Even if regulators were to identify a proper target initially, the regulatory process changes so slowly that regulatory standards would be unlikely to keep up with technological change or account for new information.” Instead of being driven by regulatory definitions, some uncertainty allows technologies to be driven by demand. In short, the government needs to send signals that it believes in the value of the emerging service, but not regulate so narrowly that it drives how or which precise technology develops to provide that service. This is not to say that intentional uncertainty will always yield positive results, but that

(2012) (explaining that the market alone does not foster enough innovation and that the government must intervene to influence technological innovation).

254. The International Energy Agency, for example, recently promulgated an implementing agreement between thirteen countries in order “to formulate effective policies that increase production and trade in [energy efficient appliances and equipment].” INT’L ENERGY AGENCY, TECHNOLOGY-FORCING STANDARDS FOR ENERGY EFFICIENCY: EFFICIENT ELECTRICAL END-USE EQUIPMENT (4E), at ii (2012). The Agency noted that far-reaching regulatory action concerning end-use electrical equipment was justified because technology-forcing standards for appliances would likely enable research and development, bring forward significant technology changes, and provide industry long-term regulatory certainty. Id. at v.

255. Adler, supra note 179, at 37.

256. Jon C. Dubin, Overcoming Gridlock: Campbell After a Quarter-Century and Bureaucratically Rational Gap-Filling in Mass Justice Adjudication in the Social Security Administration’s Disability Programs, 62 ADMIN. L. REV. 937, 944 (2010) (finding that although the Social Security Administration’s application of disability rules was intended to provide clarity, it instead led to inconsistent results, rendering severely disabled claimants, such as epileptics or psychotics, ineligible for benefits while rendering much less disabled claimants, such as arthritics, eligible); Andrew A. Lundgren, Sarbanes-Oxley, Then Disney: The Post-Scandal Corporate-Governance Plot Thickens, 8 DEL. L. REV. 195, 199 (2006) (pointing to the Sarbanes-Oxley Act as an example of legislation designed to grant flexibility but produced a climate that is “exactly the opposite of what Congress intended to do.”).
there is a better chance for positive results when risks are undertaken than when risks are imposed.

Second, uncertainty may be less troublesome where there is unilateral as opposed to multiple sources. Uncertainty that is an involuntary confluence of multiple factors outside the control of any one actor is more troublesome than uncertainty that is intentionally embraced by a single actor. Multiple sources render it less likely that the uncertainty can be easily resolved and increase the transaction costs of reducing the uncertainty from multiple sources. To demonstrate this point, one need only look to the Cape Wind fiasco. In that situation, the stakeholders involved in developing the nation’s first offshore wind farm experienced uncertainty from a myriad of sources, including the Department of the Interior, the state of Massachusetts, and even the Federal Aviation Administration, resulting in decade-long delays.257

Applying this factor to energy storage reveals a more discrete and manageable source of uncertainty. FERC responded to this uncertainty with an explicit embrace of it, declining to resolve the issue with general applicability and instead approaching each unique energy storage technology on a case-by-case, fact-specific basis. FERC has stated that “electricity storage devices, in a general sense, do not readily fit neatly into either of the traditional functions of generation, transmission or distribution.”258 Similarly, FERC Commissioner Moeller has said, “Our overall view is that energy storage is unique and doesn’t fit neatly into the distribution or transmission box.”259

For FERC to do otherwise may have been criticized as premature. Regulating with more certainty at this point in the emerging technology cycle may have caused more damage than good. It would have eliminated the flexibility inherent in the current case-by-case analyses and could have thwarted creativity and market-driven moves on the part of energy storage developers. For instance, if


FERC had expressly delineated the type of energy storage that satisfied their definition of a generation asset, firms may have tailored their investment towards those types of energy storage even if the grid was more in need of others. By the same token, in addition to reaping some of the virtues of uncertainty, the singular source suggests that resolution of the uncertainty at a later point in time could be swift.

In sum, this Part demonstrates that the uncertainty associated with FERC’s determination for energy storage is not sufficiently troublesome to justify inaction. Unlike many other types of uncertainty, this uncertainty was not caused by the juxtaposition of multiple actors or circumstances. On the contrary, the uncertainty surrounding energy storage was intentionally embraced, with an eye toward rendering the best outcomes, as regulators and stakeholders become familiar with the different energy storage technologies, values, and purposes. When the critical features of uncertainty are analyzed it becomes clear that this uncertainty is consistent with the general uncertainty that surrounds the energy industry, that the scope is narrower than other types of uncertainty, and that the source of the uncertainty is one federal agency intentionally seeking to reap the advantages of energy storage in a world where the law is struggling to keep up with the technology.

IV. STRATEGIES FOR RESOLVING THE REGULATORY UNCERTAINTY SURROUNDING ENERGY STORAGE

Political scientists have developed considerable organizational theory literature on the response of “the firm” to regulatory uncertainty. In the simplest sense, the analyses can be categorized into four major response strategies: (1) avoid the uncertainty (2) ignore the uncertainty, (3) adapt to the uncertainty, or (4) advocate for more clarity to reduce the uncertainty. The choice of response is affected in part by the type of uncertainty facing the firm, but as Professor Hoffman and her co-authors have observed, “investment decisions cannot be viewed solely from the perspective of

260. See Engau & Hoffmann, supra note 17, at 55-56.
262. Engau & Hoffmann, supra note 17, at 55 (arguing that “firms pursue four objectives when responding to regulatory uncertainty, seeking to either avoid, reduce, adapt to, or disregard this uncertainty”).
regulatory uncertainty,” and there are certainly other factors that trump this uncertainty.\footnote{263}

An avoidance strategy is usually reserved for the riskiest of endeavors.\footnote{264} As Professors Engau and Hoffman remark, “[H]igh regulatory uncertainty is more difficult to cope with than low regulatory uncertainty, therefore forcing firms without sufficient coping capacity to avoid uncertain regulatory environments and to shift their business to more predictable ones.”\footnote{265} Avoiding the uncertainty usually involves postponing decisions, waiting for more clarity to prevent errors, or withdrawing completely from the enterprise.\footnote{266} This response is generally adopted by smaller firms experimenting with suspect technology that has not yet gained large-scale public commitment.\footnote{267}

Ignoring the uncertainty involves adopting a “no regrets policy,” in which, unsure of how government regulations will affect the firm’s future, they adopt as many strategies as possible at once.\footnote{268} This strategy is reserved for firms that are large enough to have a substantial reserve to adopt multiple strategies, allowing for success regardless of any regulatory outcome.\footnote{269}

Adapting to the uncertainty is reserved for firms whose success is threatened by the uncertainty of changes coming from new legislative actions.\footnote{270} The choices a firm makes in adapting its response to such

\footnote{263. Hoffman et al., supra note 172, at 1244 (identifying timing, complementary resources, and institutional pressure as other factors that can counter a response that postpones investments).}

\footnote{264. Engau & Hoffmann, supra note 17, at 59 (“[F]irms exposed to high regulatory uncertainty will avoid this uncertainty to a greater extent than firms facing low regulatory uncertainty.”); Chowdhury, supra note 189, at 637 (“[O]nly when regulatory uncertainty reaches unmanageable proportions does it challenge and undermine the effectiveness of the regulatory system as whole.”).}

\footnote{265. Engau & Hoffman, supra note 17, at 59.}

\footnote{266. See id. at 56; see also Summit Farm, Inc. v. Comm’r, 42 T.C.M. (CCH) 1240, 1243 (T.C. 1981) (There is “considerable legislative and regulatory uncertainty concerning whether this plastic container would be banned in Minnesota. . . . [P]rudence and good business judgment prompted Summit to adopt a wait-and-see attitude.”).}

\footnote{267. Marcus et al., supra note 261, at 9-10 (giving an example of petro-algae, an immature technology today, as it remains unclear as to whether sufficient progress will ever be made to justify its commercialization).}

\footnote{268. Id. at 9 (explaining that an electric utility, for example, may be unsure of how government regulations will affect future energy prices and thus begin using multiple forms of energy—coal, natural gas, wind, renewable, and nuclear). A similar concept is an anticipator response. Christian Engau et al., Airlines’ Flexibility in Facing Regulatory Uncertainty: To Anticipate or Adapt?, 54 CAL. MGMT. REV. 107, 117 (2011).}

\footnote{269. Marcus et al., supra note 20, at 9 (noting that electric utilities may have the financial reserves to adopt such a strategy but that start ups in energy efficiency may not have similar reserves and will thus be unable to adopt the strategy).}

\footnote{270. See, e.g., Nancy M. Carter, Small Firm Adaptation: Responses of Physicians’ Organizations to Regulatory and Competitive Uncertainty, 33 ACAD. MGMT. J. 307, 307-08}
uncertainty largely depends on costs—in these situations, firms aim to limit costs such as “loss of autonomy, increased dependency, and increased uncertainty.”

Advocating for more clarity is used by those who are likely to benefit from such an investment. These firms participate in the policy process themselves, with the aim of influencing policymakers. Contrary to an avoidance strategy, where a stakeholder may stay away until more information is available, an advocacy strategy seeks to enhance the effectiveness of the eventual decision by actively acquiring more information to narrow the scope of the uncertainty. Ernst & Young has documented an advocacy response for firms exposed to uncertainty from climate change: “The companies interviewed in this survey indicate a strong preference for more regulatory certainty, but to a large extent, they are not waiting for clarity and are positioning their businesses accordingly.”

Importantly, one strategy may not be right for every type of energy storage stakeholder involved. The prior analysis in Part III demonstrates that energy storage uncertainty does not rise to the level deserving of complete withdrawal from energy storage. Energy storage’s foothold demonstrates that there are sufficient varieties that would not be classified as “suspect technologies.” Furthermore, the nation’s energy grid cannot afford such a wait-and-see approach.

By the same token, energy storage stakeholders should not pursue a “business as usual” approach that does little to track developments on energy storage. This is particularly true of stakeholders operating in traditional cost-of-service jurisdictions, where the prudence of investments is carefully evaluated. It is important that these stakeholders not turn a blind eye to the uncertainty they face so as not to find themselves making decisions that a PUC may find imprudent.

(1990). This type of strategic flexibility has also been analyzed in Engau et al., supra note 268, at 117-20.

271. Carter, supra note 270, at 308.


274. See, e.g., Violet v. FERC, 800 F.2d 280, 281 (1st Cir. 1986) (noting that the Massachusetts Department of Public Utilities found that Edison Electric was imprudent in not cancelling a project once the “increased costs due to licensing delays, regulatory requirements, and uncertainty surrounding various other aspects of the project” had become “intolerably high”).
It is possible that the strategy being deployed by a number of wind farm developers could be categorized as “ignoring” the uncertainty. This strategy involves capitalizing on the existence of complementary resources, which can cause decisionmakers to invest despite a high level of regulatory uncertainty.275 Many wind farms are pursuing this strategy, pairing energy storage with their wind farm resources already in existence.276 Their ability to capture profits on their wind farms can only increase with energy storage, but these entities have diversified the risk to the extent that they will still profit regardless of the energy storage component.

Similarly, some stakeholders may be seen as adapting to the uncertainty facing storage. For instance, utilities in California have been approved to build “permanent load shifting” demand response, which is really a form of energy storage. By adapting its terminology to that already accepted within the regulatory framework, these utilities were able to seek approval for storage as part of their demand response funding.277

This Article urges energy storage stakeholders to engage in more advocacy responses.278 As Professor Mandel has said, “[i]nstead of allowing the scientific and regulatory uncertainty to produce stagnation . . . it may be possible to leverage the uncertainty to achieve a more positive outcome.”279 Energy storage developers could even benefit from investments in the face of regulatory uncertainty “if they gain a first-mover advantage.”280 This Part provides some advocacy strategies for energy storage stakeholders to function

275. Hoffmann et al., supra note 172, at 1244.
277. See, e.g., Decision Authorizing Long-Term Procurement for Local Capacity Requirements, Cal. Pub. Util. Comm’n, Rulemaking 12-03-014, at 2 (Feb. 13, 2013), available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M050/K374/50374520.PDF (approving Southern California Edison’s 2013 capacity procurement plan and imposing a requirement that 150 MW be procured through “preferred resources,” including demand response); see also S. CAL. EDISON, PERMANENT LOAD SHIFTING PROGRAM 1, https://www.sce.com/wps/wcm/connect/a4e1543d-1cc7-46b3-8c02-920f3aa66a/SCE_PLS_ProgramGuides_20140205.pdf?MOD=AJPERES (last visited June 14, 2014) (explaining that Permanent Load Shifting “focuses on cooling [thermal energy storage] systems” in which “[c]ooling is produced and stored during the time when energy charges are lower and discharged at a later time when energy and peak demand charges are high”).
278. Cf., e.g., Reuters Ltd. v. FCC, 781 F.2d 946, 948-49 (D.C. Cir. 1986) (documenting the “assault” on the Commission to resolve regulatory uncertainty over the uses of microwave radio stations when applications lay dormant at the Commission).
279. Mandel, supra note 249, at 76.
280. Hoffmann et al., supra note 172, at 1228.
within the uncertainty, as well as some suggestions for federal regulators to facilitate these efforts.

A. Strategies for Energy Storage Stakeholders to Function Under Regulatory Uncertainty

Implicit in both advocacy and adaptation strategies are affirmative actions to reduce or manage the extent of the uncertainty. Advocating for clarity requires a significant expenditure of capital, but FERC already has begun engaging with stakeholders on ways to properly integrate energy storage into the existing legal regime. For instance, stakeholders have proposed a number of solutions to resolve this asset classification uncertainty, including squeezing technology into one of the three existing categories, creating an entirely new fourth category for energy storage, or retaining the status quo. This section suggests additional pathways for stakeholders to advocate for clarity. First, stakeholders can reduce uncertainty by harnessing the benefits of federalism and seeking state initiatives to fill the gap left by FERC. Second, stakeholders can petition FERC for affirmative rulings on jurisdictional or cost recovery questions. Third, stakeholders can continue to pursue additional funds for energy storage research and development to generate more information that further reduces the uncertainty. Each of these forms of actively reducing uncertainty is discussed below.

1. Harness the Benefits of Federalism

The first advocacy strategy for investors considering energy storage is to evaluate and encourage state actions that may drive certainty. An oft-discussed benefit of our federalist system is the ability of states to step in and fill a void left by the federal government. Where the federal government is hesitant to provide

281. See, e.g., LUONG, supra note 19, at 21, 29 (“[T]ransmission is the most discussed and controversial market for energy storage participation.”).

282. CHALLENGES AND OPPORTUNITIES, supra note 34, at 16 (“NHA recommends further evaluation of treating bulk energy storage as a separate and distinct electricity infrastructure asset class (i.e., Balancing Asset or Compensating Asset), capable of relieving grid stresses through the absorption of excess energy during low demand periods or rapidly providing capacity during periods of peak demand.”).

283. See LUONG, supra note 19, at 33 (“Increasing the renewable energy supply will eventually create needs for energy storage to supplement all components of the grid [including generation, transmission, and distribution markets]. As such, it follows that its roles be carved out within the existing energy market structure. A new energy storage asset category is not needed.”).

284. See, e.g., Shawna Bligh & Chris Wendelbo, Hydraulic Fracturing: Drilling into the Issue, NAT. RESOURCES & ENV’T, Winter 2013, at 7, 8-12 (exploring the proliferation of state fracking regulations in the absence of any comprehensive federal action).
clarity on an issue, as is the case with FERC, state legislatures and PUCs may act to force the issue. Although state initiatives with respect to energy storage could generate inconsistencies that drive stakeholders to appeal to the federal government for relief or clarification, state initiatives may also be effective in establishing a path forward toward certainty. This may occur through successful state legislative or PUC programs that gather additional information or begin to coalesce around a more unified set of rules.

One example can be found in California, the first state to move toward providing more certainty for energy storage investments. In 2010, California passed the Energy Storage Law (AB 2541), which requires publicly-owned and investor-owned utilities to procure grid-connected storage systems where appropriate. The new law directs the California Public Utilities Commission (CPUC) to open a proceeding to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems. The law provides that an energy storage system is designed to “reduce the need for new fossil-fuel powered peaking generation facilities” and to “provide the ancillary services” fossil fuels had been providing, but it otherwise defines an “energy storage system” broadly to include centralized or distributed, or ownership by a utility, customer of utility, or merchant third-party, but with the requirement that it must reduce greenhouse gas emissions, reduce demand for peak generation, or improve the reliable operation of the transmission or distribution grid. In February 2013, the CPUC began implementation of this law by requiring that fifty MW of Southern California Edison’s long-term capacity requirements come from energy storage by 2021. In October 2013, the CPUC continued to implement the energy storage

285. DeShazo & Freeman, supra note 210, at 1500 (“[S]tates can be important catalysts of a federal policy response by stimulating both pro-regulatory and anti-regulatory forces to appeal to the federal government for relief sooner rather than later.”).

286. CAL. PUB. UTIL. CODE § 2835(f) (2010) (such energy storage can be acquired through ownership or a contractual right to purchase electricity from a third party).

287. Notably, the bill could have set the procurement target at zero, largely eviscerating the impact of the law. The procurement targets must be “viable and cost effective.” Id. § 2836(a)(1).

288. Id. § 2837(c), (h). The law required the proceeding by March 1, 2012, adoption of an energy storage system procurement target by October 1, 2014, and attainment by December 31, 2016, and a second target to be achieved by December 31, 2020. Id. § 2836(b)(1)-(2).

289. Id. § 2837(c), (h).

290. Id. § 2835(a)(1)-(3).

mandate for all of California’s investor-owned utilities by approving more procurement targets and mechanisms totaling 1325 MW of storage.292

Such mandates can provide important protection for investors who will be subject to cost of service recovery evaluations. They protect investors from the discretion of PUCs that are often unwilling to approve rate requests involving technologies that exceed those required by law.293 Rejected as overkill that harms the ratepayers, these new technologies are often exactly the type of innovation being encouraged on other policy levels. Past efforts to bet on the winners of technologies that are not yet mandated have often left utilities disappointed. Instead, utilities are now counseled to wait to implement technologies until they are mandated and not jump ahead of the regulatory curve.294

Despite the benefit of mandates for utilities, such mandates also generate risks. Notably, such mandates do the exact opposite of the benefit of uncertainty cited above—whereas uncertainty allows the market to pick winners instead of the government, mandates allow the government to pick the winners.295 Such technology-forcing endeavors have been widely criticized in the literature, running the

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294. See, e.g., MacElroy, supra note 238 (noting how Congressional inaction on carbon “left early adopters of carbon technologies without the market incentives needed to make them competitive”).

risk of forcing technology that is not yet ready for commercialization or picking a winner when another option turns out to be better.\textsuperscript{296} The cumulative impact of such mandates on utilities should also be considered, as many states are already subject to mandates for renewable energy and energy efficiency, generating backlash.\textsuperscript{297} Forcing these technologies too soon could result in disaster, with utilities being forced to invest in higher-risk technologies than they would otherwise invest in. Others have urged the inclusion of escape valves in case the target is set too high for technology to keep up, as the California energy storage mandate does, requiring the target to be reevaluated every three years.\textsuperscript{298} Regardless of the outcome of California’s experiment in federalism, such state actions can serve as a catalyst toward ultimately resolving the uncertainty.

A second example can be found in Texas, where the state stepped in to provide regulatory clarity for energy storage. Texas is in a unique regulatory position, being the only state among the forty-eight contiguous states with its own interconnection, excluding itself from FERC jurisdiction.\textsuperscript{299} Although it does not address energy storage serving as a transmission asset, Texas has explicitly identified energy storage used to sell energy or ancillary services as generation for cost recovery purposes.\textsuperscript{300} “Texas already deployed the nation’s biggest sodium-sulfur (NaS) battery, which can power 4,000 residents in Presidio, Texas, for up to eight hours during an outage.”\textsuperscript{301} The utility, S&C Electric Co., is using a PureWave Storage

\textsuperscript{296} But cf., e.g., \textsc{Matthew Deal et al.}, \textsc{Cal. Pub. Util. Comm'n, Electric Energy Storage: An Assessment of Potential Barriers and Opportunities} 8 (2010) (The California PUC has acknowledged that it needs to “[c]ompare the costs and benefits of various types of EES with those of other load-shifting and emissions reduction strategies (including energy efficiency, demand response, and renewable energy procurement), in order to determine how ratepayer funds can be optimally committed.”).


\textsuperscript{300} \textsc{Tex. Util. Stat. Ann.} § 35.152 (West 2011) (“Electric energy storage equipment or facilities that are intended to be used to sell energy or ancillary services at wholesale are generation assets.”); see also \textit{Project #39917}, \textsc{Pub. Util. Comm'n of Tex.}, http://www.puc.texas.gov/industry/projects/rules/39917/39917.aspx (last visited June 14, 2014).

\textsuperscript{301} Roberts, \textit{supra} note 55, at 48.
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Management System to control the system, including storing grid power and dispatching it back to the grid as needed. “This is the first time a state PUC has allowed rate-based recovery for a distributed energy storage project.”302 As stakeholders have indicated,

“[w]ithout the right pressure from the Public Utilities Commission (PUC), grid-scale utility storage will remain a good idea that will likely never get implemented.” Ed Cazalet of Megawatt Storage Farms alluded to utilities that claim, “We can’t sign this storage contract until we have a regulation telling us to do that.”303

2. Encourage FERC to Develop Case-by-Case Precedent

A second strategy for functioning within this uncertainty involves stakeholders approaching FERC for advance orders on case-specific projects. FERC can assert jurisdiction over energy storage through either its authority over transmission services or through its authority over wholesale electricity transactions. Energy storage developers also can use FERC’s processes to obtain affirmative orders from FERC regarding their specific asset classification situation, reflecting another advocacy response.

There are already a few examples of developers seeking an affirmative declaration from FERC that their energy storage facilities qualify as wholesale transactions under FERC jurisdiction or as “transmission assets” justifying incentive-based rates. In Norton Energy Storage, L.L.C., FERC held a compressed air energy storage facility was subject to its exclusive jurisdiction under section 201 of the FPA through its jurisdiction over wholesale electricity rates.304 This compressed air facility converted non-storable electric energy to storable compressed air, a process known as the conversion/storage cycle.305 FERC held it was this conversion/storage cycle that separated the storage facility from other facilities that consume energy that is sold for end use, an action outside the Commission’s jurisdiction.306 It reached this decision by comparing the compressed air facility to pumped storage hydroelectric facilities, which are traditionally subject to FERC jurisdiction under section 201.307 A compressed air facility, like a pumped storage hydroelectric

302. Id. at 49.
305. Id. at 2.
306. See id. at 7.
307. Id.
facility “is not a source of new energy,” as the energy is converted but is not consumed.\textsuperscript{308}

In Western Grid Development, L.L.C., FERC classified a proposed sodium sulfur battery storage project as a wholesale transmission facility.\textsuperscript{309} Like in Norton Energy, L.L.C., the Commission used analogies to other energy facilities to reach its decision. Specifically, FERC compared the battery storage “to capacitors in the sense that they will be operated to provide electricity to the transmission grid to maintain system reliability, rather than to act as an energy or capacity resource.”\textsuperscript{310} However, the Commission emphasized this decision was not a general policy determination regarding the jurisdiction of battery storage but rather limited to the specific facts of the facility at hand.\textsuperscript{311} These batteries are similar to substation equipment already used in many wholesale transmission system facilities, will be operated by the California ISO, and will not participate in any wholesale electricity markets—all of which are characteristics that led FERC to designate them as transmission facilities.\textsuperscript{312} Western Grid will pay retail energy prices when taking power from the grid, will receive retail credit when reliability concerns trigger a release of energy, and will also “pass through any incremental market revenues to customers through a PTO tariff.”\textsuperscript{313} Importantly for those who are concerned about double-counting, Western Grid will not retain revenues outside of the transmission access charge.\textsuperscript{314}

Although such case-by-case analyses can carry with them high transaction costs, they allow entities to realize one of the benefits of uncertainty—flexibility to respond to specific situations in lieu of an overbroad, one-size-fits-all approach. As is demonstrated above, they also begin to provide factual energy storage scenarios that provide benchmarks for analogizing and distinguishing future energy storage projects. Although there is disagreement about FERC’s approach to energy storage, forcing the issue will provide more opportunities for scrutiny and evaluation. The more applicants that use this approach,

\textsuperscript{308} Id. at 8 (emphasis omitted).

\textsuperscript{309} Western Grid Development, L.L.C., 133 FERC ¶ 61,029, slip op. at 1 (Oct. 12, 2010).

\textsuperscript{310} Id. at 6-7.

\textsuperscript{311} Id. at 6 (noting that this is subject to CAISO approval of projects through their transmission plan).

\textsuperscript{312} See PJM Interconnection, L.L.C., \textit{supra} note 92, at 4; Western Grid Development, L.L.C., 130 FERC ¶ 61,056, slip op. at 14 (Jan. 21, 2010).

\textsuperscript{313} Western Grid Development L.L.C., \textit{supra} note 312, at 7.

\textsuperscript{314} Id. at 15.
the broader the precedent for energy storage will grow, establishing gradual norms that can narrow the range of uncertainty.

3. **Develop More Information**

A last strategy for functioning within the uncertainty is to develop more information through enhanced research and development. Stakeholders can use the period of uncertainty to gather superior information that leads to more effective and accurate decisionmaking. This is particularly the case where any harm caused by delaying regulatory certainty is surpassed by the benefits of a more informed decision.\(^{315}\) As Professor Elliot describes,

> By regulating too soon we may not only regulate the wrong thing, but we may regulate in the wrong way. To be more precise, it may be that if we had waited a little while, we would have developed regulatory tools and techniques that are better by an amount that more than compensates for the harm that comes about in the meantime.\(^{316}\)

As much as certainty is valued, many stakeholders might value the opportunity to develop more information and shape the rules in a way that enhances effectiveness.\(^{317}\) One advantage of withholding regulation, and thus creating uncertainty, is that doing so allows regulators more time to collect information, refine the purpose and feasibility of a law, and facilitate the proper means to implement their policies.\(^{318}\) One example can be found in modeling advancements. MISO and PJM have independently determined that better modeling is required to better assess the role of energy storage.

\(^{315}\) Elliott, *supra* note 234, at 264-65 (pointing to the delay in providing regulatory certainty regarding acid rain as an example of a delay and period of regulatory uncertainty that resulted in better regulation compared to that of climate change).

\(^{316}\) *Id.* at 264; see also Warren G. Lavey, *Making and Keeping Regulatory Promises*, 55 FED. COMMS. L.J. 1, 15 (2002) (Even after significant time is spent developing a final decision, "the FCC may identify flaws in the rules it adopted from market experience, by assessing changing market conditions, by developing a new evaluation of options, or after judicial reversal.").

\(^{317}\) See, e.g., Fremeth & Richter, *supra* note 184, at 146 (arguing that more firms should use the advocating response in the face of environmental regulatory uncertainty, in which firms advocate for pragmatic, progressive policies, which enable them to shape future regulation in their favor). But see the extensive literature on rent-seeking, much of which suggests that stakeholders may use this opportunity only to shape rules in a way that favors themselves.

\(^{318}\) See Elliott, *supra* note 234, at 263; see also *id.* at 265 ("When we can afford to, we should wait until we understand a problem well enough to develop a sensible, effective regulatory approach—rather than rushing off to ‘do something’ as soon as the scientists tell us that there is a problem.").
in transmission planning. Technology continues to advance to aid those in the energy storage community to find a way to integrate these multi-faceted services into the existing legal regime. To do otherwise can have serious consequences. There could be more energy storage start-up bankruptcies and more discontent within the emerging industry if the agency jumped the gun and regulated before more complete information about the value, effects, and integration was developed.

This information gathering will be helped by recent public and private funds that have been earmarked for energy storage and other smart grid technologies. On the public level, the Advanced Research Projects Agency – Energy (ARPA-E) has received approximately $770 million since 2009 to support the development of innovative energy technologies. On the private level, “[a]ccording to a recent survey by Ernst & Young, energy storage was the largest segment for cleantech investment in the third quarter of 2011, increasing by 1,932 percent over the same period last year.” The Internal Revenue Service is also providing a tax credit equal to thirty percent of the specified advanced energy property for qualifying advanced energy projects.

Political scientists argue that “high regulatory uncertainty denotes a lower availability of information on the respective regulation than is available under low regulatory uncertainty.” Therefore, as more information develops, stakeholders may serve to reduce the uncertainty surrounding energy storage even further. In

319. MISO ENERGY STORAGE REPORT, supra note 78, at 1-4 (“MISO needs to improve storage modeling.”); see also ABDURRAHMAN ET AL., supra note 119, at 2 (PJM identifying better models as a fundamental need for energy storage); Bhatnagar, supra note 159, at 7.

320. “The new software will allow companies and utilities to understand how a given storage system could perform multiple functions, creating multiple streams of revenue that together allow the owner of the energy storage system to make a profit. It also does an analysis of which revenue streams are something that can actually be captured, given existing regulations.” Kevin Bullis, Building the Business Case for Energy Storage, MIT TECH. REV. (June 14, 2013), http://www.technologyreview.com/view/516146/building-the-business-case-for-energy-storage/.


324. Engau & Hoffmann, supra note 17, at 59.
short, developers should have sufficient confidence and strategies to “power through” the uncertainty associated with energy storage.

B. Strategies for Regulators to Narrow the Range of Regulatory Uncertainty

The approaches for stakeholders will be most effective if regulators can also work to narrow the range of uncertainty involved in energy storage. Although a number of strategies could be discussed, this section considers two feasible options. First, PUCs can reduce cost recovery uncertainty through cost recovery protections. Second, FERC can reduce cost and jurisdictional uncertainty by providing some parameters to cabin its discretion and applying such parameters to produce consistent outcomes. Each of these is discussed below.

1. Constrain the Regulatory Uncertainty

Although mandates were discussed earlier as a way to constrain PUC discretion, PUCs can also affirmatively act in ways to reduce the risks for new technologies. First, state PUCs may be able to provide some pre-approval for energy storage applicants in the form of a prudence determination. As an example, a 2011 Florida law required risk reduction, in that “the [PSC] shall provide for full cost recovery . . . of all reasonable and prudent costs incurred by a provider for renewable energy projects that are zero greenhouse gas emitting at the point of generation . . .”

Second, some PUCs even allow utilities to implement creative alternatives to reduce their risk in questionable investments. PUCs have allowed “tariffed rates” and feed-in-tariffs to recover the

325. See, e.g., Fabrizio, supra note 182, at 792 (discussing strategies that have been proposed to reduce the risk of investment, such as shared risk, and binding the regulatory body to make it more costly to change their mind).

326. See supra Part IV.A.1.

327. JIM LAZAR & DAVID FARNSWORTH, INCORPORATING ENVIRONMENTAL COSTS IN ELECTRIC RATES 17, 21-22 (2011), available at www.raponline.org/document/download/id/4670; Wiranowski, supra note 206, at 376-77 (“Utilities also face regulatory uncertainty, especially regarding cost recovery, so utilities often seek pre-approval from their regulators in the form of a prudence determination . . . For example, if a utility can secure a statutorily guaranteed return for particular kinds of investments like renewable energy generation, it can avoid the uncertain process of the state regulator's cost-benefit analysis for those investments.”).


costs of renewable projects. PUCs have also granted greater weight to a utility’s own estimate of costs and potential electricity production of a proposed project than an outside statistical estimate.\(^{331}\) So long as the utility’s projections have been made in good faith, a utility can sometimes assume that its numbers will be presumed legitimate instead of being worried that the PUC will always need to conduct its own study.\(^{332}\) Other PUCs have approved “spot market prices” that lowered consumer's bills and reduced uncertainty for utilities.\(^{333}\)

2. **Develop Parameters and Apply Them Consistently**

A second method for regulators to narrow the range of uncertainty is for FERC to adopt some limiting principles on its case-by-case assessment. For instance, although FERC was loathe to commit to specific qualifications, limits, or incentives required during its rulemaking on market incentives, FERC did provide three situations creating rebuttable presumptions that the requirements of section 219 are satisfied: (1) transmission projects that result from a fair and open regional planning process that considers and evaluates projects for reliability and/or congestion and is found to be acceptable to the Commission; (2) a proposed project located in a National Interest Electric Transmission Corridor; or (3) a project that has received construction approval from an appropriate state commission or state citing authority.\(^{334}\) If energy storage meets any of these three conditions, its proposal for incentive-based rates carry a rebuttable presumption of approval.\(^{335}\)

FERC also provided a number of other relevant parameters that it would apply to future decisions. First, FERC interpreted “section 219 to promote capital investment in a wide range of infrastructure investments that can have either reliability or congestion benefits rather than investments that have both reliability and congestion benefits.”\(^{336}\) Second, applicants are required “to show some nexus between the incentives being requested and the investment being made, i.e., to demonstrate that the incentives are rationally related to the investments being proposed.”\(^{337}\) Third, FERC will not

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332. See id.
334. FERC Order No. 679, supra note 141, ¶ 58.
335. Id.
336. Id. ¶ 42.
337. Id. ¶ 48.
impose size limits on eligible projects or condition approval on market power findings. 338

FERC can develop similar benchmarks for energy storage, perhaps taking a functional approach to asset classifications. As more cases present themselves, categories will begin to develop and certain factual scenarios will become more predictable. If the industry can come to anticipate the outcome of these cases, a norm will eventually develop that can provide more confidence in expected future outcomes. Although there may not be consistency across jurisdictions, there should at least be consistency within a jurisdiction.

V. CONCLUSION

There is no doubt about the vast potential found in energy storage. According to some estimates, “[t]he U.S. energy storage market exceeded $1 billion in 2011 and could surpass the $5 billion mark in 2014.”339 “[A]nnual global demand for grid-scale energy storage will reach an astounding 185.4 gigawatt-hours (GWh) by 2017 and represent a $113.5 billion incremental revenue opportunity for an industry that currently generates sales of $50 to $60 billion a year.”340 In 2009, the U.S. Department of Energy (DOE) awarded $185 million of $778 million in smart grid funding to energy storage initiatives. DOE loan guarantees have supported many of the energy storage projects discussed above,341 and legislation proposing tax credits for energy storage technologies continues to be introduced.342

338. Id.


To realize its full potential, however, energy storage also needs to be integrated into the labyrinth of regulated and restructured energy regimes. The uncertainties are numerous. It is unclear whether restructured market rules will allow energy storage services to compete on even playing fields. If the market rules are amended to allow more even competition between energy storage and traditional generation assets, it is unclear if the markets will account for the variety of energy storage services. It is unclear whether utilities will be able to receive compensation through their rates where many PUCs are focused on the least-cost alternative. Furthermore, different uncertainties are resolved at different times. For instance, it has been suggested that uncertainties in restructured markets may be resolved more quickly than those in regulated markets. It will be interesting to see whether California’s utilities respond to the new energy storage mandate by obtaining their own resources or whether they will contract with Independent Power Producers to fulfill the majority of their needs. This Article is not intended to minimize the challenges posed by regulatory uncertainty, but to caution our response. Without diagnosing the different varieties of uncertainty, we run the risk of perpetuating inaction.

By characterizing the regulatory uncertainty surrounding energy storage, this analysis reveals that it is of a manageable variety, a variety that will allow energy storage to develop even within a zone of uncertainty. In fall 2004, Navigant Consulting conducted a comprehensive survey to solicit the insights of utility leaders into the key challenges surrounding regulatory uncertainty and the implications on the rate-case and ratemaking activities of gas and electric distribution utilities. “The message, heard loud and clear, was that regulatory uncertainty is real and remains one of the most critical issues in the North American energy industry. It must be better managed.”

