ADDRESSING CLIMATE CHANGE WITHOUT LEGISLATION

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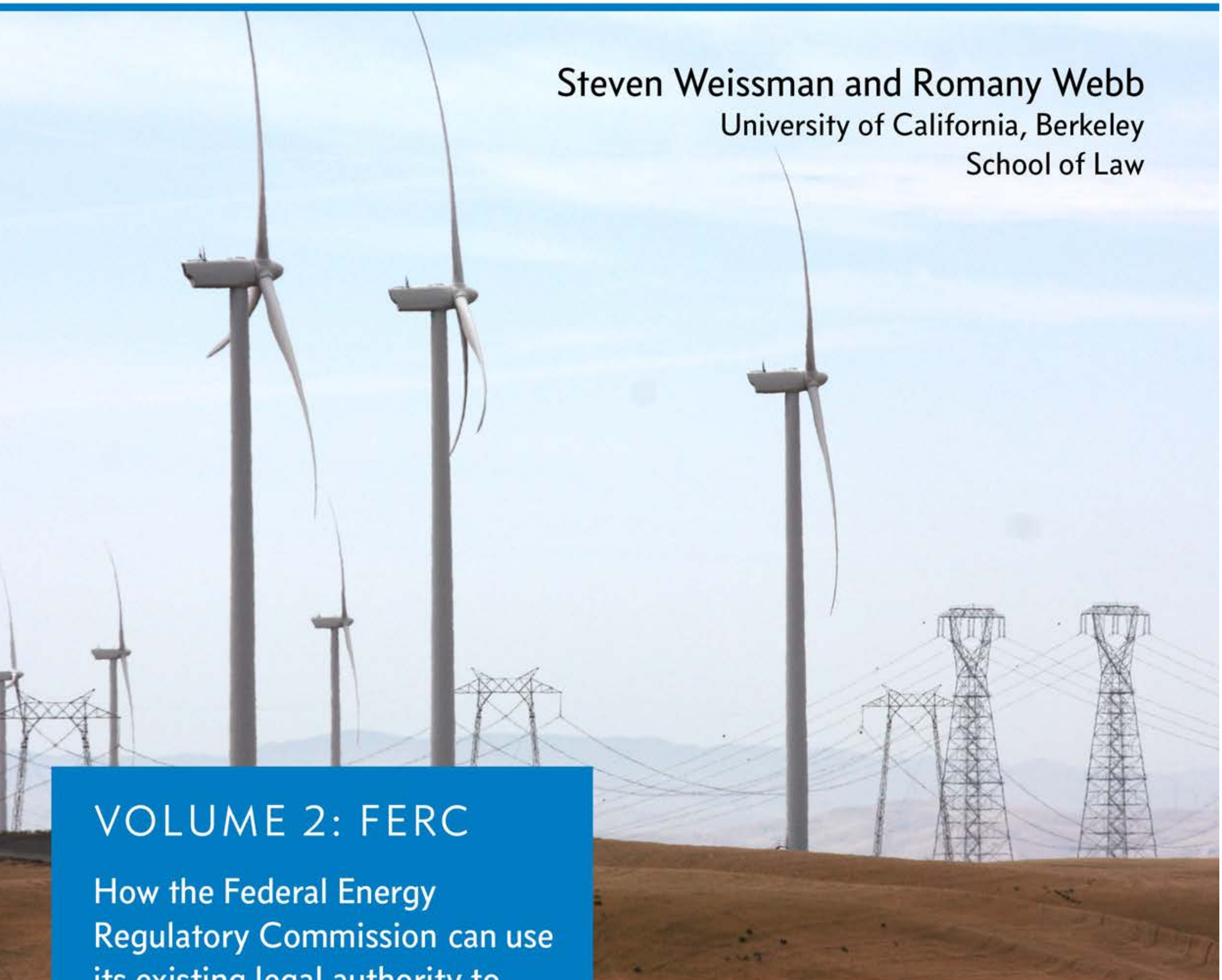

VOLUME 2: FERC

How the Federal Energy Regulatory Commission can use its existing legal authority to reduce greenhouse gas emissions and increase clean energy use

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HOW THE FEDERAL ENERGY REGULATORY COMMISSION CAN USE ITS EXISTING LEGAL AUTHORITY TO REDUCE GREENHOUSE GAS EMISSIONS AND INCREASE CLEAN ENERGY USE

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Shiloh wind farm in California. Courtesy of Etienne Le Sueur.

1. Introduction

A significant and growing body of scientific evidence indicates that human activities are contributing to rising temperatures and other climatic variations.[1] The third National Climate Assessment, released on May 6, 2014, estimates that average temperatures in the U.S. have risen by 1.3 to 1.9°F since 1895, with the most recent decade being the hottest ever recorded.[2] This rise has corresponded with a substantial increase in human-induced carbon dioxide emissions. The concentration of carbon dioxide in the earth's atmosphere has increased by more than forty percent since the Industrial Revolution, primarily due to the burning of fossil fuels (i.e., coal, oil, and natural gas) in energy production and other human activities.[3]

Increasing atmospheric carbon dioxide levels are expected to cause continued warming, with average global temperatures forecast to rise by up to 10°F during the 21st century.[4] Rising temperatures will lead to more variable precipitation patterns, causing prolonged droughts and flash floods.[5] Other extreme weather events, such as hurricanes and tornadoes, will also become increasingly frequent and severe.[6] Additional climatic changes are also anticipated, including reduced snow and ice cover, accelerated melting of glaciers, and rising sea levels.[7]

According to the third National Climate Assessment, these and other changes "will affect human health, water supply, agriculture, transportation, energy…and many other sectors of society, with increasingly adverse impacts on the American economy and quality of life."[8] The extent of these impacts will depend, in large part, on the amount of carbon dioxide and other greenhouse gas emissions over coming decades. Recent research suggests that, if all emissions were eliminated now, future temperature increases would be limited to just 0.5°F.[9] This would avoid major changes in precipitation, minimize snow and ice loss, and reduce the risk of sea level rise.

Recognizing this, governments around the world have taken steps to minimize carbon dioxide and other greenhouse gas emissions. This has commonly been achieved by reducing the use of carbon-intensive fossil fuels in electricity generation and other activities.[10] Seeking to encourage such reductions, President Obama has repeatedly called on Congress to enact legislation mitigating climate change.[11] In the absence of Congressional action, the President has used existing executive powers to support climate change mitigation.

In the 2013 State of the Union Address, delivered on February 12, President Obama indicated that he would take "executive actions…now and in the future, to reduce pollution, prepare our communities for the consequences of climate change, and speed the transition to more sustainable sources of energy."[12] Fulfilling this commitment, on June 25, 2013, the President adopted a new Climate Action Plan directing the executive branch to, among other things:

- establish carbon pollution standards for new and existing power plants;[13]
- encourage electricity generation using wind, solar, and other renewable energy sources;[14]
- provide financial assistance for advanced fossil energy projects;[15]
- limit energy waste and enhance energy efficiency;[16]
- develop fuel economy standards for heavy-duty vehicles;[17]
- support research into biofuels, electric vehicles, and other clean transportation options;
- limit emissions of methane;[18] and
- conserve forests to increase carbon sequestration.[19]

The strategies outlined in the Climate Action Plan represent an important first step in reducing greenhouse gas emissions. However, the Climate Action Plan is far from comprehensive. On June 3, 2014, we published the first in a series of reports identifying other actions the executive can take to mitigate climate change. That report focused on mitigation actions available to the Department of the Interior ("**DOI**"). In this report, we identify actions available to the Federal Energy Regulatory Commission ("**FERC**" or "**Commission**").

FERC is an independent federal agency responsible for regulating aspects of the electricity, hydropower, natural gas, and oil industries.[20] These industries are among the largest emitters of greenhouse gases nationally. Research by the U.S. Environmental Protection Agency ("**EPA**") indicates that electricity generation accounted for almost thirty eight percent of carbon dioxide emissions in the U.S. in 2012.[21] In the same year, oil and gas systems[22] were responsible for over one quarter of U.S. emissions of methane[23] – a greenhouse gas over twenty times more potent than carbon dioxide.[24]

FERC makes many decisions that have an effect on the energy industry's overall greenhouse gas emissions. However, despite this, the Climate Action Plan does not provide for the adoption of emissions reductions strategies by FERC.

The EPA has recently issued proposed rules to reduce greenhouse gas emissions related to electric power generation. It is too soon to know what form the final rules will take. This report discusses further actions FERC can take to reduce the energy sector's greenhouse gas emissions. The report identifies actions that can be taken under existing law, without the need for approval by Congress. However, the report does not assess the merits of the identified actions. Rather, it is left up to FERC to determine whether implementation of each action is a wise policy choice.

Relying on its current legal authority, FERC could:

- **Promote greater use of clean energy sources.** FERC can reduce fossil fuel generation by including a carbon adder, reflecting the cost of climate and other environmental damage caused by electricity generation's carbon dioxide emissions, in wholesale electricity rates.
- **Encourage increased development of renewable power systems.** FERC can promote more renewable generation by facilitating the development and use of feed-in tariffs that guarantee renewable generators a specified price for their power.
- **Support the use of hydrokinetic resources, particularly ocean energy resources**. FERC can encourage the development of offshore hydrokinetic projects by simplifying the approvals process for such projects.
- **Encourage expansion of the transmission grid to connect areas with high renewable energy potential to load centers.** FERC can require electric utilities to expand their transmission capacity to serve renewable power systems. Additionally, FERC can encourage utilities to voluntarily invest in such expansions by changing its transmission cost recovery rules to allow for broader allocation of investment costs.
- **Promote integrated resource planning that considers both supply- and demand-side options for meeting future electricity requirements.** By encouraging utilities to consider all possible resource options, integrated resource planning may lead to greater use of renewable generation, energy efficiency, and other environmentally friendly resources. Recognizing this, FERC may require utilities to adopt a fully integrated approach when preparing regional transmission plans. Additionally, FERC can also foster greater cooperation and information sharing between utilities during the planning process.
- **Reduce the natural gas industry's climate impacts.** FERC can mitigate greenhouse gas emissions from natural gas production, transportation, and use by requiring natural gas companies to report on the climate impacts of their operations and to take appropriate steps to minimize those impacts.

2. THE FEDERAL ENERGY REGULATORY COMMISSION

FERC is an independent federal agency regulating aspects of energy production and delivery. FERC's primary regulatory duties include:

- overseeing the interstate transmission and wholesale sale of electricity;
- reviewing mergers and other commercial transactions involving electricity companies;
- approving the construction of electricity transmission lines in designated congested areas;
- maintaining the reliability of the interstate electricity transmission grid;
- licensing the construction, operation, and maintenance of private, municipal, and state hydropower projects;
- supervising the interstate transport of oil by pipeline;
- authorizing the construction and abandonment of interstate natural gas pipelines and storage facilities; and
- permitting the construction and operation of liquefied natural gas ("**LNG**") terminals.

3. WHOLESALE ELECTRICITY SALES

KEY POINTS

- The combustion of fossil fuels during electricity generation emits substantial carbon dioxide and other greenhouse gases that contribute to climate change. These emissions can be reduced by replacing fossil fuel generating systems with cleaner renewable generating plants. FERC is uniquely placed to support this shift in generation.
- The Federal Power Act (16 U.S.C. § 791a et seq.) invests FERC with broad regulatory authority over wholesale electricity transactions. FERC's regulatory duties include overseeing wholesale electricity rates to ensure that they are just and reasonable and not unduly discriminatory or preferential.
- FERC relies primarily on markets to set wholesale electricity rates. These market-based rates do not reflect the cost of climate and other environmental damage caused by electricity generation's carbon dioxide emissions. This gives fossil fuel generators a competitive advantage over less polluting generating systems.
- To ensure a level playing field in the generation market, FERC could include a carbon adder, reflecting the cost of environmental damage caused by electricity generation's carbon dioxide emissions, in wholesale electricity rates.
- FERC can also support clean energy sources by facilitating the use of feed-in tariff programs that guarantee renewable and other low-emission generators a specified price for their power.

Research by the EPA indicates that U.S. electricity generation produced over 2,200 million tons of carbon dioxide in 2012, making it the largest source of emissions nationally.[25] These emissions result from the combustion of carbon-intensive fossil fuels, such as coal, oil, and natural gas, in generating systems.[26] According to the National Research Council, coal-fired systems produce, on average, between 0.95 and 1.5 tons of carbon dioxide per megawatt hour ("**MWh**") of electricity generated.[27] Carbon dioxide emissions from oil- and natural gas-fired systems are also significant, averaging approximately 0.84[28] and 0.57[29] tons per MWh generated respectively.

The electricity industry's carbon dioxide emissions can be minimized by using wind, solar, and other renewable fuel sources in generation. The Intergovernmental Panel on Climate Change ("**IPCC**") estimates that lifecycle greenhouse gas emissions from renewable generating systems are ninety to ninety five percent lower than lifecycle emissions from fossil fuel systems.[30]

Notwithstanding the above, expanding renewable generation is not a perfect solution to climate change. While renewable power systems generate electricity without emitting carbon dioxide or other air pollutants, the production and installation of such systems may do so.[31] Additionally, these activities may also reduce carbon sequestration. For example, solar installations typically require land clearing which destroys trees and other vegetation that absorb carbon dioxide from the atmosphere.[32] Land clearing may also have other adverse environmental effects, destroying wildlife habitat and thereby reducing biodiversity.[33] Nevertheless, renewable generating systems typically cause less environmental damage than fossil fuel power plants.[34]

Recognizing this, the federal government has adopted various policies aimed at increasing renewable power production. Most significantly, the Energy Policy Act of 1992 provided a tax credit for electricity generated from qualifying renewable power sources.[35] With the expiration of the credit on December 31, 2013, other means of encouraging renewable generation are needed.

The need for a tax credit or similar policy arises because renewable generation is often not economically competitive with fossil fuel-based electricity. One reason for this is that fossil fuel generators are not required to pay for the significant climate and other environmental damage caused by their carbon dioxide emissions. It is estimated that each ton of carbon dioxide emitted by electricity generation and other activities causes climate damage equal to $21 today, rising to $45 by 2050.[36] These and other costs take the form of externalities - impacts that are felt by third parties or the public at large – and are therefore not reflected in electricity market prices.[37] As a result, they tend to be overlooked by market participants.[38] This gives polluting generators a competitive advantage in electricity markets and leads to higher levels of fossil fuel use than would otherwise take place. The National Research Council has argued that "when market failures like this occur, there may be a case for government interventions in the form of regulations, taxes, fees, tradable permits, or other instruments."[39]

This chapter explores possible regulatory mechanisms FERC can use to ensure a level playing field between fossil fuel and renewable generators. Section 3.1 outlines FERC's regulatory jurisdiction over electricity transactions. Section 3.2 then discusses actions FERC can take to ensure that these transactions reflect the full climate and other environmental costs of fossil fuel generation and do not disadvantage renewable power systems.

3.1. FERC's REGULATORY JURISDICTION OVER WHOLESALE ELECTRICITY SALES

Federal Power Act, section 201(a) (16 U.S.C. § 824(a)) gives FERC jurisdiction over the sale of electric energy at wholesale in interstate commerce. Under Federal Power Act, section 201(d) (16 U.S.C. § 824(d)), "sales at wholesale" are defined to mean sales to any person for resale. These sales are considered to occur "in interstate commerce" whenever electric energy moves from the buyer to the seller via an interstate transmission grid.[40]

Today, electricity transmission in all U.S. states except Alaska, Hawaii, and parts of Texas and Maine occurs via two synchronous grids. The Western Interconnection reaches from British Columbia in Canada to Baja California in Mexico and includes all U.S. territory west of the Great Plains. All U.S. territory to the east of the Great Plains, except parts of Texas and Maine, is covered by the Eastern Interconnection. Therefore, with the exception of parts of Texas and Maine, all electricity transmission in the contiguous U.S. occurs through interstate grids and is therefore subject to FERC regulation.

Under the Federal Power Act (16 U.S.C. § 791a et seq.), FERC is responsible for overseeing wholesale rates for interstate electricity sales, which includes all sales utilizing the interstate grid. Federal Power Act, section 205(a) (16 U.S.C. § 824d(a)) requires the rates charged by electric utilities for, or in connection with, wholesale electricity sales to be just and reasonable. Federal Power Act, section 205(b) (16 U.S.C. § 824d(b) further provides that, in making wholesale electricity sales, public utilities must not grant any undue preference or advantage to, or discriminate against, any person.

To enforce these requirements, Federal Power Act, section 205(c) (16 U.S.C. § 824d(c)) requires public utilities to file all rate schedules and contracts relating to their wholesale electricity sales with FERC. Additionally, under Federal Power Act, section 205(d) (16 U.S.C. § 824d(d)), utilities must also file with FERC proposed changes to their rates and contracts. Federal Power Act, section 206(a) (16 U.S.C. § 824e(a)) authorizes FERC to change rates that it determines, after a hearing held on its own motion or upon complaint, are "unjust, unreasonable, unduly discriminatory or preferential." In such cases, FERC must establish the just and reasonable rate. FERC may also order a refund to ratepayers of the difference between the amount paid and the just and reasonable rate.[41]

The Federal Power Act (16 U.S.C. § 791a et seq.) does not define what constitutes a "just and reasonable" rate. Therefore, it is up to FERC and the courts to interpret this phrase. The U.S. Supreme Court has held that the just and reasonable standard does not require FERC to adopt a particular rate level[42] or use a particular rate methodology.[43] Rather, FERC must use its discretion to set rates "within a zone of reasonableness, where rates are neither 'less than compensatory' nor 'excessive'."[44] This requires FERC to balance the interests of electricity suppliers and customers.[45] From the supplier side, rates will be just and reasonable if they provide an opportunity to earn sufficient revenue to cover the operating expenses and capital costs of the business and provide a return on investment.[46] From the customer side, just and reasonable rates do not permit exploitation, abuse, or gouging, or unjust discrimination between customer groups.[47] In addition to considering these supplier and customer interests, FERC's ratemaking must also protect the general public interest.[48]

Coal-fired power plant. Credit: U.S. Geological Survey.

3.2. Actions available to FERC to ensure a level playing field between fossil fuel and renewable generators

As fossil fuel generators are not required to pay the environmental costs of their carbon dioxide emissions, they enjoy a competitive advantage over renewable energy producers. FERC could remove this advantage by including a carbon adder, reflecting the cost of climate and other environmental damage caused by carbon dioxide, in wholesale electricity rates. By providing a more accurate estimate of the environmental costs of different generation resources, this may encourage increased use of less-polluting generating systems.[49] Similar benefits could also be achieved using feed-in tariffs that guarantee renewable and other low-emissions generators a specified price for the electricity they supply.

3.2.1. Reducing the environmental externalities of electricity generation

Under Federal Power Act, section 205 (16 U.S.C. § 824d), FERC must ensure that the rates, terms, and conditions for wholesale electricity sales are just and reasonable and not unduly discriminatory or preferential. FERC uses a combination of regulatory and market means to achieve this goal.[50]

Until 1989, FERC relied exclusively on cost of service ratemaking to set wholesale electricity rates.[51] Under this approach, FERC allowed each public utility to recover, in its rates, the legitimate costs it incurred in providing electricity services and a reasonable return on its capital investment.[52] While this cost-based methodology is still employed in some circumstances, FERC has recently made increasing use of market-based rates.

In 1989, FERC took the first of many steps to promote market competition in electricity generation.[53] In that year, FERC issued its first market-based rate authorization allowing Citizens Power & Light – a power marketer – to sell electricity at market-based rates.[54] Since this time, FERC has approved over 1900 applications for market-based rate authority[55] and implemented a range of other measures to promote competitive wholesale electricity markets.[56] As a result, market-based rates now dominate.[57] FERC takes the view that, provided a seller and its affiliates do not have, or can mitigate, market power in generation and transmission, these market-based rates will be just and reasonable.[58]

FERC's primary objective in promoting competitive wholesale electricity markets was "to bring more efficient, lower cost power to the Nation's electricity consumers."[59] In practice, this has meant minimizing electricity prices.[60] However, as one writer has observed, "low-priced power may not be the same as low-cost power."[61] This mismatch between price and cost occurs because generating electricity results in external costs, including climate and environmental damage, which are not reflected in electricity market prices.[62] Due to the presence of these externalities, market-based electricity rates are arguably not just and reasonable and therefore violate the Federal Power Act (16 U.S.C. § 791a et seq.).

In *Federal Power Commission v. Sierra Pacific Power Company*, 350 U.S. 348 (1956), the U.S. Supreme Court held that, in exercising its authority to set just and reasonable rates, the former Federal Power Commission (now FERC) must ensure protection of the public interest.[63] As a result, a rate that is "so low as to have an adverse effect on the public interest" will be unjust and unreasonable.[64] In that case, the court sought to ensure that low rates did not impair the supplier's financial ability to provide services and/or lead to excessive rates for other customers.[65]

Our research has not identified any relevant administrative decisions or court cases analyzing FERC's ability to consider the impact of low rates on environmental outcomes. However, previous cases interpreting the public interest criterion in the Federal Power Act (16 U.S.C. § 791a et seq.) strongly suggest that these impacts can be taken into account. The leading case on this issue is *National Association for the Advancement of Colored People v. Federal Power Commission*, 425 U.S. 662 (1972) ("**NAACP**"). There, the U.S. Supreme Court held that references to the "public interest" in the Federal Power Act (16 U.S.C. § 791a et seq.) do not give FERC "a broad license to promote the general public welfare."[66] Rather, the court held that the term must be interpreted in light of the purposes of the Federal Power Act (16 U.S.C. § 791a et seq.).[67] The court described the principal purpose of the Federal Power Act (16 U.S.C. § 791a et seq.) as being to "encourage the orderly development of plentiful supplies of electricity…at reasonable prices."[68] Notably however, the court recognized that the Federal Power Act (16 U.S.C. § 791a et seq.) also contains a number of subsidiary purposes and, in particular, authorizes FERC to consider environmental issues.[69]

The NAACP decision suggests that, in setting electricity rates that protect the public interest, FERC must account for the climate and other environmental costs of generation. This view is shared by a number of energy law scholars. For example, a 2011 study by Jeremy Knee found that FERC's shift to market-based rates was intended to advance the public interest in minimizing electricity costs.[70] Knee argues that achieving this goal requires FERC to account for the environmental impacts of generation as, "it is virtually impossible to minimize total costs if a substantial portion of costs are left out of the calculation."[71] Similarly, Elesha Simeonov asserts that protecting the public interest requires FERC to consider the environmental costs of electricity generation's carbon dioxide and other air emissions.[72]

FERC has repeatedly determined that it is in the public interest to encourage the development of healthy wholesale power markets. However, less-polluting generators are placed at a competitive disadvantage when more-polluting generators can mask the true cost of power by ignoring externalities. As a result, competitive markets might discourage the development of power sources that make the most efficient use of resources and thereby discourage the development of healthy wholesale markets.

FERC may account for the climate externalities of electricity generation using carbon adders. This would require FERC to set a dollar value – the adder – for each ton of carbon dioxide emitted during electricity generation and include that adder in wholesale electricity rates. To ensure that generators do not over-recover compared to their expenditures, the amount collected through the adder program would need to be reimbursed to customers in an equitable manner.

There is some precedent for FERC using rate adjustments to achieve public policy objectives. For example, in 2006, FERC ordered PJM Interconnection, L.L.C. ("**PJM**") – the manager of a wholesale electricity market covering Delaware, Maryland, New Jersey, Pennsylvania, Virginia, the District of Columbia, and parts of Illinois, Michigan, North Carolina, Ohio, Tennessee, and West Virginia – to impose an uplift charge equal to the marginal cost of transmission line losses on all wholesale customers to cover the cost of energy lost during transportation from the point of generation to the point of delivery ("**marginal line loss pricing**").[73]

FERC's decision to require marginal loss pricing was made on policy grounds and aimed to ensure that prices provide the strongest signal possible to encourage more efficient use of the transmission system. In reaching this policy decision, FERC was aware that its approach would produce a mismatch between costs and revenues and would most likely lead to a significant over-collection by PJM.[74] FERC ordered that any surplus funds collected in excess of PJM's costs be returned to market participants, based on the amount they pay for the fixed costs of the transmission grid.[75] This order was subsequently upheld by the U.S. Court of Appeals for the District of Columbia Circuit as a valid exercise of FERC's ratemaking authority.[76]

In ordering PMJ to adopt marginal loss pricing, FERC emphasized that use of this methodology would reduce electricity supply costs and thereby increase electricity market efficiency.[77] In this regard, FERC stated:

> *"[B]y changing to the marginal losses method, PJM would change the way that it dispatches generators by considering the effects of [transmission line] losses. As a result…the total cost of meeting load would be reduced… PJM estimates that this cost reduction would be about $100 million per year. Implementation of marginal losses, therefore, would produce a more efficient allocation of resources."*[78]

Including a carbon adder in wholesale electricity rates would have similar benefits. Specifically, placing a value on electricity generation's carbon dioxide emissions forces market operators to consider climate and other environmental costs when dispatching generators. This should, in turn, help ensure that electricity demand is met using the generating resources with the lowest environmental cost.

One way that the marginal line loss pricing example differs from the carbon adder proposal is that, while carbon externalities by definition do not usually create a burden for buyers and sellers of power, line losses do create such a burden. The cost of line losses must be reflected in rates, while carbon externalities arguably need not. What makes the line loss example relevant is that in order to achieve a greater purpose - increased electric market efficiency - FERC has elected to allow the collection of revenues for line losses that exceed direct cost and developed a methodology for redistributing over-collections. A carbon adder would work in a similar way.

A second example worthy of consideration appears in two FERC decisions, issued in 2006 and 2011, relating to the New England Forward Capacity Market ("**FCM**"). In *Devon Power LLC*, 115 FERC ¶ 61,340 (2006), FERC approved a proposal by ISO New England, Inc. ("**ISO-NE**") – the manager of a wholesale electricity market covering Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont - to establish an alternative price rule to reset the market clearing price in the FCM in certain circumstances.[79] The rule allows ISO-NE to declare below-cost bids from new capacity to be "out-of-market".[80] When there are out-of-market bids, ISO-NE must reset the clearing price if: (1) new capacity is needed, (2) there is adequate supply in the market, and (3) at the market clearing price, purchases from out-of-market capacity exceed the required new entry.[81] In such cases, the market clearing price must be set to the lower of the price at which the last bid from new capacity was withdrawn minus $0.01 or the cost of new entry.[82]

FERC held that the alternative price rule is just and reasonable as it mitigates the exercise of buyer-side market power and thereby ensures that market prices are high enough to encourage new entry when additional capacity is needed.[83] In this regard, FERC stated:

> *"In the absence of the alternative price rule, the price in the [FCM] could be depressed below the price needed to elicit entry if enough new capacity is self supplied (through contract or ownership) by load. That is because self-supplied new capacity may not have an incentive to submit bids that reflect their true cost of new entry. New resources that are under contract to load may have no interest in compensatory auction prices because their revenues have already been determined by contract. And when load owns new resources, they may have an interest in depressing the auction price, since doing so could reduce the prices they must pay for existing capacity procured in the auction."*[84]

In 2011, to further mitigate market power, FERC directed ISO-NE to establish an "offer floor," based on the cost of new entry, that all bids in the FCM must equal or exceed.[85] In issuing this direction, FERC indicated that the offer floor was needed to "deter the exercise of buyer-side market power and the resulting suppression of capacity market prices."[86]

A similar means of mitigating market power was considered in *PJM Interconnection, LLC*, 143 FERC ¶ 61,090 (2013). There, FERC reviewed the minimum offer price rule which requires all new generation resources seeking to participate in PJM's capacity market auctions to submit bids at or above a specified price floor.[87] FERC indicated that the rule "seeks to prevent the exercise of buyer-side market power in the forward capacity market, which occurs when a large net-buyer – that is, an entity that buys more capacity from the market than it sells into the market – invests in capacity and then offers that capacity into the auction at a reduced price."[88]

FERC's action to shore up the bid prices in the ISO-NE and PJM capacity markets represents the agency's response to a certain type of market failure – the potential distortion of auction prices caused by suppliers bidding at a price below cost. The existence of environmental externalities represents another kind of market failure to which FERC could also respond by adjusting the bid price. In the case of the capacity markets, FERC's policy preference is to encourage the construction of more electric generating units. In the case of a carbon adder, the policy objective would be to stimulate the development of generating units that will impose the lowest cost on society and remove another type of market distortion – the ability of some generators to undercut their competitors by escaping responsibility for their environmental costs.

Also, note that the EPA's recently-released proposed rules for carbon emissions from existing power plants allow for creative approaches to emission reductions. A carbon adder as applied to wholesale markets would be consistent with the proposed rules, and those rules provide additional support for the legality of such a strategy.

For the reasons described above, FERC could find that wholesale electricity rates that minimize the environmental costs of generation are just and reasonable. To achieve this outcome, FERC could include a carbon adder, reflecting the environmental costs of electricity generation's carbon dioxide emissions in wholesale rates. If FERC decides to adopt this approach, it should issue a Notice of Inquiry to investigate how best to design and implement the carbon adder program.

FINDING 1

FERC could account for the costs of climate damage resulting from electricity generation's carbon dioxide emissions by including a carbon adder in wholesale electricity rates.

3.2.2. SUPPORTING THE USE OF FEED-IN TARIFFS

One way to accelerate the development of renewable energy resources is to offer to pay for renewable power at a rate sufficient for the developer to cover its costs and have a chance to make a profit. As simple as this concept might be, renewable generators have traditionally been left to compete, based on price, against coal and natural gas power generators that are not paying for the significant environmental and health costs they are imposing on society as a whole. Feed-in tariffs are seen by many as a way to use markets to ensure a certain level of renewable power development.

In the simplest sense, a feed-in tariff could be any promise to pay certain generators a specified price for power that they deliver to the electricity grid. The term has taken on a special meaning in light of adjustments made to feed-in tariffs in various countries to ensure that the prices offered to renewable energy producers cover the reasonable cost of generation and offer a chance for a fair return on investment. Denmark, Germany, Portugal, and Spain have offered the most popular feed-in tariffs.[89] Other jurisdictions with feed-in tariffs include South Africa, Kenya, the Canadian province of Ontario, the Indian states of West Bengal, Rajasthan, Gujarat, and Punjab, as well as the Australian Capital Territory, South Australia, and New South Wales in Australia.[90] Recently, a few U.S. states, including California, Hawaii, Oregon, Rhode Island, Vermont, and Washington, and some U.S. municipalities have introduced feed-in tariffs.[91]

The response to the European programs was dramatic. Germany and Spain saw stunning growth in renewable energy deployment and jobs as a result of their feed-in tariff programs. Today, over twenty percent of Germany's power comes from renewable sources, with the goal of reaching thirty five percent by 2020.[92] In 2010, Germany's 9.8 gigawatts ("**GW**") of solar arrays comprised forty seven percent of the world's installed solar capacity.[93] Germany reports that two thirds of its 367,000 renewable energy jobs can be attributed to the legislation creating the feed-in tariff program.[94]

In Spain, by the end of 2010, wind generation alone totaled 19,710 megawatts

("**MW**") of capacity out of the nation's total of 98,687 MW.[95] However, the continuing economic crisis in Spain has taken a toll on its feed-in tariff offering. The Spanish government reduced tariff levels for new projects in 2009,[96] suspended the offer of tariff payments at any level to new projects in 2012,[97] and reduced payments to existing renewable energy facilities in 2013.[98] While the formula now in place allows for a continued modest return on investment, the simple fact that the government has stepped back from its earlier price commitments has drawn much criticism. Some argue that Spain did not show adequate restraint in setting its initial tariff prices, creating an unsustainable rush to build. Other countries have also modified their feed-in tariffs since the economic crisis began in 2008, but in a manner less extreme than has occurred in Spain.

States in the U.S. are not unencumbered in their efforts to experiment with feed-in tariffs. Some regulated utilities have fought efforts to require them to buy renewable power at predetermined prices. They assert that state regulators lack jurisdiction to impose feed-in tariffs by making the following arguments:

- The Commerce Clause of the U.S. Constitution[99] empowers Congress to regulate commerce among the states. By implication, the states are prohibited from regulating or otherwise interfering with interstate commerce. This prohibition is often referred to as the Dormant Commerce Clause.
- A feed-in tariff represents the establishment of a wholesale power rate.
- Establishing a wholesale power rate interferes with interstate commerce when the power would flow through a multi-state interconnected grid.
- Since only Congress can regulate wholesale rates, the states cannot impose feed-in tariffs.

In 2010 the California Public Utilities Commission ("**CPUC**"), interested in establishing a feed-in tariff through its regulated utilities, asked FERC for its interpretation of the states' legal authority to require feed-in tariffs. FERC responded by agreeing with the argument summarized above.[100] At the same time, FERC acknowledged the authority of states, as granted by Congress in section 210 of the Public Utility Regulatory Policies Act of 1978 ("**PURPA**") (16 U.S.C. § 824a-3), to set prices for utility purchases of power from cogenerators[101] and certain "small power" producers[102] (together, "**qualifying facilities**"). The states were delegated responsibility for determining prices for payments to qualifying facilities at the utility's avoided cost – the amount the utility would pay for the same amount of power if it obtained the power from another source. In its declaratory order, FERC concluded that states could establish feed-in tariffs only if the seller of the power meets the definition of a qualifying facility under PURPA and only if the price offered to the seller does not exceed the utility's avoided cost.

As a follow-up to FERC's declaratory order, the CPUC asked for clarification as to how the states would be allowed to determine the avoided cost. FERC responded by concluding that, in places such as California where there is a requirement that utilities purchase a certain amount of power from renewable sources,[103] state regulators may conclude that the avoided power source would be another renewable energy generator. In this situation, the avoided cost could be set at the cost of producing power from the specified renewable source.[104]

While these two orders from FERC create an opportunity for states to establish feed-in tariffs in some circumstances, they could also have a chilling effect on state efforts to utilize feed-in tariffs. To comply with the orders, the facility receiving the payments would have to be a qualifying facility. This limits the program to certain technologies and certain generating capacities. Additionally, a state could arguably lose its ability to establish a feed-in tariff if FERC excuses a utility from its obligation to buy power from qualifying facilities. FERC has the authority to do this under section 1253(a) of the Energy Policy Act of 2005 (16 U.S.C. § 824a-3(m)), when it determines that the qualifying facilities are able to participate in a sufficiently competitive wholesale market in the utility's service area. This means that states face uncertainty and some limitations when considering the adoption of a feed-in tariff.

FERC could do one of several different things to remove this chilling effect. FERC could:

1. Conclude that a feed-in tariff does not represent the setting of a wholesale rate by a state. While FERC does have exclusive authority to establish wholesale rates for interstate power sales,[105] arguably a feed-in tariff would be no more than an offer to buy power at a certain price. A seller would retain the authority to sell at any reasonable rate it sees fit, and to any buyer, while being able to benefit from the feed-in tariff offer if it so chooses. In addition, the utilities would still have the ability to make other purchases at other prices. In its 2010 order on the CPUC's establishment of feed-in tariffs, FERC rejected these arguments. However, the order did not provide a rationale for that rejection and simply stated "we disagree."[106]
2. Take one or more of the following actions, all of which are consistent with FERC's finding of federal preemption:
   a. allow a state to set feed-in tariffs for any types of facilities it chooses, without the constraints of PURPA, and create a process under which a utility could ask FERC to overturn a state-established rate that is not just and reasonable;
   b. allow states to create feed-in tariff plans and submit them to FERC for approval;[107]
   c. delegate authority to the states to establish feed-in tariffs beyond the limits of PURPA, with FERC setting rules under which the programs must operate, potentially including "safe harbor" prices that states could require utilities to offer without needing further approval;
   d. for states that require utilities to procure certain quantities of specified renewables, declare that the state is free to identify a price below which a utility's failure to procure the required quantity would be subject to a nonperformance penalty; or

e. acknowledge that states can enter into contracts to purchase renewable power and allocate the cost of those contracts to utilities to pass through to their customers, much as California did for a variety of power sources during its energy crisis in 2000-2001.

While the first option would require FERC to reverse its ruling that states cannot set feed-in tariffs outside of the constraints of PURPA, any one of the other options could be undertaken in a manner consistent with FERC's current interpretation of the law. Under options 2(a) through 2(c) above, FERC would still have the ultimate authority in determining whether the feed-in tariff price is just and reasonable. The option in paragraph 2(d) would also be consistent with FERC's current interpretation, since the states would be buying the power directly, rather than requiring that the utilities offer a certain price. No one has suggested that an individual purchaser, whether it is a regulated utility or a government body, would be precluded from offering of its own volition to buy power at a particular price.

Using one of these mechanisms FERC could, in a manner consistent with its current authority, leave states free to design feed-in tariff programs outside of the constraints of section 210 of PURPA (16 U.S.C. § 824a-3), and thereby actively encourage states to adopt feed-in tariffs as they see fit. It would then be up to the states to determine if the creation of a feed-in tariff is a wise policy choice and, if so, how the program should be structured.

FINDING 2

FERC could investigate possible regulatory mechanisms to support state efforts to develop and use feed-in tariffs.

Careful consideration should also be given to how FERC exercises its power to exempt electric utilities from the obligation, under section 210 of PURPA (16 U.S.C. § 824a-3), to buy power from qualifying facilities. Under PURPA, section 210(m) (16 U.S.C. § 824a-3(m)), FERC may exempt an electric utility from this obligation if it finds that qualifying facilities have nondiscriminatory access to:

(A) independently administered, auction-based day ahead and real time wholesale markets for the sale of electric energy and wholesale markets for long-term sales of capacity and electric energy;

(B) transmission and interconnection services provided by a FERC-approved regional transmission entity and administered pursuant to an open access tariff that affords nondiscriminatory treatment to all customers and competitive wholesale markets that provide a meaningful opportunity to sell capacity and electric energy; or

(C) wholesale markets for the sale of capacity and electric energy that are of comparable competitive quality to (A) and (B) above.

As noted above, FERC's exercise of this exemption power will have important implications for the operation of state feed-in tariff programs. A state could arguably lose its ability to establish feed-in tariffs if FERC exempts a utility from the obligation to buy power from qualifying facilities. Without such tariffs, the development of renewable energy sources may stagnate.

To minimize any impact on renewable energy development, FERC could refuse to grant exemptions unless there is a robust wholesale market for the relevant renewable energy source in the utility's service area.

FINDING 3

In determining whether to exempt a public utility from the obligation to buy power from a qualifying facility, FERC could assess the extent to which there is a competitive market for the sale of power generated from the energy source used by the facility.

4. ELECTRICITY TRANSMISSION

KEY POINTS

- Renewable resources are location constrained and often available only in remote areas. Using these resources will therefore require a significant expansion of transmission infrastructure to connect areas with high renewable energy potential to load centers.
- The Federal Power Act (16 U.S.C. § 791a et seq.) authorizes FERC to regulate interstate electricity transmission. FERC's regulatory duties include approving transmission rates, supervising transmission grid interconnections, and permitting transmission construction in designated areas.
- FERC has recently moved, albeit tentatively, to promote increased transmission investment. To this end, FERC has changed cost allocation rules to enable recovery of transmission investment from the beneficiaries thereof.
- FERC could take additional steps to encourage and/or require transmission investment by, for example, ordering utilities to expand transmission capacity to serve renewable generators.
- To ensure that the construction of new transmission does not contribute to climate change, FERC could collect and publish information regarding the greenhouse gas emissions and other climate effects of construction activities and impose mitigation on projects within its jurisdiction.

Increasing renewable generation will require major changes to the electricity transmission grid. Many of the most useful renewable energy sources are situated in remote locations.[108] A recent study of wind power in the eastern U.S. found that wind resources in the remote Great Plains region have capacity factors up to nine percent higher than those close to urban areas.[109] Unlike fossil fuels, which can be transported to where they are needed, renewable energy sources must be used in situ.[110] Consequently, new transmission infrastructure will be needed to deliver the electricity generated by renewable energy systems to load centers.[111]

The North American Electric Reliability Corporation estimates that 40,000 miles of new transmission will be needed to serve just fifteen percent of national electricity demand from renewable resources.[112] Another study for the Department of Energy's National Renewable Energy Laboratory indicates that achieving twenty percent wind penetration in the Eastern Interconnection will require transmission investment of between $65 billion and $93 billion.[113]

Despite the recognized need for additional transmission infrastructure, recent investment therein has been limited. Transmission investment declined substantially in the latter twentieth century, falling from $5.5 billion in 1975 to $3 billion in 2000.[114] While investment levels rose over the last decade,[115] further increases will be needed to support the transition to renewable generation.[116]

This chapter identifies actions FERC can take to promote increased investment in transmission infrastructure. FERC's regulatory authority with respect to transmis-

Transmission lines in California. Courtesy of Etienne Le Sueur.

sion is outlined in section 4.1 below. Section 4.2 then discusses ways in which FERC can use this authority to promote expansion of the transmission grid.

4.1. FERC'S REGULATORY JURISDICTION OVER ELECTRICITY TRANSMISSION

Federal Power Act, section 201(a) (16 U.S.C. § 824(a)) authorizes FERC to regulate the transmission of electric energy in interstate commerce. Under Federal Power Act, section 201(c) (16 U.S.C. § 824(c)), electric energy is considered to be transmitted in interstate commerce if it is "transmitted from a State and consumed at any point outside thereof." This requirement is satisfied whenever electric energy is transmitted over a grid that is capable of moving energy across state boundaries, even if the sending and receiving parties, and the electric pathway between them, are located in a single state.[117] Today, all electricity transmission in the contiguous U.S., except that occurring in parts of Texas and Maine, takes place through interstate grids and is therefore subject to FERC regulation.[118]

FERC's regulatory duties with respect to electricity transmission include approving transmission rates[119] and supervising transmission grid interconnections.[120] While primary responsibility for the siting and construction of transmission infrastructure rests with the states, FERC has "backstop" authority to site transmission lines in areas designated by the Secretary of Energy as national interest electric transmission corridors ("**National Corridors**") under certain circumstances.[121]

4.2. ACTIONS AVAILABLE TO FERC TO PROMOTE INCREASED INVESTMENT IN ELECTRICITY TRANSMISSION

Expanded transmission infrastructure will be needed to support the move to renewable generation. There are several actions FERC can take to promote the necessary expansions. Pursuant to its regulatory authority over interconnection, FERC may require electric utilities to expand their transmission capacity to serve renewable generators. Alternatively, FERC may use its ratemaking authority to encourage utilities to invest in transmission expansions by, for example, changing cost recovery rules to provide for broader allocation of investment costs.

Expanding transmission infrastructure should help to mitigate climate change in the long term by facilitating the use of renewable power systems in place of fossil fuel generators. However, unless executed with care, the construction of this infrastructure may have significant near-term climate and other environmental impacts. FERC may minimize these impacts by reporting on the greenhouse gas emissions and other climate change effects of transmission expansions and options for mitigating those effects. And where it is exercising its backstop siting authority, it could impose a full range of reasonable mitigation measures as a condition of project approval.

4.2.1. MANDATING EXPANSION OF TRANSMISSION CAPACITY

The Federal Power Act (16 U.S.C. § 791a et seq.) invests FERC with broad regulatory authority over transmission grid interconnections. In exercising this authority, FERC may require electric utilities to expand their transmission capacity to serve renewable energy projects.

Under Federal Power Act, section 210 (16 U.S.C. § 824i), FERC may, on request or its own motion, issue an order requiring an electric utility to, among other things, connect its transmission facilities with the generation or transmission facilities of another electric utility, federal power marketing agency, geothermal power producer, qualifying cogenerator, or qualifying small power producer and, where necessary, expand its transmission capacity to facilitate such connection (an "**interconnection order**"). Federal Power Act, section 3(22) (16 U.S.C. §796(22)) defines an "electric utility" to include any "person or Federal or State agency…that sells electric energy."

Under Federal Power Act, section 210(c) (16 U.S.C. § 824i(c)), FERC can issue an interconnection order if it determines that the interconnection:

(1) is in the public interest; and
(2) will encourage the conservation of energy or capital, optimize the efficiency of use of facilities and resources, or improve the reliability of any electric utility system or federal power marketing agency to which the order relates.

In applying this public interest test, FERC considers the likely economic impacts of interconnection. FERC has indicated that a new interconnection will generally be considered to meet the public interest if it "enhances competition in power markets" and thereby "result[s] in lower costs to consumers."[122] In addition to these economic factors, FERC may also consider whether ordering interconnection will help to mitigate climate change by enabling increased use of renewable energy sources.

As discussed in Chapter 3, in NAACP, the court held that the term "public interest" must be interpreted in light of the purposes of the Federal Power Act (16 U.S.C. § 791a et seq.).[123] While noting that the primary aim of the Federal Power Act (16 U.S.C. § 791a et seq.) is to encourage the supply of electricity at reasonable prices, the court recognized that it also contains other subsidiary purposes.[124] Significantly, the court observed that the Federal Power Act (16 U.S.C. § 791a et seq.) authorizes FERC "to consider conservation…[and] environmental questions."[125]

Traditional thinking would limit FERC's public interest determination to reliability and cost considerations, since these concerns are clearly related to the interests of utility customers. However, a growing body of scholarly work emphasizes the need to also consider environmental issues in public interest determinations. For example, relying on the NAACP decision, Michael H. Dworkin and Rachel A. Goldwasser argue that the public interest test gives FERC "the authority, and the duty, to consider some matters going beyond the direct financial interests of buyers and sellers in wholesale transactions," including environmental matters.[126]

More recently, in 2011, Jeremy Knee analyzed decisions of FERC and state public utility commissions to determine how the public interest criterion is applied in practice.[127] Knee's review found that regulators interpret the "public interest" as encompassing three related principles – cost minimization, non-discrimination, and service adequacy – the achievement of which requires an assessment of environmental issues.[128] With respect to the first principle, Knee argues that environmental impacts are a cost of electricity generation and, as such, failure to consider such impacts may result in decisions that do not minimize costs.[129] Secondly, with respect to non-discrimination, Knee contends that, as the environmental costs of generation are not borne equally by all customers, ignoring such costs may lead to discrimination.[130] Finally, with respect to service adequacy, Knee asserts that regulators must take steps to mitigate the impact of environmental changes on electricity services.[131]

FERC has also recognized, albeit in other regulatory contexts, that environmental factors may be relevant to its public interest analysis. For example, in determining whether a proposed interstate natural gas pipeline is in the public interest, FERC considers the pipeline's likely environmental impacts.[132]

Consistent with its approach in other sectors, FERC could assess environmental factors in determining whether an interconnection order is in the public interest. As part of this environmental assessment, FERC may consider whether ordering interconnection will help to mitigate climate change by enabling the use of less-polluting renewable energy sources.[133]

FINDING 4

In determining whether a proposed interconnection is in the public interest, FERC could evaluate the proposal's likely environmental impacts, including its potential to reduce greenhouse gas emissions and/or otherwise mitigate climate change.

Regardless of whether this approach is adopted, FERC may conclude that interconnections for renewable generators further the public interest by reducing fossil fuel electricity generation and resulting greenhouse gas emissions. Emissions reductions are arguably needed to ensure the continued availability of electric services at reasonable prices.

The third National Climate Assessment, released in May 2014, indicates that climate change has already begun disrupting, and will continue to disrupt, the production and delivery of electricity.[134] The warmer temperatures associated with climate change are leading to sea level rises that could inundate coastal electric generating facilities.[135] These and other facilities could also be affected by more frequent and severe storms and other extreme weather events.[136] Moreover, changing precipitation patterns will reduce water availability in many areas, threatening the reliability of water-dependent generators and necessitating investment in new or modified equipment.[137] Together, these changes will likely lead to increased electricity prices. Thus, by helping to mitigate climate change, interconnections with renewable generators achieve the Federal Power Act's (16 U.S.C. § 791a et seq.)

primary aim of encouraging electricity supply at reasonable prices.

Additionally, such interconnections will generally also enhance electric system reliability by diversifying the generation mix. A recent study of wind power use in the Eastern Interconnection for the National Renewable Energy Laboratory concluded that increasing renewable generation "can contribute to system adequacy and additional transmission can enhance that contribution."[138]

Recognizing this, FERC could issue a policy statement acknowledging that interconnections for renewable generators will ordinarily meet the requirements of Federal Power Act, section 210 (16 U.S.C. § 824i(a)(1)), which empowers FERC to order specific new transmission construction. This is likely to have a number of benefits, increasing certainty for renewable generators and thereby reducing the costs of applying for interconnection. In addition, it may also encourage electric utilities to voluntarily provide expanded transmission services, further simplifying the interconnection process.

FINDING 5

FERC could find that interconnections for renewable generators meet the public interest by mitigating climate change and enhance electric system reliability by diversifying the generation mix.

4.2.2. IMPROVING THE ALLOCATION OF TRANSMISSION EXPANSION COSTS

The high cost of transmission construction represents a significant barrier to grid expansion. Estimates of the cost of transmission infrastructure range from $1.1 million to $4 million per mile.[139] Transmission providers may recover these costs from generators and/or customers. The cost recovery method used has profound implications for transmission development.

Requiring generators to pay for transmission upgrades creates a free-rider problem.[140] This occurs because the first generator in a particular area bears the full cost of constructing the transmission infrastructure needed to serve that area, but cannot exclude others from using it.[141] As a result, subsequent entrants can "free-ride" on the first generator's investment. This creates a strong incentive for generators to defer investment and may thereby delay the construction of needed transmission facilities.

The free-rider problem can be avoided by spreading the cost of transmission projects across all beneficiaries thereof.[142] Recognizing the advantages of this approach, on July 21, 2011, FERC issued Order No. 1000 requiring, among other things, each public utility transmission provider to develop a method(s) for allocating the costs of regional and inter-regional transmission projects that satisfies six principles[143] (the "**Cost Allocation Principles**"). The Cost Allocation Principles provide that:

(1) the costs of transmission facilities must be allocated to those who benefit from the facilities in a manner that is at least roughly commensurate with estimated benefits;[144]

(2) those who receive no benefit from transmission facilities must not be in-

voluntarily allocated the cost of those facilities;[145]

(3) if a benefit to cost threshold is used to determine whether facilities have sufficient net benefits to have their cost assigned under the cost allocation method(s), the threshold must not exceed 1.25 unless the provider justifies, and FERC approves, a higher amount;[146]

(4) costs must be allocated solely within the relevant transmission planning region(s), unless those outside the region(s) voluntarily agree to pay a portion of the costs;[147]

(5) there must be a transparent method for identifying the benefits and beneficiaries of a transmission facility;[148] and

(6) different cost allocation methods may be used for different types of transmission facilities.[149]

The cost allocation requirements established in Order No. 1000 have been appealed to the United States Court of Appeals for the District of Columbia Circuit.[150] The appeal proceedings were ongoing at the time of writing.

Order No. 1000 requires the allocation of transmission costs to be "at least roughly commensurate" with estimated benefits. Under this beneficiary pays approach, the assignment of costs depends on the definition and quantification of transmission benefits.

Commonly identified benefits of transmission expansions include increased reliability, efficiency, and grid flexibility and reduced congestion and generation costs.[151] In addition to these reliability and economic advantages, expanding transmission infrastructure may also have broader social benefits.[152]

The range of benefits stemming from transmission development is demonstrated by the Arrowhead-Weston transmission project in Wisconsin. While the project's primary aim was to improve grid reliability in northwestern and central Wisconsin, it also had other economic, social, and environmental implications for the state. In its post-construction assessment, American Transmission Company noted that, by reducing congestion, the project allowed Wisconsin utilities to decrease their power purchase costs by $94 million over forty years.[153] The project also significantly reduced line losses, avoiding generation of 5.7 million MWh of electricity and reducing carbon dioxide emissions by 5.3 million tons over forty years.[154] Additional environmental benefits also resulted from increased access to renewable power, with the project able to deliver hydroelectricity from Canada and wind power from North and South Dakota.[155] Finally, the project also supported regional economic development by, among other things, creating new employment opportunities and generating additional tax revenues.[156]

For the reasons described above, FERC could frequently find that actions beneficial to the environment are consistent with traditional notions of public interest. Nevertheless, in assessing projects and allocating costs, utilities and regulators typically focus on the reliability and economic impacts of transmission and often overlook its environmental benefits.[157] Unfortunately, Order No. 1000 does little to address this problem.

While requiring transmission costs to be allocated on the basis of benefits, Order No. 1000 declines to identify specific categories of benefits that should be taken into account.[158] Rather, the order merely states that utilities "may consider benefits including, but not limited to, the extent to which transmission facilities, individually or in the aggregate, provide for maintaining reliability and sharing reserves, production cost savings and congestion relief, and/or meeting Public Policy Requirements" (emphasis added).[159]

Given the above, it is perhaps unsurprising that, even after Order No. 1000, most utilities continue to focus on reliability and economic benefits when assessing transmission projects and allocating transmission costs. Significantly, none of the cost allocation methods approved by FERC under Order No. 1000 provide for consideration of the climate or other environmental benefits of transmission projects. To remedy this deficiency, FERC could revise its cost allocation rules to expressly require utilities to identify and quantify the climate impacts of transmission expansions.

FINDING 6

FERC could require public utility transmission providers to consider transmission facilities' environmental and climate benefits when identifying the beneficiaries of those facilities and allocating costs among those beneficiaries.

4.2.3. MINIMIZING THE CLIMATE IMPACTS OF TRANSMISSION CONSTRUCTION

The construction of transmission infrastructure can have significant climate and other environmental effects. The use of fossil fuel-powered equipment and vehicles during the construction process emits carbon dioxide and other greenhouse gases that contribute to climate change. Moreover, land clearing in the construction area removes trees and vegetation that would otherwise act as carbon sinks, removing carbon dioxide from the atmosphere and thereby mitigating climate change.

FERC and other regulators could take steps to minimize the climate impacts of transmission projects. This may be achieved by reporting on the greenhouse gases emitted from, and the carbon sinks destroyed by, transmission construction. By focusing attention on transmission's potential climate impacts, this may promote more climate-sensitive decision-making by both regulators and utilities.

The Federal Power Act (16 U.S.C. § 791a et seq.) gives FERC limited regulatory authority over the siting and construction of transmission projects in areas designated by the Secretary of Energy as National Corridors. On October 5, 2007, the Secretary of Energy issued two National Corridor designations. The Mid-Atlantic Area National Corridor covered parts of Delaware, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, West Virginia, and the District of Columbia.[160] A second designation – the Southwest Area National Corridor – applied to parts of southern California and western Arizona.[161] On February 1, 2011, the U.S. Court of Appeals for the Ninth Circuit vacated the designations due to procedural errors in their preparation.[162] Accordingly, there are currently no effective National Corridor designations.

Once a National Corridor is designated, FERC will gain backstop siting authority over transmission facilities therein. Federal Power Act, section 216(b)(1) (16 U.S.C. § 824p(b)(1)), authorizes FERC to permit the construction or modification of transmission facilities in National Corridors when:

(A) a state in which the facilities are to be located does not have authority to approve the siting of the facilities or consider their expected interstate benefits;

(B) the applicant does not qualify for a state approval because it does not serve end-customers within the state; or

(C) a state commission or other entity authorized to approve the siting of the facilities has withheld approval for more than one year or conditioned its approval in such a manner that construction or modification of the facilities is not economically feasible or will not significantly reduce transmission congestion in interstate commerce.

This permitting process should provide two opportunities for FERC to collect, analyze, and publish information regarding the climate impacts of transmission projects.

First, FERC may evaluate the greenhouse gas emissions and other climate change effects of transmission construction when determining whether a project is in the public interest. Under Federal Power Act, section 216(b)(2)-(6) (16 U.S.C. § 824(b)(2)-(6)), FERC may only issue a permit if it determines that a transmission project in a National Corridor:

- will be used for the interstate transmission of electric energy;
- is in the public interest;
- will significantly reduce transmission congestion and protect or benefit customers;
- is consistent with national energy policy and will enhance national energy independence; and
- will maximize the use of existing towers or structures, to the extent reasonably and economically possible.

This gives FERC broad discretion to inquire into the need for, and effect of, transmission projects.[163] FERC regulations indicate that, "[i]n reviewing a proposed project, the Commission will consider all relevant factors presented on a case-by-case basis and balance the public benefits against the potential adverse consequences."[164] The regulations indicate that, as part of this review, FERC will identify and, where possible, mitigate any environmental disruptions resulting from the project.[165] Notably however, there is no requirement that FERC evaluate the project's likely climate impacts. To remedy this deficiency, FERC may revise its regulations to provide for consideration of the greenhouse gas emissions and other climate change effects of transmission projects.

FINDING 7

FERC could evaluate a transmission project's likely climate impacts, including the extent to which it may increase greenhouse gas emissions and/or destroy carbon sinks, when determining whether the project is in the public interest.

In addition to its public interest review under the Federal Power Act (16 U.S.C. § 791a et seq.), FERC must also conduct an environmental assessment under the National Environmental Policy Act ("**NEPA**") (42 U.S.C. § 4321 et seq.) before permitting transmission projects in National Corridors. This provides another opportunity for FERC to analyze the project's likely climate effects.

NEPA, section 102(2) (42 U.S.C. § 4332(2)) requires federal agencies to prepare an Environmental Impact Statement ("**EIS**") for all "major federal actions significantly affecting the quality of the human environment."[166] The EIS must include a discussion of the environmental impacts of the action, including any adverse impacts that cannot be avoided.[167] Additionally, the EIS must also identify alternative actions that would avoid or minimize the adverse impacts and/or otherwise improve environmental quality.[168] Regulations issued under NEPA (42 U.S.C. § 4321) require agencies to "[r]igorously explore and objectively evaluate" all alternatives that are reasonable.[169] The courts have held that, in undertaking this analysis of alternatives, agencies must consider possible methods for mitigating the action's environmental impacts.[170] The agency may require adoption of mitigation methods that are consistent with existing legal authority.

The requirement to prepare an EIS is intended to ensure that federal agencies consider the environmental impacts of their decisions. As such, it can and should provide a means of integrating climate change information into government decision-making. Guidelines issued by the Council on Environmental Quality ("**CEQ**") indicate that climate change is a proper subject for analysis in the EIS.[171] This has subsequently been confirmed by the federal courts.[172]

FERC has indicated that it will prepare an EIS for all projects involving major transmission facilities using rights-of-way in which there are no existing facilities.[173] For other transmission projects, FERC will initially prepare an Environmental Assessment ("**EA**") and, depending on the outcome of that assessment, may then prepare an EIS.[174]

To facilitate preparation of the EA and/or EIS, FERC requires permit applications to include an environmental report identifying the potential environmental impacts of the project.[175] The environmental report must include eleven resource reports as follows:[176]

Table 1: Resource reports to be submitted with transmission line permit applications

Report title		Information to be provided in report
1	General project description[177]	Details of all facilities to be constructed or modified, procedures for construction and operation, construction timetables, future plans for related construction, and applicable regulations, codes, and permits.
2	Water use and quality[178]	Details of all water bodies affected by the project, the nature of those effects, and proposed mitigation measures.
3	Fish, wildlife, and vegetation[179]	Details of all fish, wildlife, and vegetation resources affected by the project, the nature of those effects, and proposed mitigation measures.
4	Cultural resources[180]	Details of consultations undertaken with Native Americans and other interested parties regarding the project's likely impact on cultural resources.
5	Socioeconomics[181]	Details of the likely impact on towns and counties in the vicinity of the project, including the impact of any substantial immigration of people on local infrastructure, housing, and government facilities.
6	Geological resources[182]	Details of any geological resources or hazards that may be affected by the project or place the project at risk and proposed mitigation measures.
7	Soils[183]	Details of the soils affected by the project, the nature of those effects, and proposed mitigation measures.
8	Land use, recreation, and aesthetics[184]	Details of existing uses of land on, and within 0.25 miles of, the edge of the proposed transmission line right-of-way, the project's likely impact on those uses, and proposed mitigation measures.
9	Alternatives[185]	Details of alternatives to the project and the environmental impacts of those alternatives.
10	Reliability and safety[186]	Details of potential reliability problems and other hazards resulting from accidents or natural catastrophes and proposed mitigation measures.
11	Design and engineering[187]	Design and engineering drawings of the principal project facilities.

As indicated in Table 1 above, the environmental report must analyze the project's likely effect on a range of human and environmental resources, including water, soil, and vegetation. Notably however, the report need not assess the project's likely air quality impacts and, in particular, its potential to contribute to climate change by increasing greenhouse gas emissions and/or reducing carbon sinks. Increasing access to such information is likely to have significant benefits, raising awareness of transmissions' climate impacts and thereby producing more climate-sensitive decisions.

Regulations issued by the CEQ require government agencies to update their NEPA policies "as necessary to ensure full compliance with the purposes and provisions of the Act."[188] Recent scientific and legal developments necessitate the revision of FERC's NEPA policies. Significantly, in 2007, the U.S. Supreme Court held that greenhouse gases are "air pollutants" for the purposes of the Clean Air Act.[189] Since this time, a growing number of scientists and policy makers have recognized the potential climatic impacts of greenhouse gases and called for their reduction. In light of these changes, FERC should consider updating its NEPA policies to require permit applications to report on the project's likely greenhouse gas emissions and other climate change effects.

FINDING 8

FERC could require applications for permits in respect of transmission projects to provide information regarding the project's climate impacts, including estimates of the carbon dioxide and other greenhouse gas emissions resulting from construction and details of any carbon sinks affected thereby.

FERC's regulations do not currently provide for consideration of the greenhouse gas emissions and/or other climate change effects of transmission projects as part of the environmental review process. This is contrary to guidelines issued by the CEQ. On February 18, 2012, the CEQ released a draft guidance memorandum advising federal agencies to consider climate change in reviews under NEPA (42 U.S.C. § 4321 et seq.).[190] The memorandum recommends that, when assessing a project's environmental effects, agencies should quantify cumulative greenhouse gas emissions over the life of the project, discuss the link between emissions and climate change, and identify measures to reduce such emissions.[191]

FINDING 9

FERC could consider the climate effects of transmission projects in environmental reviews.

5. ELECTRIC RESOURCE PLANNING

KEY POINTS

- Integrated resource planning requires electric utilities to examine all supply- and demand-side alternatives for meeting future electricity needs. By encouraging a broader examination of available resource options, this could lead to increased use of environmentally preferable renewable generation, energy efficiency, and demand response resources.
- Primary responsibility for resource planning in the electricity industry traditionally rests with the states. Whether or not FERC has jurisdiction to directly regulate electric utility planning activities, it may indirectly influence those activities through its regulation of transmission and wholesale electricity rates.
- The Federal Power Act (16 U.S.C. § 791a et seq.) invests FERC with regulatory authority over the interstate transmission and wholesale sale of electricity. FERC's regulatory duties include overseeing transmission and wholesale electricity rates to ensure that they are just and reasonable and not unduly discriminatory or preferential.
- To prevent discrimination, FERC has adopted regulations mandating the separation of generation and transmission services. This has made integrated resource planning difficult as no one entity has control over, or knowledge of, all aspects of the electric system.
- FERC could promote integrated resource planning by revising its regulations to allow for greater cooperation and information sharing between entities involved in electricity generation and transmission during the planning process.
- FERC could do much to ensure integrated resource planning by requiring its application to the regional transmission plans that FERC has already ordered transmission utilities to prepare.

The U.S. Energy Information Administration ("**EIA**") forecasts that demand for electricity nationwide will increase by approximately twenty five percent over the next three decades, rising from 3.69 billion MWh in 2011 to 4.62 billion MWh in 2040.[192] The need to implement policies aimed at augmenting electricity supplies and/or reducing electricity demand is therefore inescapable. The policy choices made in the next few years will affect the energy mix all the way to 2050.

The resulting energy mix will have profound implications for climate change policy. The EPA estimates that fossil fuel power plants emit between 0.57 and 1.12 tons of carbon dioxide per MWh of electricity generated.[193] While electricity generation in nuclear and renewable power systems does not cause greenhouse gas emissions, the construction of these systems may do so. Energy efficiency and other demand-side management programs reduce future electricity requirements, eliminating the need for new generating capacity and thereby mitigating greenhouse gas emissions. In many instances, an increase in local generation can help alleviate congestion on transmission lines, and an expansion of transmission capacity can reduce the need for new power plants close to load.

In planning for future electricity needs, utilities seek to identify the mix of resources that will minimize total electricity system costs.[194] Historically, utility planning focused exclusively on the procurement of supply-side resources at the expense of demand-side options for meeting electricity requirements.[195] To remedy this gap, many states now require or encourage utilities to prepare integrated resource plans that consider both supply- and demand-side alternatives.[196]

By encouraging a broader examination of available resources, integrated resource planning may lead to the adoption of environmentally preferable energy management programs. Indeed, research by the State and Local Energy Efficiency Action Network indicates that integrated resource planning may promote increased energy efficiency as, "[a]lthough the amount of available cost-effective energy efficiency will vary based on local circumstances, some quantity will probably always be available at a lower levelized cost per megawatt-hour than supply side alternatives."[197]

Truly integrated planning enables the utility to compare a broad range of options for meeting load: new generation large or small, enhanced efficiency, transmission or distribution additions, and demand response. However, most current utility plans do not allow for this type of integrated assessment. Typically, utilities offer overall load forecasts, identify all existing and expected generating resources, and then determine a residual amount of generating capacity that they must pursue through contract or acquisition. Without a sufficient emphasis on the geographic realities of their service territories, the utilities cannot compare generation options (which can vary by location) with transmission options (the need for which depends on transmission constraints in specific places on the grid).

Nor can utilities determine the merits of targeted energy efficiency efforts that might help meet local load or overcome local transmission constraints. In addition, utilities do not generally include in their forecasts the potential for developing local renewables in certain areas, the need to improve the distribution grid in specific locations, or the overall system benefits of encouraging local renewable generation projects in particular promising or helpful places. One result is that local renewables are not offered an equal place at the table as the utilities develop their plans. Another is that the utility resource plans fail to acknowledge and work with local land use planning considerations.

With these concerns in mind, the objective would be not only for utilities to produce integrated plans, but also to ensure that those plans are truly integrated.

This chapter identifies actions FERC can take to promote integrated resource planning. FERC's regulatory authority with respect to electric utility planning is discussed in section 5.1 below. Section 5.2 then examines ways in which FERC can use this authority to encourage electric utilities to consider both supply- and demand-side resources in the planning process.

5.1. FERC's Regulatory Jurisdiction over Electric Resource Planning

Primary responsibility for resource planning in the electricity industry rests with the states. FERC lacks explicit jurisdiction to regulate electric utility planning activities directly.[198] However, FERC may indirectly influence such activities through its regulation of electricity transactions and transmission rates.

Federal Power Act, section 201 (16 U.S.C. § 824) gives FERC exclusive jurisdiction over the transmission and wholesale sale of electric energy in interstate commerce. FERC's authority extends to all transactions involving the movement of electric energy via an interstate grid, regardless of the location of the transacting parties.[199] Currently, all electric transactions in the U.S., except those occurring in Alaska, Hawaii, and parts of Texas, take place through interstate grids and are therefore subject to FERC regulation.[200]

Under the Federal Power Act (16 U.S.C. § 791a et seq.), FERC must ensure that the rates, terms, and conditions for interstate transmission and wholesale electricity sales are just and reasonable[201] and not unduly discriminatory or preferential.[202] To this end, Federal Power Act, section 205 (16 U.S.C. § 824d) requires public utilities to file all rate schedules, and all rules, regulations, practices, and contracts relating thereto, with FERC for approval. Under Federal Power Act, section 206 (16 U.S.C. § 824e), if FERC determines that a filing is unjust, unreasonable, unduly discriminatory, or preferential, it must determine and fix the just and reasonable rate.

FERC's authority over interstate transmission and wholesale electricity rates extends to any "rule, regulation, practice, or contract affecting such rates."[203] Among the factors affecting rates is the design and operation of the transmission grid. Recognizing this, FERC has relied on its ratemaking authority to implement several transmission management reforms, including requiring electric utilities to provide open non-discriminatory access to transmission facilities,[204] encouraging utilities to establish independent organizations to manage the transmission grid on a regional basis,[205] and mandating that utilities participate in regional transmission planning.[206]

5.2. ACTIONS AVAILABLE TO FERC TO PROMOTE INTEGRATED RESOURCE PLANNING

The Federal Power Act (16 U.S.C. § 791a et seq.) gives FERC broad regulatory authority over interstate transmission rates. Pursuant to this authority, FERC has adopted several regulations aimed at protecting electricity wholesalers against discriminatory transmission practices. These regulations have hampered resource planning that considers both supply- and demand-side alternatives for meeting future electricity needs. Removing or amending the regulations may therefore promote more integrated planning in the electric industry.

Electricity transmission is a "bottleneck" in the sense that most generators require access to high voltage transmission lines to deliver electricity to customers.[207] Historically, these lines were owned and operated by vertically integrated electric utilities that generated, transmitted, and distributed power.[208] In some parts of the country, especially in the Southeast and the Northwest, this is still the case.

In providing transmission services, vertically-integrated utilities have both the incentive and the ability to favor themselves and their affiliates with low rates and disfavor their competitors with higher rates.[209] In 1996, in an attempt to eliminate such discrimination, FERC issued Order No. 888 requiring all electric utilities that own, control, or operate interstate transmission facilities ("**transmission-owning utilities**") to file open access non-discriminatory tariffs for the use thereof.[210] Specifically, Order No. 888 mandated the functional unbundling of transmission and generation services.[211] This required utilities to establish separate rates for generation, transmission, and ancillary services and to take transmission services under the same rates, terms, and conditions as applied to other generators.[212]

To further minimize opportunities for self-dealing, Order No. 888 also required transmission-owning utilities "to separate employees involved in transmission functions from those involved in wholesale power merchant functions."[213] To this end, Order No. 889 set out ring-fencing rules designed to ensure that employees involved in wholesale transactions operate independently of, and cannot access information about, the transmission side of the business.[214]

FERC's primary objective in adopting Orders 888 and 889 was to promote market competition in electricity generation.[215] However, the orders also affected industry planning. As energy law expert John P. Buechler has noted, prior to 1996, vertically integrated utilities "had complete responsibility for planning the generation, transmission and distribution systems under one roof."[216] As a result, the utilities were able to plan on a system-wide basis.[217] With the adoption of Orders 888 and 889 in 1996, generation was separated from transmission. This makes coordinated planning difficult as no one entity has knowledge of, or control over, all aspects of the electric system. FERC has itself acknowledged that separation may have created a barrier to coordinated planning by making it "difficult [for electric utilities] to gather together the necessary personnel and data to efficiently analyze their long-range needs for both transmission and generation."[218]

Recent research suggests that Orders 888 and 889 contributed to a significant decline in integrated resource planning in states that did not restructure their electricity industries. In other states, such planning was hampered by the restructuring process. A 2011 study by Synapse Energy Economics, Inc. found that integrated resource planning processes were in use or under development in forty one states in 1991.[219] However, by 2011, such processes were employed in just twenty seven states, leading the authors to conclude that "as the electric industry began to restructure in the mid' 1990s…integrated resource planning rules were often repealed or ignored."[220]

FERC may promote increased use of integrated resource planning by revising Orders 888 and 889 to allow greater cooperation and information sharing between entities involved in electricity generation and transmission during the planning process. FERC took an initial step in this direction in 2008 when it adopted Order No. 717 revising the ring-fencing rules for electric utilities.[221] Whereas the rules had previously required all transmission function employees to be walled-off from generation function employees, Order No. 717 limited the ring-fencing requirement to those actively and personally involved in the day-to-day operation of the transmission system.[222] Relevantly, the order stated that employees who undertake long-range planning for the transmission grid, but are not involved in its day-to-day operation, are not subject to ring-fencing and can interact with both transmission and generation business units.[223]

Notwithstanding the changes adopted in Order No. 717, the ongoing separation of day-to-day transmission and generation functions likely continues to hamper integrated resource planning. This type of separation encourages utilities to view the electric supply chain as a series of discrete components, reducing their ability and incentive to engage in coordinated, system-wide planning. As a result of the separation, utility employees with the greatest knowledge of transmission cannot interact with those most knowledgeable about generation. This may make it difficult for the utility to determine how changes to the transmission grid will affect the need for new generation and vice versa. Moreover, the utility may also have difficulty assessing the relative costs and benefits of generation, transmission, and other options for meeting increased load.

To address this problem, FERC could further revise its previous orders mandating separation and/or adopt new procedures supporting integrated planning. FERC has a long history of revising orders in response to shifts in the electricity industry. In this regard, FERC has noted that, while its "responsibilities under sections 205 and 206 of the FPA [Federal Power Act (16 U.S.C. §

791a et seq.)] to ensure that transmission rates are just and reasonable are not new…the circumstances in which it must fulfill…[those] responsibilities change with developments in the industry."[224] Therefore, to ensure that transmission rates remain just and reasonable over time, FERC must amend its orders to reflect changing circumstances.[225]

In the eighteen years since Orders 888 and 889 were adopted, the structure of the electricity industry has changed significantly. Between 1995 and 2012, electric utilities' share of generation fell from 89.32% to 57.79%[226] as many formerly vertically integrated suppliers divested their generation assets. At the same time, the amount of independent generation has increased considerably. Data published by the EIA indicates that, in 1995, independent power producers accounted for just 1.74% of U.S. electricity generation.[227] By 2012, independent power producers' market share had risen to 34.27%.[228] These changes reduce the need for separation of generation and transmission services and necessitate the revision of Orders 888 and 889.

<u>FINDING 10</u>

FERC could revise Orders 888 and 889 to provide for greater cooperation and information sharing between entities involved in electricity generation and transmission during resource planning.

FERC may also adopt new regulations encouraging and/or requiring electric utilities to undertake integrated resource planning. Taking an initial step in this direction, in July 2011, FERC issued Order No. 1000 establishing new transmission planning procedures.[229] Order No. 1000 requires, among other things, each public utility that owns or operates transmission facilities to participate in a regional transmission planning process.[230] The planning process must identify transmission needs driven by public policy requirements in state and federal laws ("**Public Policy Requirements**") and evaluate potential solutions to meet those needs.[231] At the time of writing, this aspect of the order was being challenged in the United States Court of Appeals.[232]

Order No. 1000's mandate to consider transmission needs driven by Public Policy Requirements has been widely heralded as an important step in promoting integrated resource planning that considers both supply- and demand-side alternatives for meeting projected electricity requirements.[233]

On the supply-side, Order No. 1000 may encourage utilities to plan for the increase in renewable generation driven by state clean energy policies. As of March 2013, twenty nine states and the District of Columbia had adopted renewable portfolio standards ("**RPS**") requiring utilities to obtain a specified percentage of their electricity needs from renewable resources.[234] In addition, forty one states offered loans,[235] twenty two states provided grants,[236] and twenty four states gave tax credits[237] to support renewable generation.

On the demand-side, Order No. 1000 may also promote greater consideration of energy efficiency and demand response during the planning process. The use of these measures is supported by a range of state and federal laws, regulations, and policies. For example, twenty seven states have adopted energy efficiency resource standards or goals requiring electric utilities to achieve specified electricity savings.[238] Similarly, the federal government has also recognized the importance of conserving energy[239] and, to this end, has funded a range of initiatives, including appliance standards and home weatherization projects, to reduce energy demand.

Notwithstanding the above, Order No. 1000 suffers from two important limitations that undermine its effectiveness as a tool for promoting integrated resource planning. Firstly, Order No. 1000 does not define specific public policy requirements to be considered in all regions.[240] Rather, it is left up to each utility to identify, in consultation with customers and other stakeholders, the public policy requirements they believe are relevant to the planning process.[241] This approach has been widely criticized by environmental groups, which have expressed concern that utilities may ignore federal and state renewable energy and other climate change policies.[242]

Secondly, Order No. 1000 does not require utility planning processes to incorporate likely future climate change laws or policies.[243] Rather, the order merely mandates consideration of policy requirements in currently "enacted statutes…and regulations."[244] While some transmission operators have voluntarily elected to consider additional policy objectives not codified in existing laws and regulations, most have not.[245] Due to the long lead-time required for transmission projects, this may delay realization of future policy goals. On average, large transmission projects take approximately ten years to complete.[246] Recognizing this, the National Renewable Energy Laboratory has argued that advance transmission planning "is imperative be-

Solar panels in Colorado. Credit: U.S. Geological Survey cause it takes longer to build new transmission capacity than it does to build new…[renewable power] plants."[247]

FERC may address these deficiencies by revising Order No. 1000 to require utility planning processes to consider current and likely future climate change laws and policies.

FINDING 11

FERC could require electric utilities to consider current and likely future climate change laws and policies in the planning process.

Planning now for the necessity of greenhouse gas reductions and climate adaptation should be an effective way to avoid investments in facilities that could later prove problematic and prepare in the most cost-efficient way for programs and infrastructure that will, in fact, be necessary.

Order No. 1000 acknowledges the role that integrated resource planning could play, but states that "the regional transmission planning process is not the vehicle by which integrated resource planning is conducted; that may be a separate obligation imposed on many public utility transmission providers and under the purview of the states."[248] Despite this declaration, Order No. 1000 lacks a clear explanation as to why such planning should be left to the states.

Perhaps FERC is focused on the state's role in planning for and siting new generating facilities, assuming that integrated resource planning might be compelled in order to make the best choices about new generation. However, FERC has established its authority to require transmission planning which, if done properly, also must reflect full consideration of non-transmission alternatives. FERC acknowledges this, declaring that it will "require the comparable consideration of transmission and non-transmission alternatives,"[249] yet declines to insist that its mandated transmission plans consider the most comprehensive range of alternatives.

In this manner, Order No. 1000 as written could perpetuate reliance on disaggregated planning – an approach that will increase the likelihood of poor planning results, including the failure to optimize overall efficiency and minimize unnecessary investment. If FERC has the authority to order the preparation of transmission plans, then it has the authority to insist that the planners do the job right.

FINDING 12

FERC could require regional transmission plans to reflect a fully integrated planning approach, based on the specific characteristics of the various locales within each region.

6. Hydroelectric projects

Key points

- Hydrokinetic resources are a promising source of clean, renewable power. Using these resources in place of carbon-intensive fossil fuels will help to reduce greenhouse gas emissions and thereby mitigate global climate change.
- The Federal Power Act (16 U.S.C. § 791a et seq.) requires hydroelectric power plants on U.S. navigable waters, federal lands, and reservations to be licensed. FERC asserts that this licensing requirement applies to hydrokinetic projects on the outer continental shelf.
- Any person wishing to develop a hydrokinetic project on the outer continental shelf must obtain a license from FERC and a lease from the Bureau of Ocean Energy Management ("BOEM").
- To avoid this unnecessary regulatory duplication and simplify the permitting process, FERC could conclude that hydrokinetic projects on the outer continental shelf do not require a license under the Federal Power Act (16 U.S.C. § 791a et seq.).

The EPA estimates that electricity generation was the largest single anthropogenic source of greenhouse gas emissions in the U.S. in 2012, accounting for approximately thirty one percent of national emissions.[250] Reducing these emissions will require the development of clean energy alternatives to carbon-intensive fossil fuels. One promising alternative is hydrokinetic energy.

Hydrokinetic projects – which use the motion of ocean waves, currents, and tides, and the movement of water in streams to produce electricity – have the potential to significantly increase domestic renewable generating capacity. FERC estimates that hydrokinetic technologies could double hydropower production in the U.S., delivering as much as ten percent of national electricity supply.[251]

Like other renewable power systems, hydrokinetic power plants do not emit greenhouse gases or other air pollutants.[252] However, hydrokinetic energy has a number of advantages over wind, solar, and other renewable resources. For example, as water has a higher energy density than wind, more power can be extracted from a smaller volume of resources at a lower cost.[253] Moreover, unlike intermittent solar and wind resources, hydrokinetic energy is highly predictable, with ocean tides and currents often known months in advance.[254] This increased reliability makes hydrokinetic energy easier to integrate into the electric transmission grid.[255] In view of these benefits, FERC should take steps to support hydrokinetic development.

Section 6.1 below outlines FERC's regulatory authority with respect to hydropower projects. Section 6.2 then discusses ways in which FERC can use this authority to promote increased investment in hydrokinetic technologies.

6.1. FERC'S REGULATORY JURISDICTION OVER HYDROELECTRIC PROJECTS

Part I of the Federal Power Act (16 U.S.C. § 791a et seq.) gives FERC limited regulatory authority over hydroelectric power projects under private, state, and municipal ownership. FERC's authority does not extend to regulating projects owned and operated by the federal government.

FERC's regulation of the hydroelectric industry primarily involves supervising the construction and operation of power projects in designated water bodies. Federal Power Act, section 4(e) (16 U.S.C. § 797(e)) authorizes FERC to grant licenses for the construction, operation, and maintenance of dams, reservoirs, water conduits, power houses, transmission lines, and other works necessary or convenient for the development, transmission, and utilization of power "across, along, from, or in any of the streams or other bodies of water over which Congress has jurisdiction under its authority to regulate commerce with foreign nations and among the several States, or upon any part of the public lands and reservations of the United States." Further, Federal Power Act, section 23(b)(1) (16 U.S.C. § 817(1)) prohibits the unlicensed construction, operation, or maintenance of power projects on U.S. navigable waters, federal lands, and reservations.

6.2. Actions available to FERC to promote investment in hydrokinetic technology

Currently, both FERC and the DOI's BOEM assert jurisdiction over hydrokinetic projects on the outer continental shelf.[256] As a result, project developers must generally obtain both a license from FERC and a lease from BOEM. To avoid this regulatory duplication, FERC may withdraw its assertion of jurisdiction over outer continental shelf projects. This would leave BOEM as the sole regulatory authority for such projects, simplifying the approvals process and reducing costs for project developers.

Under Federal Power Act, section 23(b)(1) (16 U.S.C. § 817(1)), a license is required to construct and operate a hydroelectric power plant on the navigable waters, federal lands, and reservations of the U.S. FERC asserts that this licensing requirement applies to hydrokinetic projects on the outer continental shelf.[257] FERC justifies this assertion on two primary grounds.

Firstly, FERC argues that ocean waters up to twelve nautical miles offshore, including the waters above the outer continental shelf, are "navigable waters" for the purposes of Federal Power Act, section 23(b)(1) (16 U.S.C. § 817(1)). However, FERC does not provide a convincing explanation as to why this is the case.

Federal Power Act, section 3(8) (16 U.S.C. § 796(8)) defines "navigable waters" to include all streams and other water bodies "over which Congress has asserted jurisdiction under its authority to regulate commerce with foreign nations and among the several States, and which…are used or suitable for use for the transportation of persons or property in interstate or foreign commerce" (emphasis added). In its decision asserting jurisdiction over offshore hydrokinetic projects, FERC did not identify any federal statutes in which Congress has asserted jurisdiction over the waters of the outer continental shelf. Rather, FERC pointed to a 1988 Presidential Proclamation extending the boundaries of the territorial sea from three to twelve nautical miles offshore and, on this basis, argued that U.S. jurisdiction extends twelve nautical miles from the coast.[258] However, the Presidential Proclamation expressly states that "[n]othing in this Proclamation…extends or otherwise alters existing Federal or State law or any jurisdiction, rights, legal interests or other obligations derived therefrom."[259] Several federal statutes issued before the Proclamation indicate that waters beyond the historic three-mile boundary of the territorial sea are not "navigable."[260]

Secondly, FERC also claims that the submerged lands of the outer continental shelf are "reservations" of the U.S. Federal Power Act, section 3(2) (16 U.S.C. § 796(2)) defines "reservations" as "lands and interests in lands owned by the United States, and withdrawn from private appropriation, and disposal under the public lands law." Relying on federal statutes and court decisions, FERC argues that the outer continental shelf is "land or an interest in land owned by the United States."[261] However, FERC does not show that this land has been withdrawn from private appropriation and reserved for a public purpose. With the exception of one area off the Alaskan coast that has been withdrawn by the President,[262] the outer continental shelf is generally available for lease by private parties.[263] Therefore, it is arguably not a "reservation" within the meaning of Federal Power Act, section 3(2) (16 U.S.C. § 796(2)).

Other factors also suggest that FERC lacks jurisdiction over hydrokinetic facilities on the outer continental shelf. Significantly, Congress has never explicitly granted FERC authority over ocean energy projects. Rather, such authority has consistently been given to other federal agencies.[264] For example, in 1980, Congress gave authority over ocean thermal energy conversion projects to the National Oceanic and Atmospheric Administration.[265] More recently, in 2005, Congress gave the DOI authority over alternative energy projects on the outer continental shelf. Relevantly, Outer Continental Shelf Lands Act, section 8(p)(C) (43 U.S.C. § 1337(p)(C)) authorizes the Secretary of the Interior to grant leases, easements, and rights of way on the outer continental shelf for projects that "produce or support the production, transportation or transmission of energy." The Secretary of the Interior has delegated this authority to BOEM.

Given the above, it is perhaps unsurprising that FERC's jurisdictional claim has been strongly disputed by the DOI. In 2007, the DOI, on behalf of the former Minerals Management Service ("**MMS**") (now BOEM), wrote to FERC protesting its review of a hydrokinetic project on the outer continental shelf.[266] Specifically, the DOI argued that the Federal Power Act (16 U.S.C. § 791a et seq.) does not give FERC jurisdiction over hydrokinetic projects on the outer continental shelf.[267] The DOI asserted that the former MMS (now BOEM) has sole regulatory authority over such projects under the Outer Continental Shelf Lands Act (43 U.S.C. § 1331 et seq.).[268]

FERC's jurisdiction to review hydrokinetic projects on the outer continental shelf has also been adamantly opposed by industry participants. For example, in its request for rehearing of a 2002 FERC decision requiring the licensing of an offshore hydropower project, AquaEnergy Group Ltd – the project developer – argued that the Federal Power Act (16 U.S.C. § 791a et seq.) applies only to inland streams and does not extend to ocean waters.[269]

Industry participants have also expressed concern regarding the difficulty of obtaining approval for hydrokinetic projects on the outer continental shelf. As discussed above, both FERC and BOEM currently assert jurisdiction over outer continental shelf projects. Therefore, persons wishing to develop such projects must obtain a license from FERC and, if the project involves attaching a structure or device to the seabed, a lease from BOEM.[270] While FERC's ability to approval transmission lines connecting the offshore project to the grid might in some instances reduce state-level regulatory involvement, this duel permit requirement assuredly imposes on project developers significant resource and time costs related to federal review. Guidelines issued by the permitting agencies indicate that BOEM's leasing process could take up to two-and-a half years.[271] Obtaining a license from FERC could take an additional year.[272]

Testifying before the U.S. Senate Committee on Energy and Natural Resources in

2007, the President of the Ocean Renewable Energy Coalition – a trade association promoting offshore renewable energy development – emphasized that duplicative permitting processes impose significant financial and other burdens on hydrokinetic developers.[273] Recognizing this, several energy law scholars have expressed concern that the duel permit requirement may have a chilling effect on industry growth.[274]

To remove this effect, FERC could reverse its ruling that hydrokinetic projects on the outer continental shelf must be licensed under the Federal Power Act (16 U.S.C. § 791a et seq.). For the reasons discussed above, FERC could validly conclude that such projects are not located in U.S. navigable waters or reservations and are therefore not subject to the licensing requirement in Federal Power Act, section 23(b)(1) (16 U.S.C. § 817(1)). This would simplify the permitting process, reducing the costs and uncertainty faced by project developers and thereby encouraging investment in hydrokinetic technologies.

<u>FINDING 13</u>

FERC could find that hydrokinetic projects on the outer continental shelf do not require a license under the Federal Power Act (16 U.S.C. § 791a et seq.).

7. NATURAL GAS

KEY POINTS

- Natural gas is often described as a clean fossil fuel. Nevertheless, its production, transportation, and use emit substantial air pollutants, including carbon dioxide, nitrogen oxides, and methane, which contribute to climate change.
- The Natural Gas Act (15 U.S.C. § 717 et seq.) invests FERC with limited regulatory jurisdiction over the natural gas industry. FERC's duties primarily comprise regulating the construction and operation of natural gas pipelines, storage facilities, and import and export terminals.
- FERC's regulation of natural gas infrastructure aims to, among other things, avoid any unnecessary disruption to the environment. To this end, FERC evaluates and, where possible, mitigates the environmental impact of infrastructure projects.
- Building on these efforts, FERC could identify climate change as a relevant factor to be taken into account when reviewing infrastructure projects and collect and publish information regarding the greenhouse gas emissions resulting from such projects.
- FERC may also require natural gas companies to reduce their greenhouse gas emissions by, for example, mandating the use of emissions control technologies.

The last decade has seen a major increase in U.S. production and use of natural gas. Research by the EIA indicates that natural gas is now the second largest fuel source in the U.S., accounting for over twenty seven percent of national energy consumption in 2013.[275]

Approximately thirty one percent of natural gas consumed in the U.S. is for electricity generation.[276] Recent price changes have made natural gas more cost competitive as a fuel in electricity generation, leading to the replacement of coal and petroleum-fired power plants. According to the EIA, between 2000 and 2012, natural gas-fired generating capacity increased by ninety six percent, while coal capacity remained relatively stable and petroleum capacity declined twelve percent.[277] Natural gas is also used as a fuel in the transportation sector and for heating, cooking, and other industrial, commercial, and residential applications.[278]

Increased natural gas use has been heralded by many as a vital step in the transition to a clean energy economy.[279] Proponents argue that natural gas is a "clean" fossil fuel, emphasizing that its combustion produces approximately fifty percent less carbon dioxide, sixty six percent less nitrogen oxides, and ninety nine percent less sulfur oxides than coal.[280] However, this is only part of the story. Recent research suggests that upstream greenhouse gas emissions resulting from the extraction, processing, and transportation of natural gas may offset any savings at the point of combustion.[281] Most of these upstream emissions involve releases of methane – a potent greenhouse gas with a global warming potential[282] twenty one times that of carbon dioxide over a 100-year time horizon and even greater relative impacts over shorter periods[283] – from gas leaks and venting during the production process. According to the EPA, natural gas production and transportation systems were the second largest anthropogenic source of methane in the U.S. in 2012, accounting for approximately twenty three percent of national methane emissions.[284] Production and transportation systems also emit significant carbon dioxide, accounting for almost one percent of national emissions in 2012.[285] In addition, the downstream combustion of natural gas in power plants and other applications releases carbon dioxide, nitrogen oxides, and other harmful air pollutants.[286]

Given the above, substituting natural gas for coal or oil in energy, transportation, and other applications may have little overall impact on climate outcomes. Moreover, it risks diverting attention away from cleaner fuel sources, such as wind and solar energy.[287] Recognizing this, the challenge for FERC and other regulators is to adopt policies that maximize the benefits, and minimize the costs, of natural gas use.

Section 7.1 below provides an overview of FERC's regulatory authority over the natural gas industry. Section 7.2 then discusses ways in which FERC can use this authority to minimize natural gas' climate impacts.

7.1. FERC'S REGULATORY JURISDICTION OVER THE NATURAL GAS INDUSTRY

Responsibility for regulating the natural gas industry is shared between the federal government and the states. At the federal level, Natural Gas Act, section 1(b) (15 U.S.C. § 717(b)) authorizes FERC to regulate the transportation and sale for resale of natural gas in interstate commerce and the natural gas companies engaged therein. Notably however, the section exempts the local distribution of natural gas and the facilities used for that distribution from FERC regulation. In addition, Natural Gas Act section 1(c) (15 U.S.C. § 717(c)) also exempts from FERC regulation those companies that receive natural gas at or within the borders of a state, where the gas is consumed entirely within that state and the company is regulated by a state commission.

Today, FERC's regulation of the natural gas industry primarily involves supervising the construction and operation of interstate natural gas pipelines and storage terminals,[288] establishing rates for pipeline services,[289] and authorizing the abandonment of pipeline and other facilities.[290] Following deregulation of the wholesale gas market, FERC's regulation of the sale for resale of natural gas is minimal.

In addition to regulating pipelines, FERC also has limited authority over natural gas import and export facilities. Natural Gas Act, section 1(b) (15 U.S.C. § 717(b)) provides for federal regulation of the import and export of natural gas in foreign commerce and the persons involved therein. This regulatory authority was transferred from FERC to the Department of Energy by the 1977 Department of Energy Organization Act (42 U.S.C. § 7151). However, the Secretary of Energy delegated back to FERC authority over the facilities used for natural gas trade, including authority to "approv[e] or disapprov[e]…the construction and operation of particular facilities, the site at which such facilities shall be located and…the place of entry for imports or exit for exports."[291] In addition, FERC also has exclusive jurisdiction over the construction and operation of liquefied natural gas ("**LNG**") terminals located onshore or in state waters.[292]

7.2. ACTIONS AVAILABLE TO FERC TO MINIMIZE NATURAL GAS' CLIMATE IMPACTS

The Natural Gas Act (15 U.S.C. § 717 et seq.) authorizes FERC to regulate the construction and operation of natural gas pipelines, storage facilities, and import and export terminals. While FERC's authority does not extend to regulating the production[293] or use[294] of natural gas, its control of industry infrastructure gives it substantial influence over those activities.

There are several actions FERC may take, pursuant to its regulatory authority over infrastructure, to minimize the natural gas industry's climate impacts. FERC may reduce methane emissions from natural gas systems directly by, for example, requiring industry participants to take appropriate steps to minimize gas leaks from pipelines and other facilities. Similar benefits may also be achieved through more indirect channels, including by reporting on the methane and other greenhouse gas emissions produced by the industry and options for mitigating those emissions.

Such action is consistent with recent executive efforts to limit emissions of methane from natural gas production and other activities. In its 2013 Climate Action Plan, the Obama Administration committed to developing an interagency strategy to reduce methane emissions.[295] Fulfilling this commitment, in March 2014, the Administration issued its Strategy for Reducing Methane Emissions ("**Methane Strategy**") outlining actions designed to avoid the emission of ninety nine million tons of greenhouse gases in 2020.[296] The Methane Strategy requires, among other things, the EPA to examine options for limiting emissions from the oil and gas sector.[297] Consistent with this requirement, in April 2014, the EPA released five technical white papers discussing major sources of emissions in the oil and gas sector and identifying techniques for mitigating those emissions.[298]

7.2.1. CONSIDERING NATURAL GAS' CLIMATE IMPACTS WHEN REVIEWING INFRASTRUCTURE PROJECTS

When reviewing infrastructure projects, FERC may collect and publish information regarding the greenhouse gas emissions resulting from production, transportation, and use of natural gas. By increasing awareness of natural gas' potential climate impacts, this may encourage more climate-sensitive decision-making both within and outside the Commission.

(a) Natural gas pipelines and related facilities

Natural Gas Act, section 7(c)(1)(A) (15 U.S.C. § 717f(c)(1)(A)) requires a natural gas company to obtain a certificate of public convenience and necessity from FERC before transporting natural gas in interstate

Hydrocarbon pipeline in Alaska. Credit: U.S. Geological Survey.

commerce or constructing, acquiring, extending, or operating any facilities therefor. As part of this certification process, FERC may collect, analyze, and publish information regarding natural gas' climate and other environmental impacts. This may occur in two primary ways.

Firstly, FERC may evaluate the greenhouse gas emissions resulting from production, transportation, and use of natural gas when determining whether a proposed pipeline is in the public interest. Under Natural Gas Act, section 7(e) (15 U.S.C. § 717f(e)) FERC may only certify a pipeline project if it determines that:

- the natural gas company is able and willing to properly perform the project and otherwise comply with the regulatory regime; and
- the project is or will be required by the present or future public convenience and necessity.

This gives FERC broad discretion to inquire into the likely public benefits and costs of a pipeline project. In *Atlantic Ref. Co. v. PSC of New York,* 360 U.S. 378 (1959), the U.S. Supreme Court held that the former Federal Power Commission (now FERC) must "evaluate all factors bearing on the public interest" when deciding whether to issue a certificate of public convenience and necessity.[299] Similarly, in *Federal Power Commission v. Transcontinental Gas Pipe Line Corp,* 365 U.S. 1 (1961), the court held that, in assessing certificate applications, the Commission acts as the "guardian of the public interest" and, as such, must assess the public need for, and public interest in, the project to be certified.[300]

Among the factors FERC must consider are the project's likely air quality and other environmental effects. In this regard, FERC has stated:

> *"In reaching a final determination on whether a project will be in the public convenience and necessity, the Commission performs a flexible balancing process during which it weighs the factors presented in a particular application. Among the factors that the Commission considers in the balancing process are the proposal's market support, economic, operational and competitive benefits, and environmental impacts."*[301]

As part of its environmental review of pipeline projects, FERC seeks to identify all potential adverse impacts on air quality and/or other disruptions to the environment.[302] FERC's analysis may consider the greenhouse gas emissions produced by the project both directly, as a result of construction and operation of the pipeline and indirectly, as a result of production and consumption of the natural gas transported thereby.[303] This was implicitly acknowledged by FERC in its 2007 decision approving proposed expansions to the North Baja pipeline running from Arizona, through California, to Mexico (the "**North Baja decision**").[304] In assessing the project's likely environmental effects, FERC considered the impact of constructing and operating the expanded pipeline. FERC also examined, and took steps to mitigate, the impact of using the natural gas transported by the pipeline. To this end, FERC conditioned its approval on the pipeline only delivering gas that meets the strictest quality standards.

On appeal, the U.S. Court of Appeals for the Ninth Circuit held that, in imposing this condition, "FERC adequately considered the environmental effects of end-use of North Baja gas."[305]

The North Baja decision demonstrates that FERC may consider both direct and indirect environmental effects when certifying natural gas pipelines. In that case, FERC's indirect effects analysis focused on the greenhouse gas emissions resulting from downstream use of natural gas transported via the pipeline. Similarly, FERC may also consider emissions caused by upstream natural gas production.

Notwithstanding the above, FERC's analysis of the climate impacts of natural gas projects is cursory at best. In recent certification decisions, FERC's environmental review has focused on the impact of constructing and operating the project.[306] FERC has generally been reluctant to analyze the environmental effects of natural gas production and/or consumption. Indeed, even in the North Baja decision, FERC denied that it had, or was required to, undertake such an analysis.[307] To remedy this deficiency, FERC could revise its certification policies to provide for consideration of the total greenhouse gas emissions resulting from natural gas projects, including those released during production and consumption of the gas.

FINDING 14

In determining whether a natural gas pipeline is required in the public convenience and necessity, FERC could consider the greenhouse gas emissions resulting from construction and operation of the pipeline and production and consumption of the natural gas transported thereby.

In addition to its public interest review under the Natural Gas Act (15 U.S.C. § 717 et seq.), FERC must also conduct an environmental assessment under NEPA (42 U.S.C. § 4321 et seq.) before issuing a certificate of public convenience and necessity authorizing a pipeline project. This provides another opportunity for FERC to assess the project's likely climate effects.

As discussed in Chapter 3, NEPA, section 102(2) (42 U.S.C. § 4332(2)) requires federal agencies to prepare an EIS for all "major federal actions significantly affecting the quality of the human environment."[308] Pursuant to this section, FERC typically issues an EIS for any major pipeline construction project using rights-of-way in which there is no existing natural gas pipeline.[309] For other pipeline projects, FERC initially prepares an EA and, depending on the outcome of that assessment, may then prepare an EIS.[310]

To facilitate preparation of the EA and/or EIS, FERC requires applications for certificates of public convenience and necessity to include an environmental report analyzing the project's likely environmental impacts.[311] The environmental report must include up to thirteen resource reports as follows:[312]

Table 2: Resource reports to be submitted with certificate applications

Report title		Information to be provided in report	Projects for which report is required
1	General project description[313]	Details of all facilities to be constructed, modified, or removed in connection with the project, procedures for construction and operation, construction timetables, future plans for related construction, and applicable regulations, codes, and permits.	All projects.
2	Water use and quality[314]	Details of all water bodies affected by the project, the nature of those effects, and proposed mitigation measures.	All projects except those involving: • the construction of facilities in previously disturbed areas of existing above ground facilities and in which there are no wetlands or other water bodies; and • no significant increase in water use.
3	Fish, wildlife, and vegetation[315]	Details of all existing fish, wildlife, and vegetation resources directly and/or indirectly affected by the project, the nature of those effects, and proposed mitigation measures.	All projects except those involving only facilities within the improved area of an existing compressor, meter, or regulator station.
4	Cultural resources[316]	Description of the nature and extent of cultural resources in the area affected by the construction, operation, and maintenance of the project.	All projects.
5	Socioeconomics[317]	Description of current socioeconomic conditions in the area affected by the construction of the project and the socioeconomic impact of construction and operation of the project in that area.	Projects involving significant aboveground facilities.
6	Geological resources[318]	Details of any geological resources or hazards that may be directly or indirectly affected by the project or place the project at risk and proposed mitigation measures.	All projects, except those involving only facilities within the boundaries of existing above-ground facilities.
7	Soils[319]	Details of the soils affected by the project, the nature of those effects, and proposed mitigation measures.	All projects, except those not involving soil disturbance.

	Report title	Information to be provided in report	Projects for which report is required
8	Land use, recreation, and aesthetics[320]	Details of any land affected by the construction and operation of the project, potential visual impacts of the project on designated scenic rivers, areas, or roads, recreation areas, and public lands or residential areas, and proposed mitigation measures. Summary of consultations undertaken with relevant federal and state agencies.	All projects, except those involving only facilities which are of comparable use at existing compressor, meter, and regulator stations.
9	Air and noise quality[321]	Details of existing air quality and noise levels in the vicinity of the project, the project's effect on the existing air and noise environment, and proposed mitigation measures.	Projects involving the construction of compressor facilities at new or existing stations and LNG facilities.
10	Alternatives[322]	Details of alternatives to the project and the environmental impacts of those alternatives.	All projects.
11	Reliability and safety[323]	Details of potential reliability problems and other hazards resulting from the failure of project components due to accidents, natural catastrophes, or acts of terrorism and proposed mitigation measures.	Projects involving new or re-commissioned LNG facilities and pipelines in respect of which significant safety concerns have been raised.
12	PCB contamination[324]	A statement that project activities will comply with an approved EPA disposal permits.	Projects involving the replacement or abandonment of facilities with PCBs in excess of 50 parts per million in pipeline liquids.
		Details of the status of remediation efforts completed to date.	Projects involving the modification of compressor stations on sites that have soils contaminated with PCBs.
13	Engineering and design material[325]	Relevant engineering and design materials for the project.	Projects involving the construction or re-commissioning of LNG facilities.

As indicated in Table 2 above, the environmental report must analyze the project's likely air quality impacts. Specifically, the report must include, among other things, a description of "existing air quality [in the vicinity of the project], including background levels of nitrogen dioxide and other criteria pollutants[326]."[327] In addition, the report must also provide an estimate of the project's likely impact on air quality and, in particular, "the emission rate of nitrogen oxides from existing and proposed facilities."[328] Notably however, there is no requirement that the report estimate the project's greenhouse gas emissions.

FERC rules and regulations do not currently require consideration of natural gas' climate impacts in environmental reviews under NEPA (42 U.S.C. § 4321 et seq.). Nevertheless, climate-related issues have been discussed in all of the EISs prepared by FERC in connection with pipeline projects since 2009.[329] However, like FERC's review under the Natural Gas Act (15 U.S.C. § 717 et seq.), this discussion has generally been brief and perfunctory.

FERC's EIS analysis has been limited to identifying the causes and effects of climate change and quantifying the greenhouse gas emissions from pipeline projects. FERC has focused primarily on the greenhouse gases emitted during construction and operation of the pipeline and has tended to overlook upstream emissions from production, and downstream emissions from consumption, of the natural gas transported thereby. Indeed, none of the EISs issued by FERC over the last five years analyzed the greenhouse gas emissions caused by natural gas production. Moreover, only half of the EISs assessed emissions from natural gas use.[330] In all cases, FERC dismissed project emissions by arguing that they represent a trivial proportion of the global greenhouse gas inventory.

FERC's typical approach is reflected in its 2012 EIS regarding Spectra Energy's proposal to expand the Texas Eastern Transmission and Algonquin Gas Transmission pipelines to serve New Jersey and New York. There, FERC concluded that greenhouse gas emissions from construction and operation of the project "would not have any direct impacts on the environment in the Project area."[331] FERC further concluded that, while the emissions may affect global climatic conditions, "there is no standard methodology to determine how the project's relatively small incremental contribution to [greenhouse gases] would translate into physical effects on the global environment."[332]

Given the large number of sources emitting greenhouse gases, any single source is unlikely to make a sizable contribution to atmospheric greenhouse gas levels.[333] However, this does not mean that such emissions can be disregarded as insignificant. Regulations issued under NEPA (42 U.S.C. § 4321 et seq.) require federal agencies to assess the significance of environmental effects in light of both their context and intensity.[334] The "intensity" of an effect refers to its severity and must be evaluated based on, among other things, whether the effect presents a risk to public health or safety and the extent to which that risk is highly uncertain or unknown.[335]

As discussed above, greenhouse gas emissions contribute to climatic changes that pose a serious risk to human health and safety, the full extent of which remains unknown. [336] Recognizing this, several prominent environmental law scholars have argued that any increase in greenhouse gas emissions may be found to have a significant impact for the purposes of NEPA (42 U.S.C. § 4321 et seq.). For example, Elizabeth Sheargold and Smita Walavalkar have asserted that "[i]n light of the potentially catastrophic impacts of global climate change, a numerically small contribution to atmospheric concentrations of GHGs [greenhouse gases] could still be considered significant."[337]

To ensure a more comprehensive assessment of natural gas' climate impacts, FERC may revise its NEPA policies to expressly provide for consideration of the greenhouse gas emissions of pipeline projects and options for reducing those emissions.

FINDING 16

FERC could consider the climate impacts of pipeline projects in environmental reviews.

(b) Import and Export Terminals

In addition to regulating natural gas pipelines, FERC also supervises the construction and operation of import and export terminals. While most natural gas trade currently occurs via international pipelines,[338] there is significant and growing interest in the import and export of LNG.[339] As LNG takes up approximately 1/600th the volume of natural gas in gaseous form, it can be transported over long distances via sea vessels and/or road tankers to areas not served by pipelines.

Like other natural gas projects, LNG raises unique environmental challenges. On the one hand, the production of LNG may increase greenhouse gas emissions as substantial energy is consumed in the liquefaction, transportation, and regasification processes. On the other hand, increased trade in LNG may lead to the substitution of natural gas for coal and oil, reducing emissions at the point of use. Recognizing this, FERC's challenge is to implement policies that minimize the costs, and maximize the benefits, of LNG.

Natural Gas Act, section 3(e) (15 U.S.C. § 717b(e)) grants FERC exclusive authority over the siting, construction, expansion, and operation of "LNG terminals." Natural Gas Act, section 2(11) (15 U.S.C. § 717a(11)), defines an "LNG terminal" as any "natural gas facility located onshore or in State waters that…[is] used to receive, unload, store, transport, gasify, liquefy or process natural gas" imported into, or exported from, the U.S. Facilities located in federal waters are regulated by the Maritime Administration and the U.S. Coast Guard under the 1974 Deepwater Port Act (33 U.S.C. § 1501 et seq.).

Any person proposing to develop an LNG terminal must apply for authorization from FERC.[340] In reviewing authorization applications, FERC must conduct an environmental assessment under NEPA (42 U.S.C. § 4321 et seq.).[341] Pursuant to NEPA, section 102(2) (42 U.S.C. § 4332(2)), FERC issues EIS' for all projects involving the siting, construction, and/or operation of import and export facilities used to liquefy, store, or regasify LNG transported by water (together "**LNG projects**").[342]

FERC's procedures for reviewing LNG projects are broadly the same as those used for pipeline projects. In summary, FERC requires applicants for authorization of LNG projects to provide an environmental report analyzing, among other things, the project's likely air quality impacts.[343] Based on this and other information, FERC prepares an EIS outlining the project's likely environmental effects and measures to avoid or minimize those effects.[344]

Since 2009, FERC has issued final EISs for two LNG projects.[345] Each EIS included an analysis of the project's likely climate impacts. In each case, FERC's analysis focused exclusively on the greenhouse gas emissions resulting from construction and operation of import and export facilities. While both EISs estimated such emissions, neither attempted to quantify emissions from the upstream production or downstream use of LNG imported to, or exported from, the U.S. Such emissions arguably can be considered by FERC in future environmental reviews.

With respect to LNG produced and/or used within the U.S., there is some precedent for FERC considering the indirect climate and other environmental impacts of infrastructure projects. For example, in the North Baja case discussed above, FERC's EIS examined the air quality impacts of using regasified LNG imported from Mexico in southern California.[346] While that case involved the certification of an interstate pipeline, FERC may adopt the same approach when authorizing LNG terminals.

The position with respect to LNG produced and/or used outside of the U.S. is more complex. We have not identified any relevant administrative decisions or court cases analyzing FERC's ability to consider the environmental impact of these overseas activities. However, previous cases analyzing the extraterritorial application of NEPA (42 U.S.C. § 4321 et seq.) provide useful guidance on this issue. The courts have held that, in determining whether NEPA (42 U.S.C. § 4321 et seq.) applies to extraterritorial impacts resulting from agency action, the agency must take into account the location in which the action takes place and the impacts are felt.[347] NEPA (42 U.S.C. § 4321 et seq.) has been held to apply where both the agency action, and its environmental impacts, occur within the U.S. or an area over which the U.S. maintains legislative control.[348]

The production and/or use of LNG in foreign countries produces greenhouse gas emissions in those countries. However, as greenhouse gases mix in the earth's atmosphere, the effects of those emissions will be felt globally. Therefore, as the production and/or use of LNG overseas will affect climatic conditions in the U.S., NEPA (42 U.S.C. § 4321 et seq.) arguably requires FERC to analyze the impact thereof. Even if such an analysis is not legislatively required, FERC may undertake it on a voluntary basis.

FINDING 17

FERC could consider all direct and indirect greenhouse gas emissions resulting from the construction and operation of LNG terminals and the production and consumption of natural gas imported and/or exported via those terminals.

7.2.2. REDUCING FUGITIVE METHANE EMISSIONS FROM NATURAL GAS INFRASTRUCTURE

FERC can take steps to mitigate the greenhouse gas emissions resulting from production, transportation, and use of natural gas. To this end, FERC can require natural gas companies to reduce methane leaks from new pipelines and other infrastructure. As a potent, but short-lived greenhouse gas, methane has a significant near-term warming effect.[349] Reducing methane emissions may therefore have a disproportionate impact on warming over the short-term.[350]

Several components of the natural gas system are prone to leakage, including compressors, valves, pumps, flanges, and pipe connections.[351] In addition to accidental leaks, intentional venting of gas from wells, processing plants, and storage tanks also releases methane.[352] While estimates of the amount of these emissions vary, recent research suggests that between two and three percent of all natural gas produced in the U.S. is lost to the atmosphere through leaks and venting.[353]

Methane leaks from natural gas systems can be substantially reduced with simple changes to the construction and operation of pipelines and other infrastructure, including by:

- using low-leak plastic and protected steel pipes instead of cast iron and unprotected steel systems, which have a leakage rate up to seventy seven times higher than low-leak pipes;[354]
- replacing high-bleed pneumatic controllers, which are designed to vent large amounts of natural gas while regulating gas flow and pressure in pipelines, compressor stations, and storage facilities, with low- or no-bleed devices;[355]
- substituting dry-seal systems, which use high-pressure gas as a barrier to prevent leakage, for wet-seals in centrifugal compressors[356] or, where wet-seals are used, installing equipment to capture and route leaking gas to a collection tank, fuel system, or combustion device;[357]
- limiting leakage from reciprocating compressors by replacing piston rod packing and/or using vapor recovery unit systems to capture leaking gas;[358]
- adopting monitoring systems and installing leak detection equipment to identify and control fugitive emissions from valves, flanges, pipe connectors, and other equipment;[359] and
- improving maintenance systems to ensure timely replacement and repair of worn and damaged infrastructure.[360]

Financial and other barriers often prevent natural gas companies from voluntarily investing in these and/or other emission control technologies.[361] To overcome these barriers, FERC could require, as a condition of approving pipeline projects, the adoption of suitable leak detection and management systems. For example, FERC could require the use of portable analyzers, optical gas imaging cameras, and other technologies that the EPA has found to be effective in identifying leaks.[362]

As discussed in section 7.2.1 above, Natural Gas Act, section 7(c)(1)(A) (15 U.S.C. § 717f(c)(1)(A)) requires natural gas companies to obtain a certificate of public convenience and necessity from FERC before constructing, acquiring, or extending interstate pipeline facilities. Section 7(e) (15 U.S.C. § 717f(e)) authorizes FERC "to attach to the issuance of the certificate and to the exercise of the rights granted thereunder such reasonable terms and conditions as the public convenience and necessity may require."

When certifying pipeline projects, FERC aims to "avoid unnecessary environmental and community impacts."[363] To this end, FERC may condition a certificate of public convenience and necessity on the taking of appropriate steps to minimize the project's environmental effects. Recent certificates issued by FERC have included conditions requiring natural gas companies to, among other things, monitor environmental conditions in the project area,[364] avoid construction in environmentally sensitive locations,[365] and complete environmental restoration activities[366]. FERC could also require natural gas companies to take appropriate steps to limit methane emissions.

Such requirements have been imposed on natural gas companies operating in Colorado. In February 2014, the Colorado Air Quality Control Board adopted regulations requiring natural gas companies to inspect equipment at wells and compressor stations for leaks and promptly complete any needed repairs.[367] Additionally, producers must also take steps to reduce natural gas venting by, for example, installing low-bleed pneumatic controllers.[368]

FINDING 18

FERC could require, as a condition of certificates of public convenience and necessity for pipeline projects, the installation of appropriate emissions control technologies.

8. CONCLUSION

There is now almost universal agreement among scientists that anthropogenic greenhouse gas emissions have caused, and will continue to cause, average global temperatures to rise.[369] Rising temperatures will have profound impacts on the global environment, leading to reduced snow and ice cover,[370] rising sea levels,[371] and more frequent and severe extreme weather events.[372] The extent of these impacts will depend, in large part, on future emissions from electricity generation and other human activities.[373]

Recognizing the threat posed by global climate change, the Obama Administration has called on Congress to enact legislation controlling greenhouse gas emissions.[374] In the absence of Congressional action, President Obama has committed to using existing executive powers to reduce emissions.[375]

In June 2013, the President adopted a new Climate Action Plan directing executive agencies to implement climate change mitigation strategies.[376] The Climate Action Plan requires agencies to, among other things, establish carbon pollution standards for new and existing power plants,[377] increase the energy efficiency of buildings and appliances,[378] adopt fuel economy standards for heavy-duty vehicles,[379] and support the development of renewable fuels[380] and other low-carbon energy and transportation options.[381]

While the Climate Action Plan takes an important first step towards mitigating climate change, it is far from comprehensive. Notably, the Climate Action Plan does not require the adoption of mitigation strategies by FERC.

As an independent federal agency regulating aspects of energy production and supply, FERC can play an important role in reducing greenhouse gas emissions. FERC's primary regulatory duties include overseeing wholesale electricity transactions occurring in interstate commerce, supervising the interstate transmission of electricity, natural gas, and oil, and licensing the construction and operation of non-federal hydropower projects.

The activities regulated by FERC make a significant contribution to the national greenhouse gas inventory. Research by the EPA indicates that the energy sector is currently the largest source of carbon dioxide in the U.S., accounting for ninety seven percent of emissions in 2012.[382] In the same year, the energy sector accounted for forty percent of methane and nine percent of nitrous oxide emissions in the U.S.[383]

There are several actions FERC can take, pursuant to its existing regulatory authority, to reduce the energy sector's greenhouse gas emissions. FERC could:

- **Promote increased use of clean energy sources.** FERC can reduce fossil fuel generation by including a carbon adder, reflecting the cost of climate and other environmental damage caused by electricity generation's carbon dioxide emissions, in wholesale electricity rates.
- **Encourage increased development of renewable power systems.** FERC can encourage more renewable generation by facilitating the development and use of feed-in tariffs that guarantee renewa-

ble generators a specified price for their power.

- **Support the use of hydrokinetic resources, particularly ocean energy resources**. FERC can encourage the development of offshore hydrokinetic projects by simplifying the approvals process for such projects.
- **Encourage expansion of the transmission grid to connect areas with high renewable energy potential to load centers.** FERC can require electric utilities to expand their transmission capacity to serve renewable power systems. Additionally, FERC can encourage utilities to voluntarily invest in such expansions by changing its transmission cost recovery rules to allow for broader allocation of investment costs.
- **Promote integrated resource planning that considers both supply- and demand-side options for meeting future electricity requirements.** By encouraging utilities to consider all possible resource options, integrated resource planning may lead to greater use of renewable generation, energy efficiency, and other environmentally friendly resources. Recognizing this, FERC may require utilities to adopt a fully integrated approach when preparing regional transmission plans. Additionally, FERC can also foster greater cooperation and information sharing between utilities during the planning process.
- **Reduce the natural gas industry's climate impacts.** FERC can mitigate greenhouse gas emissions from natural gas production, transportation, and use by requiring natural gas companies to report on the climate impacts of their operations and to take appropriate steps to minimize those impacts.

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[2] Walsh et al., *supra* note 1, at 28.

[3] U.S. Global Change Research Program, *Chapter 1: Overview and Report Findings*, in CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT 7, 12 (Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe eds., 2014), *available at* http://s3.amazonaws.com/nca2014/high/NCA3_Full_Report_01_Overview_Report_Findings_HighRes.pdf?download=1.

[4] Walsh et al., *supra* note 1, at 29.

[5] *Id*. at 40 (indicating that, over coming years, the risk of floods and droughts will likely increase).

[6] *Id*. at 49 – 42 (indicating that the frequency, intensity, and duration of extreme weather events will likely increase in the future).

[7] *Id*. at 44 (stating that increased temperatures have already led to the "[m]elting of glaciers and ice sheets [which] is…contributing to sea level rise at increasing rates" and that these effects will continue in the future).

[8] U.S. Global Change Research Program, *supra* note 3, at 9.

[9] Walsh et al., *supra* note 1, at 25 (indicating that "choices made now and in the next few decades will determine the amount of additional future warming").

[10] David Victor, Dadi Zhou, Essam Hassan Mohamed Ahmed, Pradeep Kumar Dadhich, Jos Olivier, H-Holger Rogner, Kamel Sheikho, Mitsutsune Yamaguchi, *Introduction*, in CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE 1, 16 (Ottmar Edenhofer, Ramón Pichs-Madruga, Youba Sokona, Shardul Agrawala, Igor Alexeyevich Bashmakov, Gabriel Blanco, John Broome, Thomas Brucknew, Steffen Brunner, Mercedes Bustamante, Leon Clarke, Felix Creutzig, Shobhakar Dhakal, Navroz K. Dubash, Patrick Eickemeier, Ellie Farahani, Manfred Fischedick, Marc Fleurbaey, Reyer Gerlagh, Luis Gómez-Echeverri, Shreekant Gupta, Sujata Gupta, Jochen Harnish, Kejun Jiang, Susanne Kadner, Sivan Kartha, Stephan Klasen, Charles Kolstad, Volker

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11 President Barack Obama, Remarks by the President in the State of the Union Address (Feb. 12, 2013) [hereinafter 2013 State of the Union Address] (calling on Congress to "pursue a bipartisan, market-based solution to climate change"); President Barack Obama, Remarks by the President on Climate Change (Jun. 25, 2013) (calling on Congress to "come up with a bipartisan, market-based solution to climate change).

12 2013 State of the Union Address, *supra* note 11.

13 EXECUTIVE OFFICE OF THE PRESIDENT, THE PRESIDENT'S CLIMATE ACTION PLAN, 6 (2013), *available at* http://www.whitehouse.gov/sites/default/files/images/president27climateactionplan.pdf.

14 *Id*. at 6 – 7.

15 *Id*. at 7.

16 *Id*. at 9 – 10.

17 *Id*. at 8.

18 *Id*.

19 *Id*. at 11.

20 Federal Energy Regulatory Commission, What FERC Does (last updated May 28, 2013), http://ferc.gov/about/ferc-does.asp.

21 U.S. ENVIRONMENTAL PROTECTION AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1900-2012, ES-5 – ES-7 (2014), *available at* http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html (indicating that, in 2012, electricity generation in the U.S. produced 2,022.7 teragrams of carbon dioxide equivalent, while total carbon dioxide emissions were 5,383.2 teragrams).

22 The EPA defines "natural gas systems" as including the gas wells, processing facilities, and transmission and distribution pipelines used to produce, transport, store, and distribute natural gas. "Petroleum systems" include facilities used for crude oil production, transportation, and refining. *Id.* at 3-54 – 3-55 and 3-61 – 3-62.

23 *Id*. at ES-5 – ES-7 (indicating that, in 2012, methane emissions from natural gas systems were 129.9 teragrams of carbon dioxide equivalent, methane emissions from petroleum systems were 31.7 teragrams of carbon dioxide equivalent, and total methane emissions were 567.3 teragrams of carbon dioixde equivalent).

24 *Id*. at ES-3 (stating that methane has a global warming potential twenty one times that of carbon dioxide over a 100 year time horizon).

25 *Id*., at ES-5 - ES-7 (indicating that fossil fuel combustion in electricity generation produced 2,022.7 teragrams of carbon dioxide in 2012).

26 *Id*. at ES-12.

27 NATIONAL RESEARCH COUNCIL, HIDDEN COSTS OF ENERGY: UNPRICED CONSEQUENCES OF ENERGY PRODUCTION AND USE, 99 (2010). See also EPA, Clean Energy: Coal (last updated Sep. 25,

2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/coal.html (estimating average emissions of carbon dioxide from coal-fired generation at 2,249 pounds per MWh).

[28] U.S. Environmental Protection Agency, Clean Energy: Oil (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/enedy-and-you/affect/oil.html (estimating average emissions of carbon dioxide from oil-fired generation at 1,675 pounds per MWh).

[29] U.S. Environmental Protection Agency, Clean Energy: Natural Gas (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/enedy-and-you/affect/nautral-gas.html (estimating average emissions of carbon dioxide from natural gas-fired generation at 1,135 pounds per MWh).

[30] Ottmar Edenhofer, Ramón Pichs-Madruga, Youba Sokona, Kristin Seyboth, Dan Arvizu, Thomas Bruckner, John Christensen, Helena Chum, Jean-Michel Devernay, Andre Faaij, Manfred Fischedick, Barry Goldstein, Gerrit Hansen, John Huckerby, Arnulf Jäger-Waldau, Susanne Kadner, Daniel Kammen, Volker Krey, Arun Kumar, Anthony Lewis, Oswaldo Lucon, Patrick Matschoss, Lourdes Maurice, Catherine Mitchell, William Moomaw, José Moreira, Alain Nadai, Lars J. Nilsson, John Nyboer, Atiq Rahman, Jayant Sathaye, Janet Sawin, Roberto Schaeffer, Tormod Schei, Steffen Schlömer, Ralph Sims, Christoph von Stechow, Aviel Verbruggen, Kevin Urama, Ryan Wiser, Francis Yamba, & Timm Zwickel, *Summary for Policymakers,* in RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION 3, 19 (Ottmar Edenhofer, Ramón Pichs-Madruga, Youba Sokona, Kristin Seyboth, Patrick Matschoss, Susanne Kadner, Timm Zwickel, Patrick Eickemeier, Gerrit Hansen, Steffen Schlömer, and Christoph von Stechow eds., 2011), *available at* http://srren.ipcc-wg3.de/report (estimating that, on a lifecycle basis, renewable power systems emit forty six grams of carbon dioxide equivalent per-kilowatt hour ("**KWh**") of electricity generated and fossil fuel power plants emit between 469 and 1001 grams of carbon dioxide equivalent per KWh of electricity generated).

[31] *Id*.

[32] U.S. Environmental Protection Agency, Clean Energy: Non-Hydroelectric Renewable Energy (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/non-hydro.html.

[33] *Id*.

[34] U.S. Environmental Protection Agency, Clean Energy: Natural Gas (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html (outlining the environmental effects of natural gas-fired electricity generation); U.S. Environmental Protection Agency, Clean Energy: Coal (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/coal.html (outlining the environmental effects of coal-fired electricity generation); U.S. Environmental Protection Agency, Clean Energy: Oil (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/oil.html (outlining the environmental effects of oil-fired electricity generation).

[35] 26 U.S.C. § 45 (2014).

[36] Jeremy Knee, *Rational Electricity Regulation: Environmental Impacts and the "Public Interest"* 113 W. VA. L. REV. 739, Footnote 20 (2011) (referring to estimates prepared by the U.S. Department of Energy).

[37] Rudy Perkins, *Electricity Deregulation, Environmental Externalities and the Limitations of Price*, 39 B.C. L. REV. 993 995 (1998).

[38] NATIONAL RESEARCH COUNCIL, *supra* note 27, at 3.

[39] *Id*.

[40] Fed. Power Comm'n v. Florida Power & Light Co., 404 U.S. 452 (1972).

[41] Federal Power Act § 206(b), 16 U.S.C. § 824e(b) (2014).

[42] Permian Basin Area Rate Cases, 390 U.S. 747, 767 (1968).

[43] Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591, 602 (1944).

[44] Farmer's Union Cent. Exch., Inc. v. Fed. Energy Regulatory Comm'n, 734 F.2d 1486, 1502 (D.C. Cir. 1984).

[45] Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591, 603 (1944).

[46] *Id*.

[47] Farmer's Union Cent. Exch., Inc. v. Fed. Energy Regulatory Comm'n, 734 F.2d 1486, 1502 (D.C. Cir. 1984).

[48] Fed. Power Comm'n v. Sierra Pac. Power Co., 350 U.S. 348, 355 (1956).

[49] Perkins, *supra* note 37, at 1018.

[50] FEDERAL ENERGY REGULATORY COMMISSION, THE STRATEGIC PLAN: FY2009-2013, 6 (2013), *available at* http://www.ferc.gov/about/strat-docs/FY-09-14-strat-plan-print.pdf.

[51] JAMES H. MCGREW, FERC: FEDERAL ENERGY REGULATORY COMMISSION, 179 (2nd ed. 2009).

[52] *Id*.

[53] *Id*. at 193.

[54] *Citizens Power & Light Co.* 48 FERC ¶ 61,210 (1989).

[55] Federal Energy Regulatory Commission, Companies with market based rate authority (last updated Apr. 30, 2014), http://www.ferc.gov/industries/electric/gen-info/mbr/list.asp.

[56] For example, in 1996, FERC issued Order No. 888 requiring all public utilities that own or operate transmission facilities to provide open-access transmission services to all customers on the same terms and conditions as they provide to themselves. See *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities, Order No. 888*, 75 FERC ¶ 61,080, *clarified* 76 FERC ¶ 61,009 (1996), *order on reh'g* 78 FERC ¶ 61,220 (1997), *clarified* 79 FERC ¶ 61,182 (1997), *order on reh'g* 81 FERC ¶ 61,248 (1997), *order on reh'g* 82 FERC ¶ 61,046 (1998). Building on these reforms, in 1999, FERC issued Order No. 2000 encouraging public utilities to form Regional Transmission Organizations to manage the transmission grid on a regional basis. See *Regional Transmission Organizations, Order No. 2000*, 89 FERC ¶ 61,285, *clarified* 90 FERC ¶ 61,201.

[57] Federal Energy Regulatory Commission, Electric Competition (last updated Jul. 15, 2010), http://www.ferc.gov/industries/electric/indus-act/competition.asp.

[58] *Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities* 119 FERC ¶ 61,295, *order on reh'g* 123 FERC ¶ 61,055, *order on reh'g* 125 FERC ¶ 61,326, *order on reh'g* 127 FERC ¶ 61,284, *order on reh'g* 130 FERC ¶ 61,206. Affirmed Montana Consumer Counsel v. Fed. Energy Regulatory Comm'n, 659 F.3d 910 (9th Cir. 2011), writ of certiorari denied Public Citizen, Inc. v. Fed. Energy Regulatory Comm'n, 133 S. Ct. 26 (2012).

[59] *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities, Order No. 888*, 75 FERC ¶ 61,080.

[60] Elesha Simeonov, *Just Not Reasonable: What the FERC's Order on Demand Response Compensation Reveals About the Current Shortfall in "Just and Reasonable" Rulemaking* 31 TEMP. J. SCI. TECH. & ENVTL. L. 311, 331 (2012).

[61] Perkins, *supra* note 37, at 993. See also American Clean Skies Foundation, Letter to FERC: Comments on Proposed Rule for Demand Response Compensation in Organized Wholesale Energy Markets, Docket No. RM17-10-000, 4, *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=13817172 (FERC, May 13, 2010) (arguing that fossil fuel generation is "typically mispriced because wholesale prices radically understate the full environmental and health costs associated therewith"); Environmental Defense Fund, Submission to FERC: Docket No. RM10-17-000, 2-3 (FERC, Oct. 13, 2010), *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=1385678 (stating that "current market prices fail to internalize environmental externalities – including…greenhouse gas ("GHG") pollution").

[62] Perkins, *supra* note 37.

[63] Fed. Power Comm'n v. Sierra Pac. Power Co., 350 U.S. 348, 355 (1956).

[64] *Id.*

[65] *Id*.

[66] Nat'l Ass'n. for the Advancement of Colored People v. Fed. Power Comm'n, 425 U.S. 662, 669 (1976).

[67] *Id*.

[68] *Id*. at 669-670.

[69] *Id*.

[70] Knee, *supra* note 36, at 766.

[71] *Id*.

[72] Simeonov, *supra* note 60, at 344.

[73] *Atlantic City Electric Co. v. PJM Interconnection*, L.L.C., 115 FERC ¶ 61,132 (2006).

[74] *Black Oak Energy, LLC v. PJM Interconnection, L.L.C.,* 122 FERC ¶ 61,208 (2008), *rehearing granted in part*, 125 FERC ¶ 61,042 (2008).

[75] *Id*.

[76] Black Oak Energy, LLC v. Fed. Energy Regulator Comm'n, U.S. App. LEXIS 16201 (D.C. Cir. 2013).

[77] *Atlantic City Electric Co. v. PJM Interconnection, L.L.C.*, 115 FERC ¶ 61,132, 61,478 (2006).

[78] *Id*.

[79] *Devon Power LLC,* 115 FERC ¶ 61,340, 62,323 (2006).

[80] A bid may be declared "out of market" if it is below 0.75 times the cost of new entry and such a low bid is not consistent with long run average costs, opportunity costs, or other reasonable economic measures. *Id*. at 62,322.

[81] The "required new entry" refers to new supply that is needed to meet the installed capacity requirement determined by ISO-NE and approved by FERC. *Id*.

[82] *Id*.

[83] *Id*. at 62,323.

[84] *Id*.

85 *ISO New England, Inc. et al*, 135 FERC ¶ 61,029, 61,169 (2011).

86 *Id*.

87 *PJM Interconnection, L.L.C.*, 143 FERC ¶ 61,090, 61,608 (2013).

88 *Id*. at 61,607.

89 Felix Mormann, *Enhancing the Investor Appeal of Renewable Energy*, 42 ENV.L. 681, 694 (2012).

90 *Id*.

91 *Id*.

92 P. Sauter, J. Witt, E. Billig, and D. Thran, *Impact of the Renewable Energy Sources Act in Germany on Electricity Produced with Solid Biofuels – Lessons Learned by Monitoring the Market Development*, 53 BIOMASS & BIOENERGY 171 (2013).

93 Iven Lieben and Ian Boysvert, *Making Renewable Energy Fit: A Feed-in Tariff Certifying Body Could Accelerate Renewable Energy Deployment in the United States*, 52 NRJ 157, 182 (2011) (referring to teh findings of the Renewable Energy Policy Network for the 21st Century).

94 FEDERAL MINISTRY FOR THE ENVIRONMENT, NATURE CONSERVATION, AND NUCLEAR ENERGY SAFETY, RENEWABLE ENERGY SOURCES IN FIGURES, 36 (2011), *available at* http://www.erneuerbare-energien.de/fileadmin/ee-import/files/english/pdf/application/pdf/broschuere_ee_zahlen_en_bf.pdf.

95 Adelino Pereira and Joao Tome Saraiva, *Long Term Impact of Wind Power Generation in the Iberian Day-Ahead Electricity Market Price*, 55 ENERGY 1159 (2013).

96 Spanish Royal Decree Law 6/2009.

97 Spanish Royal Decree Law 1/2012.

98 Spanish Royal Decree Law 9/2013.

99 U.S. Constitution Article I, Section 8, Clause 3.

100 *Order on Petitions for Declaratory Order*, 132 FERC ¶61,047 (2010).

101 "Cogenerators" are defined, under PURPA, as facilities that sequentially produce electricity and another form of useful thermal energy in a manner that is more efficient than the separate production of the two forms of energy. See 16 U.S.C. § 796(18)(A) (2014); 18 C.F.R. § 292.205 (2014).

102 "Small power" producers are defined, under PURPA, as facilities no larger than 80 MW of whose primary energy source is renewable (hydro, wind or solar), biomass, waste, or geothermal resources. See 16 U.S.C. § 796(18)(A) (2014); 18 C.F.R. § 292.203.

103 Usually referred to as a Renewable Portfolio Standard.

104 *Order Granting Clarification and Dismissing Rehearing*, 133 FERC ¶ 61,059 (2010).

105 Consistent with FERC's 2010 order, several court decisions have held that the doctrine of field preemption forecloses state regulation of wholesale energy rates. Most recently, in PPL Energyplus, LLC v. Nazarian, No. MJG-12-1286, 2013 U.S. Dist. LEXIS 140210 (D. Md. Sep. 30, 2013), the U.S. District Court for the District of Maryland held that, in enacting the Federal Power Act (16 U.S.C. § 791a et seq.), "Congress intended to…give FERC exclusive jurisdiction over setting wholesale energy and capacity rates or prices and thus intended this field to be occupied exclusively by federal regulation. Thus, state action that regulates within this field is void under the doctrine of field preemption." In that case, the court invalidated an order of the Maryland Public Services Commission requiring three electric utilities to enter into a contract for differences

with CPV Maryland, LLC ("**CPV**") for the construction of a gas-fired generating facility. The contract provided that, regardless of the price set in the wholesale energy market, the utilities would assure CPV a fixed price, set by a contractual formula, for each unit of energy and capacity it sold. The court held that the contract set the prices received by CPV for wholesale energy and capacity sales. Therefore, as Congress intended FERC alone to regulate such sales, the order invades an exclusive federal field and is field preempted.

106 *Order on Petitions for Declaratory Order*, 132 FERC ¶ 61,047, 64 (2010).

107 This approach is supported by industry groups, including the Cogeneration Association of California and the Energy Producers and Users Coalition, which have called on FERC to establish a program under which state established feed-in tariffs can be federally approved. See *Order on Petitions for Declaratory Order*, 132 FERC ¶ 61,047, 46 (2010).

108 LETHA TAWNEY, RUTH GREENSPAN BELL AND MICAH S. ZIEGLER, HIGH WIRE ACT: ELECTRICITY TRANSMISSION INFRASTRUCTURE AND ITS IMPACT ON THE RENEWABLE ENERGY MARKET, WORLD RESOURCES INSTITUTE REPORT 6 (2011), *available at* http://www.wri.org/publication/high-wire-act.

109 ENERNEX CORPORATION, EASTERN WIND INTEGRATION AND TRANSMISSION STUDY: PREPARED FOR THE NATIONAL RENEWABLE ENERGY LABORATORY, 29 (2011) *available at* http://www.nrel.gov/electricity/transmission/eastern_renewable.html.

110 TAWNEY ET AL., *supra* note 108, at 6 (indicating that renewable fuel sources, such as wind and solar energy, are location bound).

111 *Id*. at 4 (finding that many areas with high renewable energy potential "are currently inaccessible because of transmission constraints").

112 NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION, 2009 SCENARIO RELIABILITY ASSESSMENT (2009), *available at* http://www.nerc.com/files/2009_Scenario_Assessment.pdf

113 ENERNEX CORPORATION, *supra* note 109, at 29.

114 U.S. DEPARTMENT OF ENERGY, 20% WIND ENERGY BY 2030: INCREASING WIND ENERGY'S CONTRIBUTION TO U.S. ELECTRICITY SUPPLY, 94 (2008), *available at* http://www.20percentwind.org/20p.aspx?page=Report.

115 *Id*.

116 *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051 46 (2011) (indicating that "additional, and potentially significant, investment in new transmission facilities will be required in the future to…integrate new sources of generation").

117 Fed. Power Comm'n v. Florida Power & Light Co., 404 U.S. 452 (1972).

118 See *supra* Chapter 2.

119 Federal Power Act § 205(a), 16 U.S.C. § 824d(a) (2014) (requiring FERC to ensure that rates for the transmission of electric energy are just and reasonable and not unduly discriminatory or preferential).

120 Federal Power Act § 210; 16 U.S.C. § 824i (2014) (authorizing FERC to issue interconnection orders).

121 Federal Power Act, § 216; 16 U.S.C. § 824p (2014) (authorizing FERC to permit the construction of electric transmission facilities in national interest electric transmission corridors in certain circumstances).

[122] *Southern Cross Transmission LLC and Pattern Power Marketing LLC,* 137 FERC ¶ 61,206 31 (2011). See also *Mirant Las Vegas, et al.* 106 FERC ¶ 61,156 (2004) (indicating that requiring an electric utility to interconnect its transmission facilities with a new generation "is in the public interest because it…[promotes] competition while protecting reliability"); *Brazos Electric Power Cooperative, Inc.* 188 FERC ¶ 61,199 (2007) (stating that "[n]ew interconnections and transmission service generally meet the public interest by increasing power supply options and improving competition").

[123] Nat'l Ass'n. for the Advancement of Colored People et al. v. Fed. Power Comm'n, 425 U.S. 662, 669 (1976).

[124] *Id*. at 670.

[125] *Id*. at Footnote 6.

[126] Michael H. Dworkin and Rachel A. Goldwasser, *Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organizations* 28 ENERGY L. J. 543, 545 (2007).

[127] Knee, *supra* note 36, at 763 - 772.

[128] *Id*. at 763.

[129] *Id*. at 765 - 768.

[130] *Id*. at 768 - 770.

[131] *Id*. at 770 - 773.

[132] *Certification of New Interstate Natural Gas Pipeline Facilities*, 88 FERC ¶ 61,743 (1999), *clarified* 90 FERC P 61,128, *further clarified* 92 FERC ¶ 61, 094. See *infra* section 7.2.1.

[134] Jan Dell, Susan Tierney, Guido Franco, Richard G Newell, Rich Richels, John Weyant, and Thomas J. Wilbanks, *Ch. 4: Energy Supply and Use,* in CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT 113, 115 (Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe eds., 2014), *available at* http://s3.amazonaws.com/nca2014/high/NCA3_Full_Report_04_Energy_Supply_and_Use_HighRes.pdf?download=1.

[135] *Id*. at 119.

[136] *Id*.

[137] *Id*. at 118.

[138] ENERNEX CORPORATION, *supra* note 109, at 29.

[139] AMERICAN ELECTRIC POWER, TRANSMISSION FACTS (2009), *available at* www.aep.com/about/transmission/docs/transmission-facts.pdf.

[140] TAWNEY ET AL., *supra* note 108, at 15.

[141] *Id*.

[142] *Id*.

[143] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051, 558 and 578 (2011).

[144] *Id*. at 622.

[145] *Id*. at 637.

[146] *Id*. at 646.

[147] *Id*. at 657.

[148] *Id*. at 668.

[149] *Id*. at 685.

[150] South Carolina Public Serv. Auth. v. Fed. Energy Regulatory Comm'n, No. 12-1232 (D.C. Cir. Filed May 25, 2012 and later).

[151] J. P. Pfeifenberger and D. Hou, *Transmission's True Value: Adding up the Benefits of Transmission Infrastructure Investment*, PUBLIC UTILITIES FORTNIGHTLY 44, 45 (2012). See also TAWNEY ET AL., *supra* note 108, at 28.

[152] Pfeifenberger et al., *supra* note 151, at 45.

[153] AMERICAN TRANSMISSION COMPANY, ARROWHEAD-WESTON TRANSMISSION LINE: BENEFITS REPORT, 10 (2009), *available at* http://www.atc-projects.com/wp-content/uploads/2012/01/AW_FINAL.pdf.

[154] *Id*. at 9.

[155] *Id*. at 11.

[156] *Id*. at 16.

[157] Pfeifenberger et al., *supra* note 151, at 46 (stating that "the industry has tended to over-rely on formulaic analytical frameworks that capture east-to-quantify benefits…but generally don't consider the full range of benefits that improved transmission infrastructure can provide" including environmental and renewable access benefits); See also TAWNEY ET AL., *supra* note 108, at 28 (indicating that regulators often fail to assess the "larger social benefits" of transmission expansions, including the pollution savings resulting from increased renewable energy use).

[158] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051, 624 (2011).

[159] *Id*. at 622.

[160] U.S. Department of Energy, National Electric Transmission Congestion Report, 72 Fed. Reg. 56992 (Oct. 5, 2007).

[161] *Id*.

[162] California Wilderness Coalition v. U.S. Dep't of Energy, 631 F.3d 1072 (9th Cir. 2011)

[163] FEDERAL ENERGY REGULATORY COMMISSION, A GUIDE TO THE FERC ELECTRIC TRANSMISSION FACILITIES PERMIT PROCESS, 3 (2010), *available at* http://www.ferc.gov/industries/electric/indus-act/siting.asp.

[164] *Regulations for Filing Applications for Permits to Site Interstate Electric Transmission Facilities, Order No. 689*, 117 FERC ¶ 61,202, 41 (2006).

[165] *Id*. at 42.

[166] 40 C.F.R. § 1508.15 defines a "major federal action" to include "actions with effects that may be major and which are potentially subject to Federal control and responsibility." Under 40 C.F.R. § 1508.15, an action is considered to be "subject to Federal control" if it is undertaken by a federal agency or by a private party with the consent of a federal agency. Therefore, as the construction of interstate transmission lines requires FERC approval, it is a "federal action" for the purposes of NEPA.

[167] National Environmental Policy Act § 102(2)(C)(i)-(ii); 42 U.S.C. § 4332(2)(C)(i)-(ii) (2014) (requiring federal agencies to prepare, for each major federal action significantly affecting the quality of the human environment, a detailed statement on the environmental impact of the proposed action and any adverse environmental effects which cannot be avoided should the proposal be implemented).

[168] National Environmental Policy Act § 102(2)(C)(iii); 42 U.S.C. § 4332(2)(C)(iii) (2014) (requiring federal agencies to prepare, for each major federal action significantly affecting the quality of the human environment, a detailed statement of alternatives to the proposed action).

[169] 40 C.F.R. § 1502.14(a) (2014).

[170] Calvert Cliffs' Coordinating Comm., Inc v. United States Atomic Energy Comm'n, 449 F.2d 1109 (1971) (finding that NEPA aims to "ensure that each agency decision maker has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact").

[171] COUNCIL ON ENVIRONMENTAL QUALITY, CONSIDERING CUMULATIVE EFFECTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT (1997), *available at* http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm.

[172] See, for example, Border Power Plant Working Group v. Dep't of Energy, 206 F.Supp. 2d 997 (S.D. Cal. 2003) (requiring the Department of Energy and Bureau of Land Management to consider the greenhouse gas emissions resulting from See also Michael B Gerrard, *Climate Change and the Environmental Impact Review Process*, 22 NAT. RESOURCES & ENV'T 20 (2008) (indicating that none of the federal courts hearing challenges under NEPA (42 U.S.C. § 4321 et seq.) have expressed any doubt as to the legality of considering climate change in the EIS).

[173] 18 C.F.R. § 380.6(a)(5) (2014).

[174] 18 C.F.R. § 380.5(b)(14) (2014).

[175] 18 C.F.R. § 50.7(f) (2014).

[176] 18 C.F.R. § 380.16(a) (2014).

[177] 18 C.F.R. § 380.16(c) (2014).

[178] 18 C.F.R. § 380.16(d) (2014).

[179] 18 C.F.R. § 380.16(e) (2014).

[180] 18 C.F.R. § 380.16(f) (2014).

[181] 18 C.F.R. § 380.16(g) (2014).

[182] 18 C.F.R. § 380.16(h) (2014).

[183] 18 C.F.R. § 380.16(i) (2014).

[184] 18 C.F.R. § 380.16(j) (2014).

[185] 18 C.F.R. § 380.16(k) (2014).

[186] 18 C.F.R. § 380.16(l) (2014).

[187] 18 C.F.R. § 380.16(m) (2014).

[188] 40 C.F.R. § 1507.3(a) (2014).

[189] Mass. v. Envtl. Prot. Agency, 549 U.S. 497 (2007).

[190] Memorandum from Nancy H. Sutley, Chair, Council on Environmental Quality, to the Heads of Federal Departments and Agencies (Feb. 18, 2010), *available at* http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance.

[191] *Id*. at 3.

[192] U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY OUTLOOK 2014 WITH PROJECTIONS TO 2040, MT-16 (2014), *available at* http://www.eia.gov/forecasts/AEO/pdf/0383(2014).pdf.

[193] U.S. Environmental Protection Agency, Clean Energy: Coal (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/coal.html (estimating that coal-fired generation emits 2,249 pounds of carbon dioxide per MWh of electricity generated); U.S. Environmental Protection Agency, Clean Energy: Oil (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/oil.html (estimating that oil-fired generation emits 1,675 pounds of carbon dioxide per MWh of electricity generated); U.S. Environmental Protection Agency, Clean Energy: Natural Gas (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html (estimating that natural gas-fired generation emits 1,135 pounds of carbon dioxide per MWh of electricity generated).

[194] STATE AND LOCAL ENERGY EFFICIENCY ACTION NETWORK, USING INTEGRATED RESOURCE PLANNING TO ENCOURAGE INVESTMENT IN COST-EFFECTIVE ENERGY EFFICIENCY MEASURES, 1 (2011), *available at* http://www1.eere.energy.gov/seeaction/pdfs/ratepayer_efficiency_irpportfoliomanagement.pdf.

[195] *Id*.

[196] RACHEL WILSON AND PAUL PETERSON, A BRIEF SURVEY OF STATE INTEGRATED RESOURCE PLANNING RULES AND REQUIREMENTS: PREPARED FOR THE AMERICAN CLEAN SKIES FOUNDATION, 5 (2011), *available at* http://www.cleanskies.org/wp-content/uploads/2011/05/ACSF_IPR-Survey_Final_2011-04-28.pdf.

[197] STATE AND LOCAL ENERGY EFFICIENCY ACTION NETWORK, *supra* note 194, at 3.

[198] Federal Power Act § 201(a), 16 U.S.C. § 824(a) (2014) (indicating that federal regulation of the electric industry "extend[s] only to those matters which are not subject to regulation by the States")

[199] Fed. Power Comm'n v. Florida Power & Light Co., 404 U.S. 452 (1972).

[200] See *supra* Chapter 1.

[201] Federal Power Act § 205(a), 16 U.S.C. § 824d(a) (2014). See *supra* Chapter 3.

[202] Federal Power Act § 205(b), 16 U.S.C. § 824d(b) (2014). See *supra* Chapter 3.

[203] Federal Power Act § 205, 16 U.S.C. § 824d (2014).

[204] *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, *Order No. 888*, 75 FERC ¶ 61,080 (1996), *clarified* 76 FERC ¶ 61,009 (1996), *order on reh'g* 78 FERC ¶ 61,220 (1997), *clarified* 79 FERC ¶ 61,182 (1997), *order on reh'g* 81 FERC ¶ 61,248 (1997), *order on reh'g* 82 FERC ¶ 61,046 (1998).

[205] *Regional Transmission Organizations, Order No. 2000*, 89 FERC ¶ 61,285 (1999).

[206] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051 (2011), *order on reh'g* 139 FERC ¶ 61,132, *order on reh'g* 141 FERC ¶ 61,044.

[207] JOSEPH P. TOMAIN AND RICHARD D. CUDAHY, ENERGY LAW IN A NUTSHELL, 383 (2nd ed. 2011).

[208] *Id*. at 364.

[209] *Id*. at 384.

[210] *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, *Order No. 888*, 75 FERC ¶ 61,080, 4 (1996).

[211] *Id*. at 57.

[212] *Id*.

[213] *Id*. at 58.

[214] *Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct, Order No. 889*, 75 FERC ¶ 61,078, xxxiii-xxxv (1996).

[215] *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, Order No. 888, 75 FERC ¶ 61,080, 1 (1996).

[216] JOHN P. BUECHLER, TRANSMISSION PLANNING IN A MARKET-BASED ENVIRONMENT, 1 (2005), available at http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1489448&tag=1.

[217] *Id*.

[218] *Standards of Conduct for Transmission Providers, Order No. 717*, 144 FERC ¶ 61,064, 135 (2008).

[219] WILSON ET AL., *supra* note 196, at 2.

[220] *Id*. at 5.

[221] *Standards of Conduct for Transmission Providers, Order No. 717*, 144 FERC ¶ 61,064 (2008).

[222] *Id*. at 40.

[223] *Id*. at 146.

[224] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051, 484 (2011).

[225] *Id*. at 30 (indicating that "developments in the electric industry, such as changes with respect to the demands placed on the transmission grid" may necessitate the revision of FERC orders). See also *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, Order No. 888, 75 FERC ¶ 61,080 37 (1996) (noting that FERC may need to revise its orders to account for "changing conditions in the electric utility industry, including the emergence of non-traditional suppliers and greater competition in bulk power markets").

[226] U.S. ENERGY INFORMATION ADMINISTRATION, NET GENERATION BY STATE BY TYPE OF PRODUCER BY ENERGY SOURCE (2013), *available at* http://www.eia.gov/electricity/data/state/annual_generation_state.xls (indicating that electric utilities generated 2,994,528,592 MWh of electricity in 1995 and 2,339,172,393 MWh in 2012).

[227] *Id*. (indicating that independent power producers generated 58,220,074 MWh of electricity in 1995).

[228] *Id*. (indicating that independent power producers generated 1,386,991,120 MWh of electricity in 2012).

[229] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051 (2011), *order on reh'g* 139 FERC ¶ 61,132, *order on reh'g* 141 FERC ¶ 61,044.

[230] *Id*. at 146.

[231] *Id*. at 203.

[232] South Carolina Public Service Authority v. Fed. Energy Regulatory Comm'n, No. 12-1232, (D.C. Cir. Filed May 25, 2012 and later).

[233] See, for example, Shelley Welton and Michael B. Gerrard, *FERC Order 1000 as a New Tool for Promoting Energy Efficiency and Demand Response* 42 ELR 11025 (2012) (arguing that Order No. 1000 may help utilities plan for changes in electricity demand and supply, including the transition to greater use of renewable generation, energy efficiency and demand response).

[234] U.S. DEPARTMENT OF ENERGY, INTERSTATE RENEWABLE ENERGY COUNCIL, INC, AND NORTH CAROLINA SOLAR CENTER, RENEWABLE PORTFOLIO STANDARD POLICIES (2013), *available at* http://www.dsireusa.org/summarymaps/index.cfm?ee=0&RE=0.

[235] U.S. DEPARTMENT OF ENERGY, INTERSTATE RENEWABLE ENERGY COUNCIL, INC, AND NORTH CAROLINA SOLAR CENTER, LOAN PROGRAMS FOR RENEWABLES (2013), *available at* http://www.dsireusa.org/summarymaps/index.cfm?ee=0&RE=0.

[236] U.S. DEPARTMENT OF ENERGY, INTERSTATE RENEWABLE ENERGY COUNCIL, INC, AND NORTH CAROLINA SOLAR CENTER, GRANT PROGRAMS FOR RENEWABLES (2013), *available at* http://www.dsireusa.org/summarymaps/index.cfm?ee=0&RE=0.

[237] U.S. DEPARTMENT OF ENERGY, INTERSTATE RENEWABLE ENERGY COUNCIL, INC, AND NORTH CAROLINA SOLAR CENTER, TAX CREDITS FOR RENEWABLES (2013), *available at* http://www.dsireusa.org/summarymaps/index.cfm?ee=0&RE=0.

[238] NORTH CAROLINA SOLAR CENTER, ENERGY EFFICIENCY RESOURCE STANDARDS (2013), *available at* http://www.dsireusa.org/summarymaps/index.cfm?ee=0&RE=0.

[239] See, for example, Energy Policy and Conservation Act § 622, 42 U.S.C. § 6321(2) (2014) (stating "the Federal Government has a responsibility to foster and promote comprehensive energy conservation programs").

[240] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051 207 (2011), *order on reh'g* 139 FERC ¶ 61,132, *order on reh'g* 141 FERC ¶ 61,044.

[241] *Id*. at 208.

[242] Project for Sustainable FERC Energy Policy, Letter to FERC: Docket ID No. RM10-23-000: Notice of Proposed Rulemaking: Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities 2 (FERC, Sep. 29, 2010), *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=13852356 (stating that FERC should require utilities to consider "the state and federal public policies that will have a material impact on the cost effectiveness of transmission planning" including state RPS, state and national energy efficiency standards, air pollution emissions reductions targets, Environmental Protection Agency utility sector regulations, and habitat and wildlife conservation policies); Earthjustice, Comments: Docket No. RM10-23-000 3 (FERC, Sep. 29, 2010), *available at* http://elibrary.ferc.gov/idmws/doc_info.asp?document_id=13852398 (stating that FERC "should specify that plans, at a minimum, must consider: (A) governing RPS standards in the planning area; and (B) EPA regulations and enforcement orders that will compel retirements [of fossil fuel power plants] in the planning area").

[243] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 136 FERC ¶ 61,051, 216 (2011) (indicating that utilities may, but are not required to, assess "public policy objectives not specifically required by state or federal laws or regulations").

[244] *Id*. at 2.

[245] Of the sixteen transmission planning regions that submitted compliance filings under Order No. 1000, only four elected to identify and evaluate policy objectives not required by currently enacted laws or regulations. Specifically, the compliance filings submitted by transmission-owning members of the Northern Tier Transmission Group require the regional planning process to consider transmission needs driven by, among other things, "public policy considerations that are not established by state or federal laws or regulations." See *PacifiCorp et al., Order on Compliance Filing*, 143 FERC ¶ 61,151 (2013). The compliance filing submitted by the California Independent System Operator Corporation provides for consideration of "policy requirements and directives" including "policies or directives that are known and approved but not yet effective." See *California Independent System Operator Corporation et al., Order on Compliance Filing*, 143 FERC ¶ 61,057 (2013). The compliance filings submitted by members of WestConnect allow for consideration of transmission needs driven by "potential future public policy requirements." See *Public Service Company of Colarado et al., Order on Compliance Filing*, 142 FERC ¶ 61,206 (2013). The compliance filing submitted by PJM provides for consideration of transmission needs driven by "public policy objectives" which are defined to include "public policy initiatives of federal or state entities that have not been codified into law or regulation but which nonetheless may have important impacts on long term planning." See *PJM Interconnection, L.L.C., Order on Compliance*, 142 FERC ¶ 61,214 (2013).

[246] Iberdrola Renewables, Inc., Comments: Docket No. RM10-23-000 18 (FERC, Sep. 29, 2010), *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=13852187.

[247] ENERNEX CORPORATION, *supra* note 109, at 27.

[248] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, Order No. 1000*, 123 FERC ¶ 61,051, 154 (2011).

[249] *Id*. at 123.

[250] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 21, at ES-5 – ES-7.

[251] FEDERAL ENERGY REGULATORY COMMISSION, LICENSING HYDROKINETIC PILOT PROJECTS, 2 (2008) *available at* http://www.ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics/energy-pilot.asp.

[252] Jon Wellinghoff, James Pederson, and David L. Morenoff, *Facilitating Hydrokinetic Energy Development Through Regulatory Innovation* 29 ENERGY LAW JOURNAL 397, 398 (2008).

[253] Mark Sherman, *Wave New World: Promoting Ocean Wave Energy Development Through Federal-State Coordination and Streamlined Licensing* 39 ENVTL L. 1161, 1164 (2009).

[254] U.S. Energy Information Administration, Today in Energy: Regulators Approve First Commercial Hydrokinetic Projects in the United States (last updated Oct. 2, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=8210.

[255] Sherman, *supra* note 253, at 1164.

[256] The outer continental shelf includes all submerged lands located three to two hundred miles offshore. Outer Continental Shelf Lands Act § 2(a); 43 U.S. § 1331(a) (2014).

[257] See, for example, *AquaEnergy Group, Ltd*. 102 FERC ¶ 61,242 (2003); *Pacific Gas & Electric Company* 125 FERC ¶ 61,045 61,160 (2008).

[258] *AquaEnergy Group, Ltd*. 102 FERC ¶ 61,242, 12 (2003).

[259] Proclamation 5928, 54 Fed. Reg. 777 (Dec 27, 1988).

[260] See, for example, Federal Water Pollution Control Act § 2, 33 U.S.C. § 1362 (2014) and Oil Pollution Act of 1990 § 1001, 33 U.S.C. § 2701 (2014) (each defining "navigable waters" to mean "the waters of the United States, including the territorial sea" where "territorial sea" is defined as "the belt of the seas measured from the line of ordinary low water…and extending seaward a distance of three miles").

[261] *Pacific Gas & Electric Company* 125 FERC ¶ 61,045, 50-52 (2008).

[262] Outer Continental Shelf Lands Act, section 12(a) (42 U.S.C. § 1341(a)) authorizes the President to withdraw from disposition any of the unleased lands of the outer continental shelf. Pursuant to this section, the President has withdrawn from disposition the Bristol Bay Area of the North Aleutian Basin in Alaska. See Memorandum from President Barack Obama to the Secretary of the Interior (Mar. 31, 2010), *available at* http://www.whitehouse.gov/the-press-office/presidential-memorandum-united-states-outer-continental-shelf.

[263] Outer Continental Shelf Lands Act § 8, 34 U.S. § 1337 (2014) (authorizing the Secretary of the Interior to grant leases in respect of the submerged lands of the outer continental shelf for specified purposes, including the development of oil, gas, sulfur, and other minerals and the production, transportation, or transmission of energy).

[264] Sherman, *supra* note 253, at 1209.

[265] Ocean Thermal Energy Conversion Act, 42 U.S.C. § 9101 et seq.

[266] Protest of the United States Minerals Management Service, AquaEnergy Group Ltd., No. P-12752-000 (FERC Jan. 30, 2007), *available at* http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11239967. The Department of Interior again challenged FERC's jurisdiction over offshore power projects in 2008 when it filed a request for rehearing of FERC's issuance of preliminary permits for two hydrokinetic projects on the outer continental shelf. See Request for Rehearing of the United States Department of the Interior, Pacific Gas & Electric Company, Project Nos. 12778 and 12781 (FERC Apr. 14, 2008), *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=13598783.

[267] Protest of the United States Minerals Management Service, AquaEnergy Group Ltd., No. P-12752-000 5 (FERC Jan. 30, 2007), *available at* http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11239967

[268] *Id*. at 5.

[269] AquaEnergy Group's Request for Expedited Rehearing of Order Finding Jurisdiction and Revisions to Project Description, Docket No. DI02-3-001 23-24 (FERC Nov. 1, 2001), *available at* http://elibrary.ferc.gov/idmws/file_list.asp?document_id=4047189

[270] Memorandum of Understanding Between the U.S. Department of the Interior and Federal Energy Regulatory Commission (2009), *available at* http://ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp (stating that MMS (now BOEM) will issue leases, easements, and rights of way, and FERC will issue licenses, for hydrokinetic projects on the outer continental shelf).

[271] BOEM/FERC GUIDELINES ON REGULATION OF MARINE AND HYDROKINETIC ENERGY PROJECTS ON THE OSC, 8 (2012), *available at* http://ferc.gov/industries/hydropower/gen-info/licensing/hydrokinetics.asp.

[272] *Id*.

[273] *Alternate Energy-Related Uses on the Outer Continental Shelf, Hearing Before the S. Comm. on Energy and Natural Resources*, 110th Cong. (2007) (statement of Sean O'Neill, President, Ocean Renewable Energy Coalition).

[274] See, for example, Sherman, *supra* note 253, at 1164-1165 (arguing that the duel permit requirement "creates an unfavorable climate for the commercial development" of hydrokinetic technologies); Wellinghoff et al., supra note 252, at 417 (noting that FERC and BOEM's overlapping assertions of jurisdiction could lead to uncertainty for developers, discouraging investment in hydrokinetic projects); Peter H. Chapman, *Offshore Renewable Energy Regulation: FERC and MMS Jurisdictional Dispute Over Hydrokinetic Regulation Resolved?* 61 ADMIN L. REV. 423, 433 (2009) (indicating that the duplicative permitting processes between FERC and BOEM "pose a significant threat to the realization of hydrokinetic technologies"); Laura Koch, *The Promise of Wave Energy* 2 GOLDEN GATE U. ENVTIL. L. J. 162, 176 (2008-2009) (claiming that the regulatory uncertainty caused by FERC and BOEM's duplicative permitting processes "is wave energy's most significant non-technical obstacle").

[275] U.S. ENERGY INFORMATION ADMINISTRATION, MONTHLY ENERGY REVIEW: APRIL 2014, 7 (2014), *available at* http://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf (indicating that natural gas consumption was 26.628 quadrillion British thermal units ("**Btu**") in 2013 and total energy consumption was 97.531 quadrillion Btu in 2013).

[276] *Id*. at 71.

[277] U.S. Energy Information Administration, Competition among fuels for power generation driven by changes in fuel prices (last visited Jul. 28, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=7090.

[278] U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 275, at 71.

[279] JAMES BRADBURY, MICHAEL OBEITER, LAURA DRAUCKER, WEN WANG, AND AMANDA STEVENS, CLEARING THE AIR: REDUCING UPSTREAM GREENHOUSE GAS EMISSIONS FROM U.S. NATURAL GAS SYSTEMS, WORLD RESOURCES INSTITUTE WORKING PAPER, 8 (2013), *available at* http://www.wri.org/publication/clearing-the-air.

[280] U.S. Environmental Protection Agency, Clean Energy: Coal (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/coal.html (estimating that coal-fired generation emits 2,249 pounds of carbon dioxide per MWh of electricity generated); U.S. Environmental Protection Agency, Clean Energy: Oil (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/oil.html (estimating that oil-fired generation emits 1,675 pounds of carbon dioxide per MWh of electricity generated); U.S. Environmental Protection Agency, Clean Energy: Natural Gas (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html (estimating that natural gas-fired generation emits 1,135 pounds of carbon dioxide per MWh of electricity generated).

[281] Robert W. Howarth, Renee Santoro, and Anthony Ingraffea, *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, 106 CLIMATIC CHANGE 679 (2011) (finding that, on a life cycle basis, greenhouse gas emissions from shale gas are 100% higher than coal over a 20 year time frame); Mohan Jiang, W Michael Griffin, Chris Hendrickson, Paulina Jaramillo, Jeanne VanMriesen, and Aranya Venkatesh, *Life cycle greenhouse gas emissions of Marcellus shale gas,* 6 ENVIRONMENTAL RESEARCH LETTERS 034014 (2011) (finding that life cycle greenhouse gas emissions from shale gas-fired power plants are 20-50% higher than coal-fired plants); Andrew Burnham, Jeongwoo Han, Corrie E. Clark, Michael Wang, Jennifer B. Dunn, and Ignasi Palou-Rivera, *Life cycle greenhouse gas emissions of shale gas, natural gas, coal and petroleum*, ENVIRON. SCI. TECHNOL. 619 (2011) (finding that life cycle emissions of greenhouse gas emissions from compressed natural gas vehicles are comparable to gasoline vehicles over a 100 year time horizon, but 20-30% higher over a 20 year time horizon).

[282] "Global warming potential" refers to the ability of a greenhouse gas to trap heat in the earth's atmosphere, compared to carbon dioxide. U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 21, at 1-7.

[283] *Id*. at 1-8.

[284] *Id*. at ES-5 – ES-7.

[285] *Id*. at ES-5 – ES-7.

[286] U.S. Environmental Protection Agency, Clean Energy: Natural Gas (last updated Sep. 25, 2013), http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html (estimating that natural gas-fired power plants releases, on average, 1135 pounds of carbon dioxide and 1.7 pounds of nitrogen dioxide per MWh of electricity generated).

[287] BRADBURY ET AL. *supra* note 279, at 9 (arguing that "abundant and inexpensive natural gas could undercut the economics of energy efficiency and put all other energy sources – including coal, nuclear and renewable energy – at a competitive disadvantage").

[288] Natural Gas Act § 7(c)-(h); 15 U.S.C. § 717f(c)-(h) (2014) (authorizing FERC to permit the construction and operation of facilities for the transportation or sale of natural gas); Schneidewind v. ANR Pipeline Co., 485 US. 293, 308 (1988) (holding that FERC has jurisdiction over natural gas storage facilities as "those facilities are a critical part of the transportation of natural gas and sale for resale in interstate commerce").

[289] Natural Gas Act § 4; 15 U.S.C. § 717c (2014) (requiring FERC to ensure that rates for the transport and sale of natural gas are just and reasonable and not unduly discriminatory or preferential).

[290] Natural Gas Act § 7(b); 15 U.S.C. § 717f(b) (2014) (authorizing FERC to permit a natural gas company to abandon all or a portion of its facilities).

[291] Delegation Order No. 0204-112, 49 Fed. Reg. 6684 (Feb. 22, 1984). Renewed by Delegation Order No. 00-004.00A, 71 Fed. Reg. 69465 (May 16, 2006).

[292] Natural Gas Act §3(e), 14 U.S.C. § 717b(e) (2014).

[293] Williston Basin Interstate Pipeline Co. v. An Exclusive Gas Storage Leasehold and Easement in the Cloverly Subterranean Geological Formation, 524 F.3d 1090, 1101 (9th Cir. 2008) (holding that "Congress has excluded natural gas production and gathering operations…from the scope of the" Natural Gas Act (15 U.S.C. § 717 et seq.)).

[294] South Coast Air Quality Mgmt. Dist. v. Fed. Energy Regulatory Comm'n, 621 F.3d 1085, 1092 (9th Cir. 2010) (holding that "all aspects related to the direct-consumption of gas…[are] within the exclusive purview of the states").

[295] EXECUTIVE OFFICE OF THE PRESIDENT, *supra* note 13, at 10.

[296] THE WHITE HOUSE, CLIMATE ACTION PLAN: STRATEGY TO REDUCE METHANE EMISSIONS, 1 (2014), *available at* http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf (indicating that the Methane Strategy could deliver greenhouse gas emissions reductions of up to ninety million metric tons in 2020).

[297] *Id*. at 8.

[298] U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OIL AND NATURAL GAS SECTOR COMPRESSORS (2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415compressors.pdf [hereinafter U.S. ENVIRONMENTAL PROTECTION AGENCY, COMPRESSORS]; U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OIL AND NATURAL GAS SECTOR HYDRAULICALLY FRACTURED OIL WELL COMPLETIONS AND ASSOCIATED GAS DURING ONGOING PRODUCTION (2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415completions.pdf [hereinafter U.S. ENVIRONMENTAL PROTECTION AGENCY, WELL COMPLETIONS]; U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OIL AND NATURAL GAS SECTOR LEAKS (2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415leaks.pdf [hereinafter U.S. ENVIRONMENTAL PROTECTION AGENCY, LEAKS]; U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OIL AND NATURAL GAS SECTOR LIQUIDS UNLOADING (2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415liquids.pdf [hereinafter U.S. ENVIRONMENTAL PROTECTION AGENCY, LIQUIDS UNLOADING]; U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OIL AND NATURAL GAS SECTOR PNEUMATIC DEVICES (2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415pneumatic.pdf [hereinafter U.S. ENVIRONMENTAL PROTECTION AGENCY, PNEUMATIC DEVICES].

[299] Atlantic Ref. Co. v. PSC of New York, 360 U.S. 378, 391 (1959).

[300] Fed. Power Comm'n v. Transcontinental Gas Pipe Line Corp, 365 U.S. 1, 7 (1961).

[301] *Certification of New Interstate Natural Gas Pipeline Facilities*, 88 FERC ¶ 61,227 (1999).

[302] *Id*.

[303] South Coast Air Quality Mgmt. Dist. v. Fed. Energy Regulatory Comm'n, 621 F.3d 1085, 1099 (9th Cir. 2010) (holding that, in determining whether a pipeline project is in the public interest, FERC may consider "the environmental effects of end-use consumption of… gas" to be transported by the pipeline).

[304] *North Baja Pipeline, LLC,* 121 FERC ¶ 61,010 (2007), *rehearing denied* 123 FERC ¶ 61,073.

[305] South Coast Air Quality Mgmt. Dist. v. Fed. Energy Regulatory Comm'n, 621 F.3d 1085, 1099 (9th Cir. 2010).

[306] See, for example, *North Baja Pipeline, LLC*, 121 FERC ¶ 61,010 (2007), *rehearing denied* 123 FERC ¶ 61,073 (2008); *Ruby Pipeline, LLC*, 131 FERC ¶ 61,007 (2010).

[307] *North Baja Pipeline, LLC*, *rehearing denied* 123 FERC ¶ 61,073, 61,612.

[308] 40 C.F.R. § 1508.15 defines a "major federal action" to include "actions with effects that may be major and which are potentially subject to Federal control and responsibility." Under 40 C.F.R. § 1508.15, an action is considered to be "subject to Federal control" if it is undertaken by a federal agency or by a private party with the consent of a federal agency. Therefore, as the construction and operation of a natural gas pipeline requires FERC approval, it is a "federal action" for the purposes of NEPA.

[309] 18 C.F.R. § 380.6 (2014).

[310] 18 C.F.R. § 380.5(b)(1) (2014).

[311] 18 C.F.R. §§ 157.14(a)(6-a) and 380.12 (2014).

[312] 18 C.F.R. § 380.12(a) (2014).

[313] 18 C.F.R. § 380.12(c) (2014).

[314] 18 C.F.R. § 380.12(d) (2014).

[315] 18 C.F.R. § 380.12(e) (2014).

[316] 18 C.F.R. § 380.12(f) (2014).

[317] 18 C.F.R. § 380.12(g) (2014).

[318] 18 C.F.R. § 380.12(h) (2014).

[319] 18 C.F.R. § 380.12(i) (2014).

[320] 18 C.F.R. § 380.12(j) (2014).

[321] 18 C.F.R. § 380.12(k) (2014).

[322] 18 C.F.R. § 380.12(l) (2014).

[323] 18 C.F.R. § 380.12(m) (2014).

[324] 18 C.F.R. § 380.12(n) (2014).

[325] 18 C.F.R. § 380.12(o) (2014).

[326] The U.S. EPA has designated the following as criteria pollutants: nitrogen oxides, carbon monoxide, sulfur dioxide, lead, ozone, particulate matter less than 2.5 micrometers in diameter and particulate matter less than 10 micrometers in diameter.

[327] 18 C.F.R. § 380.12(k)(1) (2014).

[328] 18 C.F.R. § 380.12(k)(3) (2014).

[329] FEDERAL ENERGY REGULATORY COMMISSION, FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE HUBLINE / EAST TO WEST PROJECT (2009) *available at* http://ferc.gov/industries/gas/enviro/eis/2009/09-25-09.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, HUBLINE EIS]; FEDERAL ENERGY REGULATORY COMMISSION, FINAL ENVIRONMENTAL IMPACT STATEMENT ON FLORIDA GAS TRANSMISSION COMPANY, LLC'S PHASE VIII EXPANSION PROJECT (2009) *available at* http://ferc.gov/industries/gas/enviro/eis/2008/07-11-08-eis.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, FLORIDA GAS EIS]; FEDERAL ENERGY REGULATORY COMMISSION, FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE JORDAN COVE LIQUIFIED NATURAL GAS (LNG) TERMINAL AND PACIFIC CONNECTOR GAS PIPELINE PROJECT (2009) *available at* http://ferc.gov/industries/gas/enviro/eis/2009/05-01-09-eis.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, JORDAN COVE EIS]; FEDERAL ENERGY REGULATORY COMMISSION, BISON PIPELINE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2009), *available at* http://ferc.gov/industries/gas/enviro/eis/2009/12-29-09.asp; FEDERAL ENERGY REGULATORY COMMISSION, RUBY PIPELINE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2010), *available at* http://ferc.gov/industries/gas/enviro/eis/2010/01-08-10.asp; FEDERAL ENERGY REGULATORY COMMISSION, APEX EXPANSION PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2010), *available at* http://ferc.gov/industries/gas/enviro/eis/2010/07-23-10.asp; FEDERAL ENERGY REGULATORY COMMISSION, FINAL ENVIRONMENTAL IMPACT STATEMENT ON NEW JERSEY – NEW YORK EXPANSION PROJECT (2012), *available at* http://ferc.gov/industries/gas/enviro/eis/2012/03-16-12-eis.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, NEW JERSEY – NEW YORK PIPELINE EIS]; FEDERAL ENERGY REGULATORY COMMISSION, SIERRITA PIPELINE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2014), *available at* http://ferc.gov/industries/gas/enviro/eis/2014/03-28-14-eis.asp; FEDERAL ENERGY REGULATORY COMMISSION, ROCKAWAY DELIVERY LATERAL PROJECT NORTHEAST CONNECTOR PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2014), available at http://ferc.gov/industries/gas/enviro/eis/2014/02-28-14-eis.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, ROCKAWAY EIS]; FEDERAL ENERGY REGULATORY COMMISSION, FINAL ENVIRONMENTAL IMPACT STATEMENT: CAMERON LIQUEFACTION PROJECT (2014), *available at* http://ferc.gov/industries/gas/enviro/eis/2014/04-30-14-eis.asp [hereinafter FEDERAL ENERGY REGULATORY COMMISSION, CAMERON LIQUEFACTION PROJECT EIS].

[330] Five of the ten EIS' issued since 2008 discussed the greenhouse gas emissions resulting from natural gas use. See FEDERAL ENERGY REGULATORY COMMISSION, HUBLINE EIS, *supra* note 329, at 4-66 (explaining that the Project would likely lead to reduced use of fuel oil, the burning of which produces higher greenhouse gas emissions than natural gas); FEDERAL ENERGY REGULATORY COMMISSION, FLORIDA GAS EIS, *supra* note 329, at 4-259 (stating that "a significant amount of the natural gas to be transported [by the pipeline] would become the fuel source at existing electric generating facilities", replacing other coal and oil which have higher air emissions); FEDERAL ENERGY REGULATORY COMMISSION, JORDAN COVE EIS, *supra* note 329, at 4.11-31 (discussing life-cycle greenhouse gas emissions for natural gas-fired power plants); FEDERAL ENERGY REGULATORY COMMISSION, NEW JERSEY – NEW YORK PIPELINE EIS, *supra* note 329, at 4-262 (indicating that the Project will likely result in the substitution of natural gas for fuel oil and thereby reduce greenhouse gas emissions as "burning natural gas emits less CO2 [carbon dioxide] compared to other fuel sources (e.g., fuel oil or coal)"); FEDERAL ENERGY REGULATORY COMMISSION, ROCKAWAY EIS, *supra* note 329, at 4-217 (stating that construction of the pripeline likely "would result in the displacement of some fuel oil use, thereby potentially offsetting some…[greenhouse gas] emissions" because "burning natural gas emits less CO_2 [carbon dioxide] compared to…fuel oil"). .

[331] FEDERAL ENERGY REGULATORY COMMISSION, NEW JERSEY – NEW YORK PIPELINE EIS, *supra* note 329, at 4-262.

[332] *Id*.

[333] Kevin M. Stack and Michael P. Vanderbergh, *The One Percent Problem,* 111 COLUMBIA L. REV. 1385, 1388 (2011).

[334] 40 C.F.R. § 1508.27 (2014).

[335] 40 C.F.R. § 1508.27(b) (2014).

[336] Walsh et al., *supra* note 1 (finding that greenhouse gas emissions alter cliamtic conditions, leading to higher air and water tempatures, reduced snow and ice cover, rising sea levels, more frequent and severe weather events, and other changes).

[337] ELIZABETH SHEARGOLD AND SMITA WALAVALKAR, NEPA AND DOWNSTREAM GREENHOUSE GAS EMISSIONS OF U.S. COAL EXPORTS, 78 (2013), *available at* http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Fellows/NEPA and Review of Coal Exports.pdf. See also, Madeline Kass, *A NEPA Climate Paradox: Taking Greenhouse Gases Into Account in Threshold Significant Determinations*, 42 IND. L. REV. 47, 54 (2009) (concluding that, given greenhouse gases' potential to cause environmental devastation, even small emissions thereof may be found to have significant impacts); Amy L. Stein, *Climate Change Under NEPA: Avoiding Cursory Consideration of Greenhouse Gases*, 81 U. COLO. L. REV. 473, 529 (arguing that the significance of a project's greenhouse gas emissions should not be assessed by comparing those emissions to local, state, national, or global emissions).

[338] U.S. Energy Information Administration, Natural Gas Data (last visited May 11, 2014), http://www.eia.gov/dnav/ng/ng_sum_lsum_dcu_nus_a.htm.

[339] U.S. Energy Information Administration, U.S. Natural Gas Imports & Exports 2012 (last visited May 11, 2014), http://www.eia.gov/naturalgas/importsexports/annual/.

[340] 18 C.F.R. § 153.5(a) (2014).

[341] For a discussion of NEPA, see *supra* sections 4.2.3 and 7.2.1(a).

[342] 18 C.F.R. § 380.6(a)(1) (2014).

[343] 18 C.F.R. §§ 153.8(a)(7) and 380.12 (2014).

[344] FERC may be assisted in preparing the EIS by third-party contractors.

[345] FEDERAL ENERGY REGULATORY COMMISSION, JORDAN COVE EIS, *supra* note 329; FEDERAL ENERGY REGULATORY COMMISSION, CAMERON LIQUEFACTION PROJECT EIS, *supra* note 329.

[346] *North Baja Pipeline, LLC*, 121 FERC P 61,010 (2007), *rehearing denied* 123 FERC ¶ 61,073 (2008). Affirmed in South Coast Air Quality Mgmt. Dist. v. Fed. Energy Regulatory Comm'n, 621 F.3d 1085, 1093 (9th Cir. 2010).

[347] Consejo de Desarrollo Economico de Mexicali v. United States, 438 F. Supp. 2d. 1207, 1235 (2006).

[348] *Id*.

[349] BRADBURY ET AL., *supra* note 279, at 10.

[350] *Id*.

[351] RAMÓN A. ALVAREZ AND ELIZABETH PARANHOS, AIR POLLUTION ISSUES ASSOCIATED WITH NATURAL GAS AND OIL OPERATIONS, 1 (2012), *available at*: http://www.edf.org/sites/default/files/AWMA-EM-airPollutionFromOilAndGas.pdf.

[352] *Id*.

[353] BRADBURY ET AL., *supra* note 279, at 15 (estimating a leakage rate of approximately 2.27% based on 2012 data); SUSAN HARVEY, VIGNESH GOWRISHANKAR, AND THOMAS SINGER, LEAKING PROFITS: THE U.S. OIL AND GAS INDUSTRY CAN REDUCE POLLUTION, CONSERVE RESOURCES, AND MAKE MONEY BY PREVENTING METHANE WASTE, 4 (2012), *available at* http://www.nrdc.org/energy/files/Leaking-Profits-Report.pdf (finding that approximately 2.4% of gas produced in 2009 was lost through leaks and venting).

[354] CONSERVATION LAW FOUNDATION, INTO THIN AIR: HOW LEAKING NATURAL GAS INFRASTRUCTURE IS HARMING OUR ENVIRONMENT AND WASTING A VALUABLE RESOURCE, 10 (2012), *available at* http://action.clf.org/site/Survey?ACTION_REQUIRED=URI_ACTION_USER_REQUESTS&SURVEY_ID=3480

[355] HARVEY ET AL, *supra* note 353, at 34-36. See also U.S. ENVIRONMENTAL PROTECTION AGENCY, PNEUMATIC DEVICES, *supra* note 298, at 41 – 44.

[356] HARVEY ET AL, *supra* note 353, at 34-36. See also U.S. ENVIRONMENTAL PROTECTION AGENCY, COMPRESSORS, *supra* note 298, at 36 – 39

[357] U.S. ENVIRONMENTAL PROTECTION AGENCY, COMPRESSORS, *supra* note 298, at 39 – 42.

[358] *Id*. at 29 – 34.

[359] HARVEY ET AL, *supra* note 353, at 42-44. See also U.S. ENVIRONMENTAL PROTECTION AGENCY, LEAKS, *supra* note 298, at 36 – 54

[360] HARVEY ET AL, *supra* note 353, at 32-34. See also U.S. ENVIRONMENTAL PROTECTION AGENCY, LEAKS, *supra* note 298, at 45 – 54; U.S. ENVIRONMENTAL PROTECTION AGENCY, PNEUMATIC DEVICES, *supra* note 298, at 50.

[361] HARVEY ET AL, *supra* note 353, at 5.

[362] U.S. ENVIRONMENTAL PROTECTION AGENCY, LEAKS, *supra* note 298, at 45 – 54; U.S. ENVIRONMENTAL PROTECTION AGENCY, PNEUMATIC DEVICES, *supra* note 298, at 50.

[363] *Certification of New Interstate Natural Gas Pipeline Facilities*, 88 FERC ¶ 61,743 (1999), *clarified* 90 FERC ¶ 61,128, *further clarified* 92 FERC ¶ 61,094.

[364] See, for example, *Ruby Pipeline, LLC*, 131 FERC ¶ 61,007 (2010) (requiring the pipeline developer to undertake regular water testing in the area of the project).

[365] *Id.* (prohibiting the pipeline developer from handling or storing any fuels, solvents, or lubricants and/or staging or storing any equipment within 200 feet of a water supply well or spring).

[366] *Id.* (requiring the pipeline developer to adopt a Wetland Restoration Plan including, among other things, measures for seeding and replanting wetlands affected by the project).

[367] 5 C.C.R. § 1001-9 (2014).

[368] *Id*.

[369] Walsh et al., *supra* note 1.

[370] *Id*. at 44.

[371] *Id*. at 44 – 45.

[372] *Id*. at 38 – 42.

[373] *Id*. at 25.

[374] 2013 State of the Union Address, supra note 11 (urging on Congress to "pursue a bipartisan, market-based solution to climate change").

[375] *Id*. (indicating that, if Congress does not enact legislation addressing climate change, the President will take executive action to control pollution and encourage clean energy development). See also EXECUTIVE OFFICE OF THE PRESIDENT, *supra* note 13 (directing various executive agencies to take steps to reduce greenhouse gas emissions and support clean energy projects).

[376] Executive Office of the President, *supra* note 13.

[377] *Id*. at 6.

[378] *Id*. at 9 – 10.

[379] *Id*. at 8.

[380] *Id*. at 6 – 7.

[381] *Id*. at 7 – 8.

[382] U.S. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 21, at 3-1.

[383] *Id*.