June 18, 2018

Federal Energy Regulatory Commission
Secretary of the Commission
888 First Street NE
Washington, DC 20426

Re: Notice of Inquiry – Certification of New Interstate Natural Gas Facilities

Dear Secretary Bose:

Thank you for this opportunity to comment on whether and how the Federal Energy Regulatory Commission (FERC) should revise its approach on the certification of new natural gas transportation facilities. The Sabin Center for Climate Change Law submits the following recommendations on how FERC should determine whether a proposed natural gas project is or will be required by the present or future public convenience and necessity, as that standard is established under section 7 of the Natural Gas Act:

1. FERC should conduct a programmatic review of its natural gas certification policy to evaluate the nationwide, cumulative effects of the policy. FERC's review of individual applications should be tiered to this review. All of the recommendations below are applicable to both the programmatic and individual reviews.
2. To determine whether there is a need for proposed projects, FERC should take a long-range view, considering likely future changes in demand for natural gas, driven by climate change mitigation policies and other factors.
3. FERC should consider alternatives to natural gas to supply the energy needs of market areas (e.g., renewables and efficiency).
4. To determine whether proposed projects will serve the public interest, FERC should evaluate the effect of expanding natural gas infrastructure on fossil fuel production, consumption, greenhouse gas emissions, and climate change. This analysis should encompass consideration of both direct and indirect emissions, including emissions from upstream and downstream activities on the natural gas supply chain.
5. FERC should consider how climate change will affect the construction and operation of physical facilities involved in the proposal.

1. FERC Should Conduct a Programmatic Review of its Natural Gas Certification Policy

In recent years, FERC has received substantial criticism for its piecemeal evaluation of applications for certification of natural gas transportation facilities. Many commentators have advocated for a programmatic review of the natural gas certification policy to help FERC and the public better understand the cumulative impacts of the policy on environmental, social, and economic values. Some of the critical questions that could be addressed through a programmatic review include:

- How should FERC assess the public need for new natural gas transportation infrastructure in light of the significant capacity additions that have already been made to the interstate gas pipeline system in recent years?
- What are the cumulative quantities of direct and indirect greenhouse gas emissions that are generated by natural gas infrastructure in the U.S., including emissions from gas production, transportation, processing, and consumption?
- Does the expansion of natural gas infrastructure help or hinder the transition to a carbon-neutral economy? This can be broken down into two questions: (i) how does increasing the supply of natural gas affect the consumption of other energy sources, such as coal and renewables, and (ii) if natural gas replaces coal, is there a beneficial impact on net emissions– i.e., are emissions from the production, transportation, processing, and combustion of the natural gas fully offset by reductions in emissions from coal use?
- How will government policies aimed at promoting the transition to a carbon-neutral economy and otherwise mitigating climate change affect market demand for natural gas and the need for new gas transportation infrastructure?

Should FERC proceed with a proposal to modify its certification policy, the National Environmental Policy Act (NEPA) would require it to conduct some form of environmental review for the proposal, and a full Environmental Impact Statement (EIS) would be required if the proposal could result in any significant environmental impacts. It would be prudent for FERC to take a holistic approach in this NEPA review, examining the full scope of environmental issues raised above (as well as others) and a reasonable range of potential alternatives for modifying the policy to address environmental and social concerns.[1]

Conducting a programmatic review could also streamline the certification process, insofar as FERC's review of individual applications could be tiered to the programmatic documents. This

[1] This was the approach adopted by the Department of Interior for its programmatic review of the Federal Coal Leasing Program which it initiated in 2016. Although the administration has since terminated that review, the final scoping document published in 2017 revealed a range of critical areas for reform in the coal leasing program. *See* DOI, FEDERAL COAL PROGRAM – PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT – SCOPING REPORT (2017).

would reduce costs and save time in the long-run, consistent with the current administration's agenda for streamlining infrastructure permitting decisions.

2. When Assessing Public Need, FERC Should Consider the Long-Term Outlook for Natural Gas Demand, and Account for the Effect of Climate Change Mitigation Policies Thereon

FERC's determination of transportation infrastructure need – which is currently based on an assessment of market demand for natural gas – should account for likely future changes in the energy landscape. As natural gas pipelines are long-lived assets, typically remaining in operation for at least fifty years, FERC should consider the long-term outlook for natural gas demand. FERC's review should include, among other things, an assessment of how demand will be affected by current and foreseeable government policies, programs, and regulations aimed at mitigating climate change.

With the effects of climate change already being felt across the U.S. and expected to worsen in coming years,[2] there is growing recognition of the need to reduce climate-damaging greenhouse gas emissions. Policymakers and others have recognized that, in order to avoid the worst effects of climate change, global greenhouse gas emissions must be reduced by at least eighty percent below 1990 levels by 2050.[3] This will require a "rapid phase out of coal and natural gas" use[4] and many governments have introduced policies aimed at achieving exactly that.[5] In this context, demand for coal and natural gas will most likely decline in the decades ahead, potentially quite sharply. This is not merely speculation on the part of environmental advocates or policymakers: independent bodies and even fossil fuel companies have recognized that demand will sharply decline due to policies aimed at mitigating climate change. The International Energy Agency, for example, forecasts that global demand for natural gas could plateau after 2030 due to the impact of climate change and related policies.[6] ExxonMobil has offered even more dire predictions,

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[2] *See* U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT (D.J. Wuebbles et al. eds., 2017).

[3] *See e.g.,* JAMES H. WILLIAMS ET AL., PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES (2015), https://perma.cc/DHH8-5DBE. In November 2016, the federal government adopted a Mid-Century Strategy for Deep Decarbonization, which calls for an eighty percent reduction in emissions by 2050. *See* U.S. Mid-Century Strategy for Deep Decarbonization (2016), https://perma.cc/6ZZR-PXJE [hereinafter Mid-Century Strategy]. Similar – and in some cases more ambitious – goals have also been adopted at the state and local levels and internationally. *For details of state goals, see* Center for Climate and Energy Solutions, *Greenhouse Gas Emissions Targets*, https://perma.cc/B3XX-HZNZ (last updated Sep. 2016). *For details of international goals, see* Climate Action Tracker, Find Your Country, https://climateactiontracker.org/countries/

[4] Mid-Century Strategy, *supra* note 4, at 33 (indicating that the use of both coal and natural gas must be phased out unless carbon capture and sequestration technology is available). *See also* James H. Williams et al., supra note 3.

[5] *See* Grantham Research Institute on Climate Change and the Environment & Sabin Center for Climate Change Law, *Climate Change Laws of the World,* http://www.lse.ac.uk/GranthamInstitute/climate-change-laws-of-the-world/ (last visited June 12, 2018).

[6] Demand plateaus under the International Energy Agency's "sustainable development scenario" in which policies are adopted to achieve the three main energy-related components of the 2030 Agenda for Sustainable Development. These are: (1) to achieve universal energy access by 2030; (2) to take urgent action to combat climate change; and

suggesting that global natural gas demand could decline by up to twenty-three percent through 2040, if climate change policies are adopted.[7]

Notwithstanding the above, when assessing the need for new natural gas pipelines, FERC does not currently consider the impact of climate change policies on future demand. That is a significant oversight, which could lead to overbuilding of pipeline capacity. FERC's current approach to preventing overbuilding – i.e., relying on shipper contracts to assess the need for new pipelines[8] – is inappropriate and ineffectual. As most shipper contracts have terms of just five to fifteen years, they provide little indication of whether a pipeline will be needed over its full useful life, of fifty years or more. Thus, reliance on shipper contracts will not prevent overbuilding, which is already occurring in some areas. For example, industry analysts have warned of overbuilding in the Permian Basin, where there is expected to be significant excess pipeline capacity by 2020.[9]

FERC has repeatedly recognized the importance of avoiding overbuilding of natural gas pipeline capacity. The 1999 policy statement on pipeline certification noted that, while FERC must facilitate pipeline development needed "to meet an anticipated increase in demand for natural gas," it must also "act with caution to avoid . . . the potential for overbuilding."[10] This is because, as one FERC Commissioner recently observed, "[i]t is inefficient to build pipelines that may not be needed over the long term and become stranded assets. Overbuilding may subject ratepayers to increased costs of shipping gas on legacy systems."[11]

To avoid this outcome, FERC's pipeline certification process should include consideration of the long-term outlook for natural gas demand, and the likely impact of climate change mitigation policies, programs, and regulations thereon. There is some precedent for considering policy in energy system planning. In the electricity context, for example, FERC has allowed "transmission needs driven by public policy requirements established by state or federal laws or regulations" to

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(3) to dramatically reduce the pollutant emissions that cause poor air quality. *See* INTERNATIONAL ENERGY AGENCY, OUTLOOK FOR NATURAL GAS: EXCERPT FROM THE WORLD ENERGY OUTLOOK 2017 iii & 449 (2018), https://perma.cc/98PD-FWQ4.

[7] EXXONMOBIL, 2018 OUTLOOK FOR ENERGY: A VIEW TO 2040 49 (2018), https://perma.cc/HCG4-GJ3C (finding that, under a 2ºC scenario, where action is taken to reduce energy-related carbon dioxide emissions to zero, global demand for natural gas could decline to 265 billion cubic feet (bcf) per day in 2040). The percentage reduction was calculated assuming global demand for natural gas of 342.8 bcf per day in 2016. *See* BP, STATISTICAL REVIEW OF WORLD ENERGY 29 (2017), https://perma.cc/H78M-RMDY.

[8] FERC, Statement of Policy: Certification of New Interstate Natural Gas Pipeline Facilities, 88 FERC ¶ 61,227, 25 (Sep. 15, 1999) [hereinafter FERC Policy Statement] (indicating that "contracts or precedent agreements always will be important evidence of demand for a project").

[9] Jordan Blum, "There is a risk of overbuild for Texas Pipelines," HOUSTON CHRONICLE (Aug. 26, 2017), https://perma.cc/25Z3-V72V. *See also* Jeremiah Shelor, "Marcellus/Utica On Pace for Pipeline Overbuild, Says Braziel," Natural Gas Intelligence (June 8, 2016), https://perma.cc/L2C5-YEYT (discussing the potential for overbuilding of pipeline capacity in the Marcellus and Utica shale regions).

[10] *Id*. at 2,9.

[11] Statement of Commissioner Norman Bay, Order Granting Abandonment and Issuing Certificates, 158 FERC ¶ 61,145, 3 (Feb 3, 2017).

be considered in planning.[12] Public policy requirements should also be considered in the natural gas context.

3. FERC's Assessment of Public Need Should Also Consider the Availability of Alternatives to Natural Gas to Supply the Energy Needs of Market Areas

As well as assessing the impact of government policies on future natural gas demand, FERC should also consider how demand will be affected by market forces, including increased competition from renewables and other alternative energy sources. The availability of such alternatives, particularly for electricity generation, will reduce the need for new natural gas transportation infrastructure.

While natural gas is currently the key fuel used in electricity generation in the U.S. –accounting for thirty-two percent of total generation[13] – the use of alternatives is increasing. Renewable generation, in particular, has grown significantly over the last decade and is forecast to continue increasing in the future.[14] In the first quarter of 2018, ninety-five percent of all new electric generating capacity in the U.S. came from solar and wind, whereas natural gas accounted for just two percent of capacity additions.[15] Industry experts have warned that, with the cost of renewable generation declining, it could "squeeze out" natural gas, causing demand to "plateau" before midcentury.[16] This possibility must be considered in evaluating the need for new natural gas pipelines which, if approved today, will likely remain in operation well beyond 2050. FERC should also consider renewable generation as an alternative to natural gas to supply the energy needs of market areas insofar as renewable energy entails fewer emissions and other harmful environmental impacts.

4. When Assessing Public Interest, FERC Should Evaluate the Effect of the Proposal on Fossil Fuel Production, Consumption and Greenhouse Gas Emissions

The expansion of natural gas transportation infrastructure will generate greenhouse gas emissions and will also affect total emissions from the energy sector (i.e., by affecting the proportion of

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[12] FERC, Final Rule: Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 136 FERC ¶ 61,051, 9 (July 21, 2011).

[13] Energy Information Administration (EIA), *What is U.S. Electricity Generation by Energy Source?* FREQUENTLY ASKED QUESTIONS, https://perma.cc/WP9P-7BZJ (last updated Mar. 7, 2018).

[14] For example, the U.S. EIA forecasts that renewable generation will grow at an average rate of 2.8% per year, from 2017 to 2050. *See* EIA, ANNUAL ENERGY OUTLOOK 2018 90 (2018), https://perma.cc/K7DE-VQ8B. Similarly, the International Energy Agency also predicts an increase in renewable generation, forecasting that it could supply up to sixty percent of the world's electricity needs by 2040. *See* International Energy Agency, *World Energy Outlook 2017*, https://perma.cc/3AAF-DCRG (last visited June 11, 2018).

[15] AUSTIN PEREA ET AL., U.S. SOLAR MARKET INSIGHT 6 (2018), https://perma.cc/4W9W-AHKE.

[16] Jack Farchy & Kelly Gilbolm, *What If Big Oil's Bet on Gas is Wrong?* BLOOMBERG, https://perma.cc/39EG-B98N?type=image (Jul. 17, 2017). See also BP, ENERGY OUTLOOK: 2018 EDITION 47 (2018), https://perma.cc/V328-8B7V (noting that renewables will play an "ever increasing role" in electricity generation in the future, while "[t]he share of natural gas [in generation] is projected to be relatively flat").

natural gas that is consumed as compared with other fossil fuels and renewables). Those emissions impacts should be taken into account by FERC in determining whether proposed infrastructure is required by the public convenience and necessity. As FERC has itself recognized, and the courts have confirmed, the public convenience and necessity standard requires an assessment of whether proposed infrastructure is in the public interest.[17] As part of that assessment, FERC must balance the likely public benefits and costs of the infrastructure, including its environmental impacts.[18]

As part of its public interest assessment, FERC should evaluate the likely climate change impacts of expanding natural gas transportation infrastructure, taking into account all associated direct and indirect greenhouse gas emissions. In this context:

- *Direct* emissions refer to those arising from the use of natural gas transportation infrastructure. They result primarily from natural gas leaks and venting (i.e., fugitive emissions), which release methane, a highly potent greenhouse gas, with a twenty-year global warming potential of at least eighty-four.[19] The U.S. Environmental Protection Agency (EPA) estimates that natural gas transportation and storage was responsible for almost seven percent of national methane emissions in 2016.[20] That estimate is not, however, based on direct measurement of fugitive emissions and likely understates the true extent thereof.[21]

- *Indirect* emissions are those associated with upstream and downstream activities on the natural gas supply chain. Significant methane is released during upstream activities – i.e., natural gas extraction, production, and processing – primarily due to gas leaks and venting.[22] Upstream activities, as well as the downstream use of natural gas, also emit carbon dioxide

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[17] FERC Policy Statement, *supra* note 8, at 2 (noting that, as part of its certification process, FERC must consider "whether, on balance, the project will serve the public interest"). *See also* Atlantic Ref. Co. v. PSC of New York, 360 U.S. 378, 391 (1959) (holding that FERC must "evaluate all factors bearing on the public interest" when determining whether to certify a pipeline); Federal Power Commission v. Transcontinental Gas Pipe Line Corp, 365 U.S. 1, 7 (1961) (indicating that, in certifying pipelines, FERC acts as the "guardian of the public interest" and must assess the public interest in the pipeline).

[18] FERC Policy Statement, *supra* note 8, at 18-19.

[19] The "global warming potential" of a greenhouse gas reflects the amount of heat it traps in the earth's atmosphere relative to carbon dioxide. The Intergovernmental Panel on Climate Change estimates that methane has a twenty-year global warming potential of eighty-four, meaning that it traps eight-four times more heat in the earth's atmosphere than carbon dioxide (on a pound-for-pound basis), in the first twenty years after it is released. *See* Rajendra K. Pachauri et al., *Climate Change 2014: Synthesis Report*, *in* FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 87 (Core Writing Team et al. eds., IPCC 2014), *available at* https://perma.cc/DK4M-FBRL. Other researchers have suggested that methane's global warming potential may be even higher. *See e.g.*, Robert W. Howarth et al., *Methane and the Greenhouse Gas Footprint of Natural Gas From Shale Formations*, 106 CLIMATE CHANGE 679, 683 (2011).

[20] EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016 ES-7 & 3-79 (2018), https://perma.cc/297Y-HULK.

[21] EPA, GREENHOUSE GAS EMISSIONS REPORTING FROM THE PETROLEUM AND NATURAL GAS INDUSTRY: BACKGROUND TECHNICAL SUPPORT DOCUMENT 7 (2010), https://perma.cc/795C-ZYZT (noting that EPA's approach to estimating emission is "outdates" and may "understate[] [emissions] from some emissions sources"). *See also* ROMANY WEBB, SAFETY FIRST, ENVIRONMENT LAST: IMPROVING REGULATION OF GAS PIPELINE LEAKS 18-19 (2015), https://perma.cc/TQ2E-KXRS.

[22] EPA, *supra* note 21, at 3-78.

> through gas combustion.[23] According to EPA, in 2016, gas combustion accounted for approximately twenty-eight percent of national carbon dioxide emissions.[24]

In 2017, the D.C. Circuit Court of Appeals clarified that FERC is required to consider and quantify downstream greenhouse gas emissions from the combustion of natural gas transported via pipelines approved by FERC, where such emissions are foreseeable.[25] The court noted that there was a sufficient casual nexus between the transportation of natural gas and its combustion (i.e., because if the gas could not reach end users, it would not be combusted) and that FERC's approval was a "legally relevant cause" of combustion because it had the authority to act on information about downstream emissions and could deny the application if it found that those emissions would be too harmful. The same logic applies to upstream emissions: there is factual causation (if gas cannot be transported to end users, then it will not be produced in the first place) as well as legal causation (FERC has the authority to act on information about upstream emissions when reviewing applications).[26] Thus, we maintain that FERC has a legal obligation to evaluate both upstream and downstream emissions in its NEPA reviews, and this should be reflected in FERC's policies and operating procedures.

FERC recently issued a decision in which it stated that upstream and downstream emissions may not be "reasonably foreseeable" for natural gas transportation projects where FERC does not know exactly where the natural gas is coming from or where it will be consumed, and thus FERC does not have an obligation to consider or quantify those emissions.[27] We disagree. If FERC is able to quantify the amount of natural gas that will be transported via a project undergoing environmental review, then it can use emissions factors and other forecasting tools to estimate the amount of upstream and downstream greenhouse gases that will be emitted, even if the precise locations of production and/or end-use are unknown. The available estimation tools include:

- EPA's GHG emission factors for greenhouse gases.[28]
- IEA's CO_2 emission factors from fuel combustion.[29]
- NETLs *Life Cycle Analysis of Natural Gas Extraction and Power Generation.*[30]

FERC and other agencies have also asserted that projects which increase the supply of natural gas may decrease total greenhouse gas emissions by offsetting the use of other fossil fuels (primarily coal). However, FERC has not published the analysis needed to support this assertion –

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[23] *Id*. at 3-4 & 3-78 – 3-80.
[24] *Id*. at ES-6 & 3-6.
[25] Sierra Club v. FERC, No. 16-1329 (D.C. Cir. 2017).
[26] For a more detailed analysis of this issue, see Michael Burger & Jessica Wentz, *Downstream and Upstream Greenhouse Gas Emissions: The Proper Scope of NEPA Review*, 41 HARVARD ENVTL. L.J. 109 (2017).
[27] Dominion Transmission Inc., Order Denying Rehearing, 163 FERC ¶ 61,128, Docket No. CP14-497-001 (2018).
[28] EPA, *Emission Factors for Greenhouse Gas Inventories* (2014), https://perma.cc/VLK8-7G8C.
[29] IEA, *Emissions Factors* (2017), https://perma.cc/NBP7-9MMY.
[30] NETL, *Life Cycle Analysis of Natural Gas Extraction and power Generation* (2014),https://perma.cc/TA2G-7GMG.

specifically, an analysis of how expanding natural gas transportation infrastructure affects the consumption of renewable energy, as well as other fossil fuels.[31] Nor has FERC considered how upstream methane emissions from natural gas production affect the benefits of moving away from coal. Research suggests that, if upstream emission rates exceed two to three percent, switching from coal to natural gas will have no climate change benefits.[32] The potential for upstream emissions must, therefore, be considered by FERC when assessing the overall climate impacts of natural gas projects.

FERC should conduct a detailed analysis to better understand the net emissions impact of its natural gas certification decisions at both a programmatic and project-specific level.[33] When FERC assesses the net emissions impact of a natural gas infrastructure project (as compared with the no action alternative), FERC must be careful about its energy market forecasts, and in particular its assumptions regarding the future demand for fossil fuels as compared with cleaner energy sources. As noted above, FERC's analysis of energy market impacts and energy consumption trends should reflect present and foreseeable shifts in fossil fuel demand driven by: (i) policies aimed at reducing greenhouse gas emissions and fossil fuel use; and (ii) decreases in the cost of alternative energy sources such as solar and wind. This analysis should then factor into FERC's determination of net emissions impacts.

To assess the significance of greenhouse gas emissions impacts, FERC should refer to the NEPA regulations, which instruct agencies to consider both the context and intensity of the emissions.[34] Contextual factors relevant to any proposal which would increase the production of fossil fuels include:

- the fact that climate change is such a massive environmental problem;
- the broad scope of interests that will be adversely affected by the problem; and
- the compelling need to rapidly reduce dependency on fossil fuels to address the problem.

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[31] FERC could refer to outside studies on how expanding natural gas supply affects renewable energy use. *See, e.g.*, Christine Shearer et al., *The Effect of Natural Gas Supply on US Renewable Energy and CO_2 Emissions*, 1 ENVIRON. RES. LETT. 9 (2014).

[32] STEFFEN JENNER & ALBERTO J. LAMADRID, SHALE GAS VS. COAL 7 (2012), https://perma.cc/NBG3-X2JY. Several recent lifecycle analysis suggest that emission rates may exceed the 2-3% threshold. *See e.g.,* Robert W. Howarth et al., *Methane and the Greenhouse Gas Footprint of Natural Gas From Shale Formations*, 106 CLIMATE CHANGE 679, 683 (2011) (finding that, "[c]ompared to coal, the footprint of shale gas is at least 20% greater and perhaps more than twice as great on the 20-year time horizon"); Mohan Jiang et al., *Lifecycle Greenhouse Gas Emissions from Marcellus Shale Gas*, 6 ENVIRON. RES. LETT. 0.4014 (2011) (finding that, on a lifecycle basis, greenhouse gas emissions from electricity generation using shale gas are twenty to fifty percent higher than those from electricity generation using coal). *But compare* Ian J. Laurenzi & Gilbert R. Jersey, *Life Cycle Greenhouse Gas Emissions and Freshwater Consumption of Marcellus Shale Gas*, 49 ENVIRON. SCI. TECHNOL. 4896 (2013) (estimating that lifecycle emissions associated with shale gas are fifty-three percent lower than those associated with coal).

[33] In this context, net emissions would be the total direct and indirect emissions arising from the use of FERC-approved infrastructure, minus the emissions that would be generated by substitute energy resources if the proposal is not implemented

[34] 40 CFR § 1508.27.

With regards to intensity, FERC should use the following tools to assess the magnitude of the greenhouse gas emissions impact:

- the EPA's quantification threshold of 25,000 tons per year of carbon dioxide-equivalent to identify major emitters for the purposes of Clean Air Act regulation;[35]
- the social cost of carbon, methane, and nitrous oxide, which can be used to assign a dollar value to the potential impacts of these emissions;[36] and
- the EPA's Greenhouse Gas Equivalencies Calculator, which would allow FERC to compare emissions from the proposal with, for example, emissions from household electricity use or vehicle miles driven.[37]

FERC should also refer to other factors outlined in the NEPA regulations for measuring intensity, including: the degree to which the environmental effects are likely to be highly controversial, the degree to which the possible effects are highly uncertain or involve unique or unknown risks, and whether the action is related to other actions with individually insignificant but cumulatively significant impacts.[38]

5. FERC Should Consider how Climate Change will Affect the Construction and Operation of Natural Gas Transportation Infrastructure

FERC should also consider how climate change may affect natural gas transportation facilities and whether climate change may exacerbate environmental hazards associated with the construction and operation of those facilities or vice versa. This analysis will help satisfy FERC's obligations to thoroughly review environmental impacts, as required by NEPA,[39] and to assess whether the project is in the public interest, as required by the Natural Gas Act.[40]

Numerous studies have identified the effects of climate change as threats to natural gas pipelines and associated infrastructure (both above- and below-ground).[41] For example, climate change is

[35] EPA, *GHG Reporting Program Facts and Figures*, https://www.epa.gov/ghgreporting/key-facts-and-figures.
[36] Interagency Working Group on the Social Cost of Greenhouse Gases, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (May 2013, Revised August 2016); *Interagency Working Group on the Social Cost of Greenhouse Gases, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide* (Aug. 2016).
[37] EPA, *GHG Equivalencies Calculator*, https://perma.cc/JN9W-WDRX.
[38] 40 CFR § 1508.27(b).
[39] An analysis of climate change impacts may be necessary to satisfy NEPA obligations to evaluate both the status of the affected environment and the environmental outcomes of proposed actions. *See* 40 C.F.R. §§ 1502.15-1502.16.
[40] *See* Natural Gas Act § 3, 15 U.S.C. § 717b (requiring that export and important projects be in the public interest); Natural Gas Act § 7, 15 U.S.C. § 717f (requiring a certificate of public convenience and necessity for the construction or extension of natural gas infrastructure).
[41] *See e.g.*, JOHN D. RADKE ET AL., ASSESSMENT OF CALIFORNIA'S NATURAL GAS PIPELINE VULNERABILITY TO CLIMATE CHANGE (2017), https://perma.cc/Q8NS-ESUV; U.S. DEPARTMENT OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER (2013), https://perma.cc/PH93-L69A.

expected to increase the frequency and severity of storms,[42] leading to more damaging floods, which may inundate pipelines and/or subject them to greater hydrostatic load, leading to cracking and other damage.[43] Such damage may also occur due to earth movement caused by flooding and other climate change-induced phenomenon, such as rapid melting of permafrost in arctic areas and sea level rise along the coasts.[44] Sea level rise and associated storm surge also increase the risk of pipeline corrosion due to inundation with brackish or saline water.[45] This was a major problem during and after Hurricane Katrina, with over 300 miles of pipeline having to be replaced as a result of corrosion damage.[46] Pipelines and associated infrastructure have also been affected by wildfires,[47] which are expected to become more frequent and intense due to climate change, increasing the risk to natural gas transportation facilities.[48]

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Thank you for considering our comments and recommendations on the scope of FERC's review of the natural gas certification policy. Please let us know if you have any questions.

Sincerely,

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[42] D. J. Wuebbles et al., *Executive Summary*, in CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT 10, 21 (D.J. Wuebbels et al. eds., 2017), http:perma.cc/TD85-T3H8.
[43] Radke et al., *supra* note 41, at 9.
[44] *Id*. at 10. *See also* Jack Nicas, *Floods Put Pipelines at Risk: Records Suggest Erosion of Riverbeds Jeopardizes Oil and Gas Infrastructure*, Wall Street Journal (Dec. 3, 2012) (reporting that flood-caused erosion led to the rupture of two pipelines in Iowa and Montana); National Oceanic and Atmospheric Administration, *Artic Development and Transport*, U.S. CLIMATE RESILIENCE TOOLKIT, https://perma.cc/JAT5-88G4 (last updated Nov. 22, 2016) (noting that "[u]neven sinking of the ground in response to thawing permafrost is causing underlying land to shift, including the potential to damage . . . pipelines" and finding that "[p]ermafrost thaw is already affecting the Trans-Alaska Pipeline System: for instance, a vertical support member on one segment of the pipeline has tilted by seven degrees over a period of about three years").
[45] Radke et al., *supra* note 41, at 10.
[46] *Id*. at 1.
[47] *See e.g.*, Dina O'Meara, *Lessons Learned from ATCO and the Fort Murray Wildfires*, ENERGY (2017), https://perma.cc/8QS4-APZL; Ethan Lou, *Pipelines Secured as Wildfires Rage in Western Canada*, REUTERS (Jul. 12, 2017), https://perma.cc/49YG-73X6.
[48] M.F. Wehner et al., *Droughts, Floods, and Wildfires*, in CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT 231, 249 (D.J. Wuebbels et al. eds., 2017), http:perma.cc/TD85-T3H8.