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Executive Summary

In recent years, legal controversy has emerged over several new interstate pipeline projects linking shale gas-producing regions of the United States to power plants and homes on the densely populated East Coast. Section 7 of the Natural Gas Act gives the Federal Energy Regulatory Commission (FERC) responsibility for approving only those interstate natural gas facilities that are necessary for the present and future public convenience and necessity.¹ In light of growing public attention to the environmental effects of these pipeline projects, FERC has faced competing pressures regarding how to balance the need for new natural gas pipelines with the environmental consequences of approving the construction and operation of those facilities. In particular, concerns about the greenhouse gas emissions, and resulting climate change effects, caused by new pipeline infrastructure have become a flashpoint in the debate about whether FERC has met its statutory obligations when approving new projects. In addition to questions about whether new pipeline facilities are truly required for the public convenience and necessity in light of their climate change consequences, FERC has also faced questions about whether its analysis of these projects complies with existing environmental laws such as the National Environmental Policy Act (NEPA).²

FERC has struggled with how to evaluate applications for certificates of public convenience and necessity in light of these competing demands. As of April 2019, FERC is reevaluating its approach to considering certificate applications. In the meantime, FERC has been operating under an interpretation of its existing policy that requires little to no consideration of the greenhouse gas emission increases or decreases enabled by proposed infrastructure projects, and is facing legal challenges to this interpretation.

This report examines the legal context surrounding FERC's evaluation of the environmental impacts of proposed interstate natural gas pipeline projects under the two statutes that govern certificates of public convenience and necessity: the Natural Gas Act and NEPA. In the nineteen years since FERC last comprehensively reevaluated its approach to these questions, there have been significant advances in the understanding and measurement of climate change and other environmental effects of natural gas production, transportation, and consumption. Based on these advancements, FERC has the opportunity and obligation to adopt improvements to its Natural Gas Act and NEPA analyses that will better inform policymakers and the public about the environmental effects of proposed projects.

FERC has a legal obligation to analyze and consider upstream and downstream greenhouse gas emissions. The Natural Gas Act and NEPA require analysis of greenhouse gas emissions associated with potential projects. This includes greenhouse gases directly emitted during the construction and operation of a pipeline, as well as the emissions associated with additional production (upstream emissions) and additional consumption (downstream emissions) of natural gas. FERC should incorporate climate damages into its process for determining whether a proposed project is required by the present or future public convenience and necessity, pursuant to the Natural Gas Act. FERC should also clarify that analysis of upstream and downstream emissions associated with potential projects is required pursuant to NEPA, in line with the weight of federal caselaw. The consideration of alternatives to a particular interstate natural gas pipeline facility, as required by NEPA, can and should better inform FERC as it exercises its Natural Gas Act obligations.

¹ 15 U.S.C. § 717f.

² 42 U.S.C. § 4332.

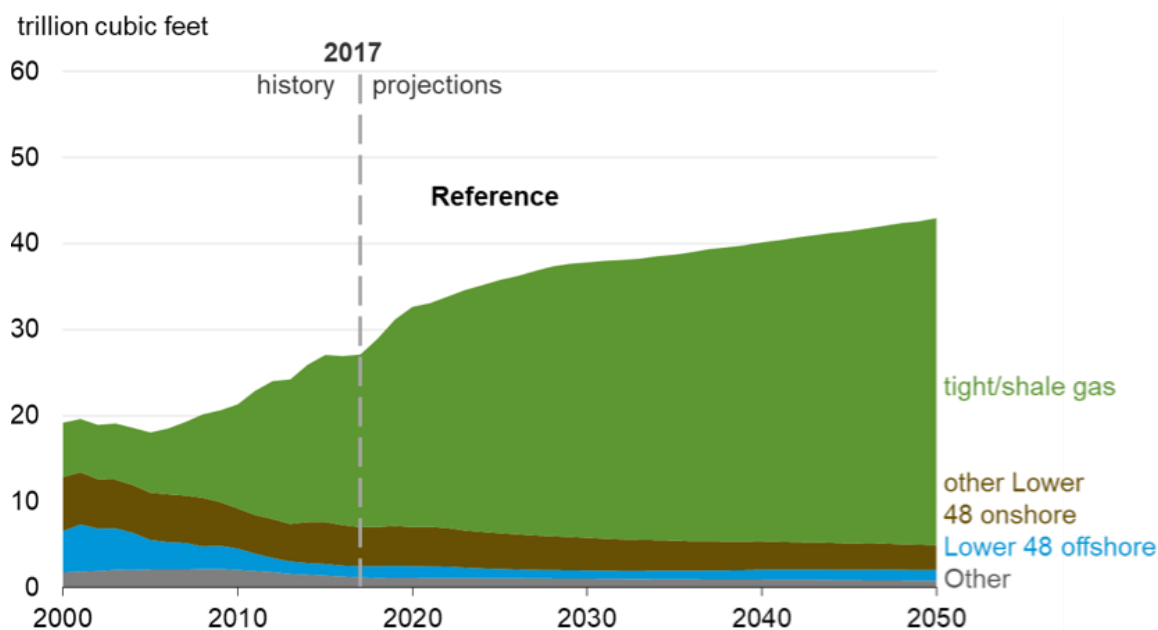
Accepted methods exist to quantify and monetize greenhouse gas emissions, which can be used to evaluate the significance of those emissions and to balance consequences of emissions against benefits of a project. FERC should adopt a policy that it will quantify and monetize upstream and downstream greenhouse gas emissions in all Natural Gas Act and NEPA analyses of interstate natural gas facilities, to the maximum extent feasible. In order to inform that quantification and monetization, FERC should request that certificate applicants provide as much information as possible on the expected source, end use, and amount of natural gas to be transported through a proposed pipeline. Barring a more precise estimate based on project-specific data, FERC should use default scenarios, available emission factor estimates, and, when possible, modeling to estimate the quantity of greenhouse gas emissions that will be enabled by new natural gas transportation infrastructure. Once emissions have been quantified, they should be monetized to inform whether the emissions are significant and in order to balance the environmental harms from a project against the benefits of a project. In order to monetize greenhouse gas emissions, FERC should use the federal Interagency Working Group on Social Cost of Greenhouse Gases (IWG)'s 2016 estimates of the Social Cost of Greenhouse Gases, which reflect the best available science and economics of the climate consequences of a marginal ton of greenhouse gases.

Cost-benefit analysis provides a useful framework for evaluating certificate applications. FERC should move towards a social welfare maximizing framework for evaluating whether a project is required by the public convenience and necessity: cost-benefit analysis in which FERC balances the monetized benefits of additional pipeline infrastructure against the costs of constructing and operating that infrastructure, including the environmental costs.

Introduction

The United States energy system is in the midst of a transition. A key component of that transition has been the significant expansion of domestic natural gas production, enabled in large part by technological advances, including hydraulic fracturing and horizontal drilling.³ Figure 1 below shows the substantial growth in natural gas production from shale formations, driven by the use of hydraulic fracturing technology, and the expectation that under current policies shale gas production will continue to increase. These technological advances have enabled lower cost production of natural gas in parts of the country that had not previously seen significant gas development.⁴ Figure 2 shows that natural gas production has grown over the past five years in new areas such as the Marcellus and Utica shale formations in northern Appalachia and the Bakken formation in North and South Dakota. This increase of natural gas production has resulted in a substantial reduction in natural gas prices and, consequently, a significant increase in natural gas demand by power plants and industrial users.⁵ Together, these conditions have led to greater demand for new natural gas transportation infrastructure that connects new producing areas with end users.

Figure 1: Natural Gas Production by Type



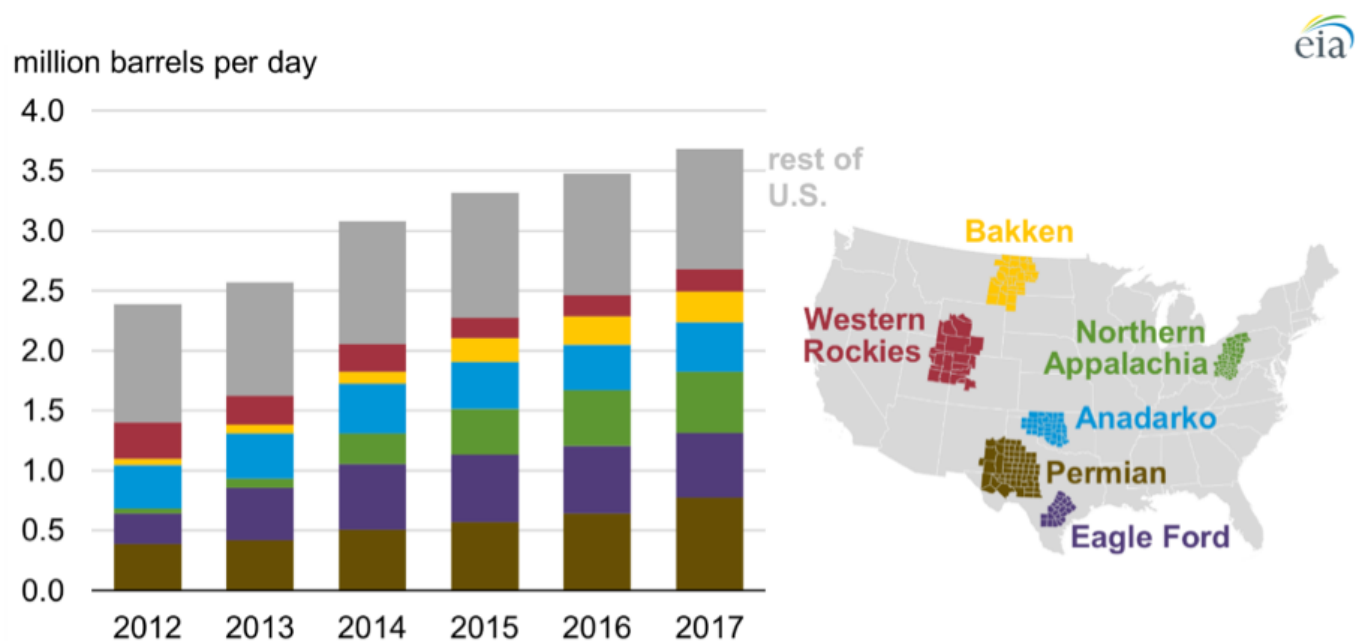
Source: U.S. Energy Info. Admin. Annual Energy Outlook 2018

³ Jack Perrin & Troy Cook, U.S. Energy Info. Admin., *Hydraulically Fractured Wells Provide Two-thirds of U.S. Natural Gas Production*, TODAY IN ENERGY (May 5, 2016), <https://www.eia.gov/todayinenergy/detail.php?id=26112>.

⁴ U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2018 at 67-68 (2018), <https://www.eia.gov/outlooks/aeo/pdf/AEO2018.pdf>.

⁵ *Id.* at 69.

Figure 2: U.S. Natural Gas Plant Liquid Production by Region (2012-2017)



However, new natural gas infrastructure—primarily interstate pipelines, compressor stations, and related facilities—also involve social costs. New and expanded pipelines bring the risk of spills and accidents; disturb landowner property, natural geology, forests, wetlands, and other wildlife habitat; and require construction infrastructure that can damage communities and the local environment.⁶ Moreover, natural gas pipelines and related infrastructure directly emit greenhouse gases that cause climate change. Methane is emitted when pipelines leak and during safety tests, and carbon dioxide is emitted when natural gas is combusted in order to operate compressor stations and other enabling infrastructure.⁷ Further, pipeline infrastructure creates the economic conditions for additional natural gas production and consumption, which produce both upstream and downstream greenhouse gas emissions, contributing to climate change.

Congress has given FERC the responsibility for regulating the interstate transportation of natural gas in the public interest.⁸ In order to meet this obligation, FERC balances the need for additional natural gas infrastructure against the costs that such infrastructure may impose.⁹ FERC recently issued a number of orders approving projects and denying rehearing of prior approvals, in which the Commission adopted an interpretation of its obligations that involves little to no consideration of the upstream and downstream greenhouse gas emission increases or decreases that would be enabled by

⁶ See e.g. *Mountain Valley Project and Equitrans Expansion Project Final Environmental Impact Statement* at ES-4 to ES-16, Docket Nos. CP16-10-000, CP16-13-000 (2017) (describing potential harms to safety, the community, and the environment of the Mountain Valley Project).

⁷ See JAMES BRADBURY, ZACHARY CLEMENT, & ADRIAN DOWN, GREENHOUSE GAS EMISSIONS AND FUEL SUE WITHIN THE NATURAL GAS SUPPLY CHAIN – SANKEY DIAGRAM METHODOLOGY 8-9 (2015), https://www.energy.gov/sites/prod/files/2015/07/f24/QR%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20System%2C%20Sankey%20Diagram%20Methodology_0.pdf.

⁸ 15 U.S.C. § 717(a); see also *id.* at § 717f(c), (e).

⁹ Certification of New Interstate Natural Gas Pipeline Facilities, 88 FERC ¶ 61,227, 61,746 (1999) (“1999 Policy Statement”), clarified, 90 FERC ¶ 61,128 (1999), further clarified, 92 FERC ¶ 61,094 (2000).

the projects.¹⁰ FERC is currently facing legal challenges to its interpretations and deficient NEPA analysis.¹¹ For instance, FERC has argued that indirect upstream and downstream climate effects are not “reasonably foreseeable,” and that it lacks proper tools to quantify and monetize emissions.

Recently, FERC itself has indicated a need to reevaluate how it analyzes the climate effects of pipeline decisions. In April 2018, FERC issued a Notice of Inquiry (NOI) that initiated a process to reevaluate its current approach to balancing the competing interests implicated by pipeline projects.¹² As a result of growing concern about climate change, including among at least some Commissioners,¹³ and a pivotal decision from the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit),¹⁴ one of the key aspects of FERC’s NOI was whether and, if so, how FERC should consider greenhouse gas emissions when evaluating potential pipeline projects.¹⁵

This report examines the legal requirements for FERC’s evaluation of the climate consequences of proposed interstate natural gas pipeline projects. In Parts III, IV, and V, it responds to FERC’s arguments for why it has recently stopped analyzing indirect emissions from pipeline projects and why it does not monetize the climate damages that result from direct and indirect pipeline emissions. The report makes recommendations regarding how FERC can alter its current process to more fully and transparently balance the need for and adverse consequences of natural gas infrastructure, with a focus on greenhouse gas emissions. By following the precedent and court decisions that have guided other federal agencies in their review of federal actions, and by adopting the methodologies described, FERC has the opportunity to limit legal risk regarding its pipeline approvals while better informing policymakers and the public about the environmental effects of proposed projects.

¹⁰ See *Dominion Transmission Inc.*, 163 FERC ¶ 61,128 at PP 30-44, 57-70 (May 18, 2018) (“*New Market Project Rehearing Order*”); *Florida Southeast Connect. LLC*, 163 FERC ¶ 61,158 at PP 38-41 (May 30, 2018); *Tennessee Gas Pipeline Company LLC*, 163 FERC ¶ 61,190 at PP 49-70 (June 12, 2018) (“*Broad Run Project Rehearing Order*”); *Columbia Gas Transmission LLC*, 164 FERC ¶ 61,036 at PP 40-60 (July 19, 2018) (“*Eastern Panhandle Project Certificate Order*”); *Millennium Pipeline Company LLC*, 164 FERC ¶ 61,039 at PP 18-28 (July 19, 2018); *Texas Eastern Transmission, LP*, 164 FERC ¶ 61,037 at PP 32-33 (July 19, 2018); *Northwest Pipeline LLC*, 164 FERC ¶ 61,038 at PP 26-35 (July 19, 2018); *NEXUS Gas Transmission, LLC et al.*, 164 FERC ¶ 61,054 at PP 92-112 (July 25, 2018) (“*Nexus Rehearing Order*”); *Spire STL Pipeline LLC*, 164 FERC ¶ 61,085 at PP 245-254 (Aug. 3, 2018) (“*Spire STL Certificate Order*”); *Transcontinental Gas Pipe Line Company, LLC*, 164 FERC ¶ 61,101 at PP 49-53, 71-75 (Aug. 10, 2018); *PennEast Pipeline Company, LLC*, 164 FERC ¶ 61,098 at PP 104-123 (Aug. 10, 2018); *Florida Southeast Connection, LLC*, 164 FERC ¶ 61,099 at PP 11-57 (Aug. 10, 2018) (“*Sabal Trail Remand Rehearing Order*”).

¹¹ See *Atlantic Coast Pipeline, LLC v. FERC*, No. 18-1224 (D.C. Cir. filed Aug. 20, 2018); *Delaware Riverkeeper Network v. FERC*, No. 18-1220 (D.C. Cir. filed Aug. 13, 2018); *Lori Birkhead v. FERC*, No. 18-1218 (D.C. Cir. filed Aug. 8, 2018); *Otsego 2000 v. FERC*, No. 18-1188 (D.C. Cir. filed July 16, 2018).

¹² *Certification of New Natural Gas Pipeline Facilities Notice of Inquiry*, 163 FERC ¶ 61,042 (2018) (“*Policy Statement NOI*”).

¹³ *Florida Southeast Connection, LLC et al.*, 162 FERC ¶ 61,233 (2018) (LaFleur, Comm’r, *dissenting in part*) (“*Sabal Trail Remand Order*”); *id.* (Glick, Comm’r, *dissenting*); see also *National Fuel Gas Supply Corp et al.*, 158 FERC ¶ 61,145 (2017) (Bay, Comm’r, *separate statement*).

¹⁴ *Sierra Club v. FERC*, 867 F.3d 1357 (D.C. Cir. 2017) (“*Sabal Trail*”); see also *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at 4-5 (Glick, Comm’r, *dissenting*) (discussing the *Sabal Trail* decision).

¹⁵ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 58.

I. Statutory and Policy Context

Section 7 of the Natural Gas Act tasks FERC with reviewing applications for all new interstate natural gas pipelines and facilities.¹⁶ FERC must approve any projects that are “or will be required by the present or future public convenience and necessity.”¹⁷ It does so by considering applications from pipeline developers and issuing certificates of public convenience and necessity for all facilities that meet the criteria it has established for evaluating whether a facility will be in the public interest.

In 1999, FERC issued a “Policy Statement” that outlined the approach it would take for evaluating certificate applications (1999 Policy Statement).¹⁸ Under this framework, FERC “balanc[es] the evidence of public benefits to be achieved against the residual adverse effect” of a proposal.¹⁹ Specifically, FERC considers “adverse effects the project might have on the existing customers of the pipeline proposing the project, existing pipelines in the market and their captive customers, or landowners and communities affected by the route of the new pipeline.”²⁰ In practice, FERC engages in a qualitative rather than quantitative analysis to determine whether “the public benefits to be achieved from the project can be found to outweigh the adverse effects.”²¹ FERC also considers the environmental consequences of new pipeline facilities in its evaluation of certificate applications under the Natural Gas Act. FERC evaluates these environmental consequences concurrent with, but separate from, its evaluation of the “economic” factors that form its balancing test.²²

Environmental evaluation is also required for FERC to meet its statutory obligations under NEPA.²³ NEPA requires all federal agencies to take a “hard look” at the environmental consequences of a proposed activity before taking action.²⁴ Agencies are required to prepare environmental impact statements (EISs) for all “major Federal actions significantly affecting the quality of the human environment.”²⁵ If any significant environmental impacts might result from the proposed agency action, “an EIS must be prepared before the [agency] action is taken.”²⁶ EISs must contain, among other elements, a statement of the purpose of and need for the action, and a discussion of alternatives to the proposed action.²⁷ Agencies have an obligation to consider not just the direct environmental consequences of their actions, but also the “reasonably foreseeable” indirect consequences and the cumulative consequences.²⁸ An agency can avoid preparing an EIS if it issues a proper Environmental Assessment (EA), followed by a Finding of No Significant Impact (FONSI). In reviewing an EA and FONSI, courts determine whether the agency: (1) has accurately identified the relevant environmental concern, (2) has taken a “hard look” at the problem in preparing its analysis, (3) is able to make a convincing case for its finding of no

¹⁶ 15 U.S.C. § 717f(e).

¹⁷ *Id.*

¹⁸ 1999 *Policy Statement*, 88 FERC ¶ 61,227.

¹⁹ 1999 *Policy Statement*, 88 FERC ¶ 61,227 at 61,745. FERC also subjects proposed projects to a threshold requirement that “the pipeline must be prepared to financially support the project without relying on subsidization from its existing customers.” 1999 *Policy Statement*, 88 FERC ¶ 61,227 at 61,746.

²⁰ *Id.*

²¹ *Id.* at 61,747.

²² *Id.* at 61,749 (“The balancing of interests and benefits that will *precede* the environmental analysis will largely focus on economic interests”) (emphasis added).

²³ See *Policy Statement NOI*, 163 FERC ¶ 61,042 at PP 37-50.

²⁴ 42 U.S.C. § 4332(C).

²⁵ *Id.*

²⁶ *Sierra Club v. Peterson*, 717 F.2d 1409, 1415 (D.C. Cir. 1983) (emphasis omitted).

²⁷ *Id.*; 40 C.F.R. § 1502.14.

²⁸ 40 C.F.R. §§ 1508.7, 1508.8, 1508.2.

significant impact, and (4) has shown that even if there is an impact of true significance, an EIS is unnecessary because changes or safeguards in the project sufficiently reduce the impact to a minimum.²⁹

In recent orders approving pipelines and denying rehearing of approvals, FERC has limited the extent to which it analyzes and considers upstream and downstream greenhouse gas emissions when evaluating certificate applications. FERC has taken the position that, except in limited circumstances where it knows with particularity the source or end-use of the natural gas to be transported by a project, the upstream and downstream greenhouse gas emissions are not a reasonably foreseeable consequence of the project and so need not be evaluated in a NEPA analysis.³⁰ Moreover, the Commission has taken the position that because (in its view) the agency does not need to analyze such emissions pursuant to NEPA, it is also not required to analyze or factor these emissions into its public convenience and necessity determination under the Natural Gas Act.³¹ And FERC has doubled down on its longstanding argument that even when an amount of greenhouse emissions associated with a project can be quantified, it is inappropriate and unnecessary to monetize the economic value of the climate consequences of those emissions, despite the fact that a tool, the Social Cost of Greenhouse Gases, is available for that purpose.³²

Notwithstanding these recent policy positions, the April 2018 NOI raised the possibility that FERC will reconsider its approach to evaluating, among other things, the role that greenhouse gas emissions play in its public convenience and necessity evaluation of proposed projects and the related NEPA analyses that it conducts. In particular, FERC asked whether it should consider the greenhouse gases emitted when the natural gas transported by a pipeline is produced (upstream emissions) and when the natural gas transported by a pipeline is consumed (downstream emissions); whether to weigh the adverse consequences of these emissions against the benefits of a pipeline when deciding if a pipeline is in the public interest; and whether any quantified greenhouse gas emissions should be monetized.³³

²⁹ *Sierra Club v. Van Antwerp*, 661 F.3d 1147, 1153-54 (D.C. Cir. 2011).

³⁰ See, e.g., *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at P 34.

³¹ *Id.* at P 43 (“We are not aware of any basis that indicates the Commission is required to consider environmental effects that are outside of our NEPA analysis of the proposed action in our determination of whether a project is in the public convenience and necessity under section 7(c)”).

³² See, e.g., *Sabal Trail Remand Rehearing Order*, 164 FERC ¶ 61,099 at PP 26-37.

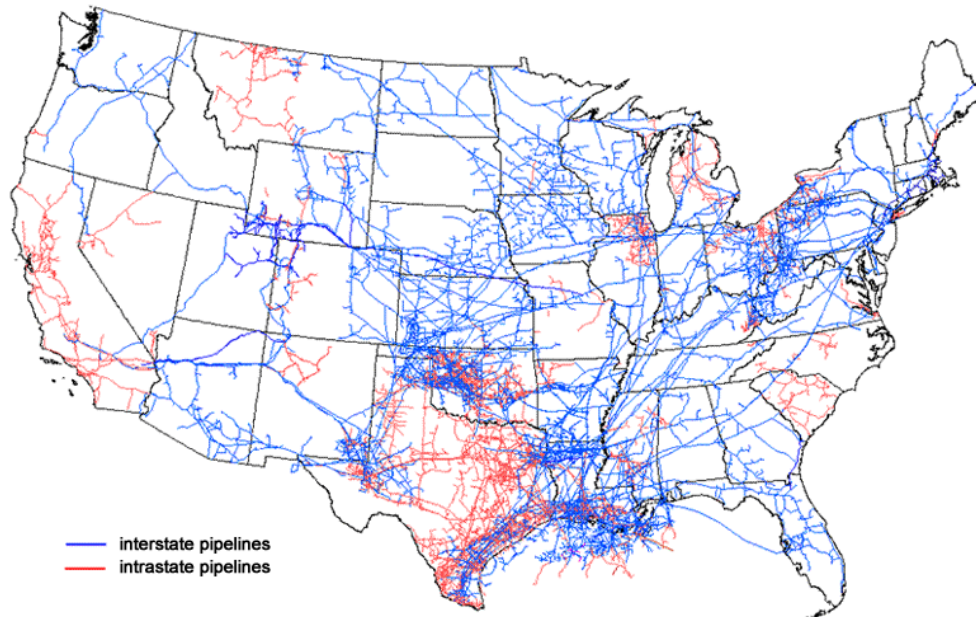
³³ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 58.

II. The Natural Gas Act Requires FERC to Consider Climate Effects in Its Public Convenience and Necessity Test.

FERC should more fully incorporate environmental considerations—and, in particular, the climate costs or benefits that result from new and expanded natural gas pipelines—into its process for evaluating, approving, or denying certificates for public convenience and necessity. This analysis is required in order for FERC to meet its obligations pursuant to Section 7 of the Natural Gas Act.

Section 7 of the Natural Gas Act requires that the construction and operation of all interstate natural gas facilities first obtain a “certificate of public convenience and necessity issued by the Commission authorizing such acts or operations.”³⁴ FERC is directed to approve only those certificates that are “or will be required by the present or future public convenience and necessity.”³⁵ And FERC establishes “such reasonable terms and conditions as the public convenience and necessity may require.”³⁶ In all of these cases, the Commission is required to exercise its expert judgment to advance only those projects and under such conditions as meet a “public convenience and necessity” test.

Map of U.S. Interstate and Intrastate Natural Gas Pipelines



Source: U.S. Energy Information Administration, *About U.S. Natural Gas Pipelines*

³⁴ 15 U.S.C. § 717f(c)(1)(A).

³⁵ 15 U.S.C. § 717f(e).

³⁶ *Id.*

When enacting the Natural Gas Act, Congress determined that the “business of transporting and selling natural gas for ultimate distribution to the public is affected with the public interest.”³⁷ As a result, the public convenience and necessity standard has been interpreted to encompass “all factors bearing on the public interest.”³⁸ One such factor is clearly the environmental effects of a project.

In *NAACP v. FPC*, the Supreme Court established that environmental considerations are a critical part of the Commission’s evaluation of pipelines under Section 7 of the Natural Gas Act.³⁹ In that case, the Supreme Court held that the precursor agency to FERC, the Federal Power Commission, was allowed to issue a rule requiring equal employment opportunity of regulated utilities only if it determined that discrimination undermined just and reasonable rates in the public interest. The Court determined that the Commission’s obligation to act in the public interest is not a “license to promote the general public welfare,” but rather the Commission must promote the public interest within the context of the purposes of the acts it administers.⁴⁰ As the Supreme Court explained, the Commission’s primary role is to “encourage the orderly development of plentiful supplies . . . of natural gas at reasonable prices.”⁴¹ The use of “orderly” suggests rational decisionmaking, which entails considering factors that are the consequence of a particular action at issue. Perhaps for that reason, in a widely cited footnote, the Court explicitly determined that “the Commission has authority to consider . . . environmental . . . questions” because they are a “subsidiary purpose[]” of the Natural Gas Act.⁴²

Numerous courts have interpreted this discussion and subsequent caselaw to confirm that environmental consequences must be considered when evaluating a certificate application.⁴³ Most recently, in the 2017 *Sabal Trail* case, the D.C. Circuit vacated FERC’s approval of a natural gas pipeline on the ground that FERC had not met its obligations under the Natural Gas Act and NEPA when it issued a certificate of public convenience and necessity.⁴⁴ The court made clear that environmental consequences are a factor that must be considered as part of the Natural Gas Act analysis:

“Congress broadly instructed the agency to consider the public convenience and necessity when evaluating applications to construct and operate interstate pipelines. FERC will balance the public benefits against the adverse effects of the project, *including adverse environmental effects*.”⁴⁵

FERC and courts have also long recognized that the environmental consequences at issue when evaluating whether a natural gas pipeline project is in the public interest are not limited to the project’s direct consequences, but also include its the upstream and downstream consequences.

³⁷ 15 U.S.C. § 717.

³⁸ *Atl. Refining Co. v. Pub. Serv. Comm’n of N.Y.*, 360 U.S. 378, 391 (1959).

³⁹ *NAACP v. Fed. Power Comm’n*, 425 U.S. 662 (1976).

⁴⁰ *Id.* at 669.

⁴¹ *Id.* at 669-70 (emphasis added).

⁴² *Id.* at 670 & n. 6.

⁴³ *Pub. Utilities Comm’n of State of Cal. v. FERC*, 900 F.2d 269, 281 (D.C. Cir. 1990); *Minisink Residents for Env’tl. Pres. & Safety v. FERC*, 762 F.3d 97, 101 (D.C. Cir. 2014) (“*Minisink*”); *Myersville Citizens for a Rural Cmty. v. FERC*, 783 F.3d 1301, 1307 (D.C. Cir. 2015) (“*Myersville*”); *Sierra Club v. DOE*, 867 F.3d 189, 202 (D.C. Cir. 2017).

⁴⁴ *Sabal Trail*, 867 F.3d at 1371-75.

⁴⁵ *Sabal Trail*, 867 F.3d at 1373 (emphasis added and citations and quotations omitted).

In 1961, the Supreme Court tacitly acknowledged that the downstream environmental and air pollution effects of natural gas pipeline construction were an important part of the Commission's public interest determination. In *FPC v. Transcontinental Gas Pipe Line Corp.* (*Transco*), the Court considered a challenge to the Commission's decision to deny a certificate based on an evaluation of "policy" factors such as the pipeline's effect on downstream conservation and end use price of natural gas.⁴⁶ The Court held that Congress intended the Section 7 language to give the Commission broad (though not unlimited) discretion in evaluating the public interest and that the Commission acted within that authority even when considering how a pipeline would affect activity that was not within its jurisdiction.⁴⁷ Notably, the Court implicitly adopted reasoning that downstream air pollution was a public interest factor that the Commission could consider when it accepted the Commission's expert judgment that the pipeline at issue would *not* sufficiently advance clear air objectives to overcome the Commission's concerns.⁴⁸

Subsequently, the Commission evaluated the downstream air pollution consequences of facilitating additional natural gas consumption by expanding pipeline infrastructure as an important factor for evaluating whether a project was required by the public convenience and necessity.⁴⁹ These downstream consequences generally supported a Commission determination that a pipeline was in the public interest because bringing additional natural gas to market would displace higher-emitting coal. There is no reason why FERC's legal authority to consider downstream consequences would be any different for downstream harms caused by a pipeline facilitating additional natural gas that displaces cleaner alternatives or conservation.

And if there were any lingering question, the court's decision in *Sabal Trail* makes clear that consideration of downstream environmental harms caused by the construction of new pipeline facilities is part of FERC's obligation to consider the public interest under Section 7.⁵⁰

In recent pipeline certificate orders, the Commission has raised the question of whether the public interest inquiry under Section 7 can extend even beyond the environmental considerations dictated by NEPA.⁵¹ But, as explained in Part III, upstream and downstream greenhouse gas emissions are environmental consequences that must be analyzed under NEPA. And even if they were not, the Natural Gas Act does not limit the environmental consequences that are relevant to the public interest to only those required to be analyzed by NEPA.⁵² The Supreme Court's decision in *Transco* that the Commission has the authority to consider downstream consequences of a certificate approval predated enactment of NEPA. There, the Court held that the Commission could consider the downstream benefit of cleaner air due to energy substitution and the downstream costs of inefficient use of natural gas and increasing retail prices. This was the case even though the Commission did not have the authority to control those downstream uses or prices directly.⁵³

⁴⁶ Fed. Power Comm'n v. Transcon. Gas Pipe Line Corp., 365 U.S. 1, 23, (1961) ("*Transco*").

⁴⁷ *Id.* at 28.

⁴⁸ *Id.* at 30; *Id.* at 42 (*Harlan, J.*, concurring in part and dissenting in part) (explaining that on remand the Commission should take a closer look at whether downstream air pollution improvements are sufficient to overcome other concerns in order to justify approval of the certificate).

⁴⁹ *E.g., Re Transwestern Pipeline Co.*, 36 FPC 176, 190 (1966) ("one of the most important factors in determining the extent and scope of the market for natural gas in any community is the contribution which additional gas might be able to make to alleviating air pollution").

⁵⁰ *Sabal Trail*, 867 F.3d at 1373 (holding that FERC was required to consider indirect downstream effects because FERC could deny a certificate based on its weighing of those downstream effects against the public benefits of a project).

⁵¹ *E.g., New Market Project Rehearing Order*, 163 FERC ¶ 62,128 at P 43.

⁵² *Id.* at 5 (*LaFleur, Comm'r, dissenting*) ("NEPA does not circumscribe the public interest standard under the NGA. Even assuming that the majority is correctly interpreting the Commission's NEPA responsibilities, I believe the Commission has broad discretion in considering factors bearing on our public interest determination").

⁵³ *Transco*, 365 U.S. at 22, 25.

In fact, FERC regularly incorporates other upstream and downstream consequences in its pipeline certificate approval analysis. FERC considers access to new supply sources to be a benefit of the project.⁵⁴ But new supply is a benefit only because of *upstream* extraction of new gas. And FERC already considers increased electric system reliability to be a benefit of additional pipeline capacity.⁵⁵ But increased reliability is achieved only by facilitating additional *downstream* combustion of natural gas. Regularly considering the upstream and downstream *benefits* of a pipeline when evaluating the public interest, while categorically ignoring the upstream and downstream *costs* imposed by additional greenhouse gas emissions, would be arbitrary.⁵⁶

When evaluating whether a particular project is necessary for the present or future public convenience and necessity under the Natural Gas Act, FERC should evaluate how that pipeline will affect the public, including to what extent it will facilitate upstream and downstream greenhouse gas emissions, in what quantities, and to what extent those emissions will cause adverse consequences to the public.⁵⁷

⁵⁴ Texas Eastern Transmission, LP, 164 FERC ¶ 61,037 at P 13 (2018) (identifying connection of “diverse supply basins with emerging Gulf Coast markets” as a “benefit[] that will result from the project”). See also 1999 Policy Statement, 88 FERC ¶ 61,227 at 61,744 (identifying potential benefits when evaluating need, including “access to new supplies”).

⁵⁵ See, e.g., *Eastern Panhandle Project Certificate Order*, 164 FERC ¶ 61,036 at P 62 (acknowledging that the project’s purpose is, in part, to increase electric system reliability). See also 1999 Policy Statement, 88 FERC ¶ 61,227 at 61,748 (identifying potential benefits when evaluating need, including “increasing electric reliability”).

⁵⁶ See *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015) (“[R]easonable regulation ordinarily requires paying attention to the advantages and the disadvantages of agency decisions.”).

⁵⁷ *Cf. Zero Zone v. Dep’t of Energy*, 832 F.3d 654 (7th Cir. 2016). In that case the U.S. Court of Appeals for the Seventh Circuit held that DOE has authority to consider of environmental benefits when setting appliance efficiency standards, including specifically the benefit of greenhouse gas reduction as monetized by the Social Cost of Greenhouse Gases. The court’s reasoned that the requirement to “consider ‘the need for national energy . . . conservation’” included evaluation of costs and benefits, including the avoided climate damages. *Id.* at 677 (emphasis added). The court also stated that the requirement to consider the “economic impact of the standard” probably included consideration of climate damages because they “have an economic impact.” *Id.* at n. 24.

III. NEPA Requires Quantification of Direct and Indirect (Including Upstream and Downstream) Emissions Associated with Potential Projects.

FERC must analyze greenhouse gas emissions associated with potential interstate natural gas pipeline projects in order to comply with NEPA. A number of federal courts of appeals and district courts have held that NEPA requires analysis of reasonably foreseeable upstream and downstream emissions.⁵⁸ Consideration of both direct and indirect emissions is also consistent with how other agencies have viewed their NEPA obligations and corresponding analysis of greenhouse gases. The environmental information gathered as part of the NEPA process is critical because, as described in Section II, the Commission has the obligation, under Section 7 of the Natural Gas Act to approve, amend, or deny projects on the basis of their environmental consequences.

A. FERC Should Clarify that Analysis of Direct and Indirect Emissions Associated with Potential Projects Is Required Pursuant to NEPA.

FERC must analyze the foreseeable direct and indirect greenhouse gas emissions associated with potential projects. NEPA and its implementing regulations require federal agencies to analyze foreseeable direct and indirect effects associated with their major actions and approvals.⁵⁹ The purpose of these requirements is to ensure that agencies account for the full range of environmental consequences associated with their actions. This review is necessary to fulfill NEPA's twin aims of informed decision-making and public disclosure.⁶⁰

NEPA regulations define “direct” environmental effects as those “caused by the [agency’s] action and occur[ing] at the same time and place.”⁶¹ “Indirect” environmental effects “are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.”⁶² Interstate natural gas transportation facilities have both direct and indirect effects on climate change. Direct effects include the climate consequences of the greenhouse gases emitted by the construction and operation of the pipeline, including methane leaks. Indirect effects include the climate consequences of both the upstream greenhouse gases emitted by the extraction and processing of the natural gas before it enters the pipeline system, and downstream greenhouse gases emitted by the combustion of the natural gas in power plants, industrial facilities, heating and cooking appliances, and other end uses.

⁵⁸ See, e.g., *Sabal Trail*, 867 F.3d at 1372; *WildEarth Guardians v. BLM*, 870 F.3d 1222, 1237-38 (10th Cir. 2017); *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-50 (8th Cir. 2003) (“Mid States”); *Montana Env’tl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1090-91 (D. Mont. 2017); *San Juan Citizens Alliance et al v. BLM*, 326 F.Supp.3d 1227, at 1243-44 (D. N.M. 2018); *W. Org. of Res. Councils v. BLM*, No. CV-16-21-GF-BMM, 2018 WL 1475470 at *13 (D. Mont. 2018); *Wildearth Guardians v. Zinke*, No. 1:16-cv-01724-RC, 2019 WL 1273181 (D.D.C. Mar. 19, 2019).

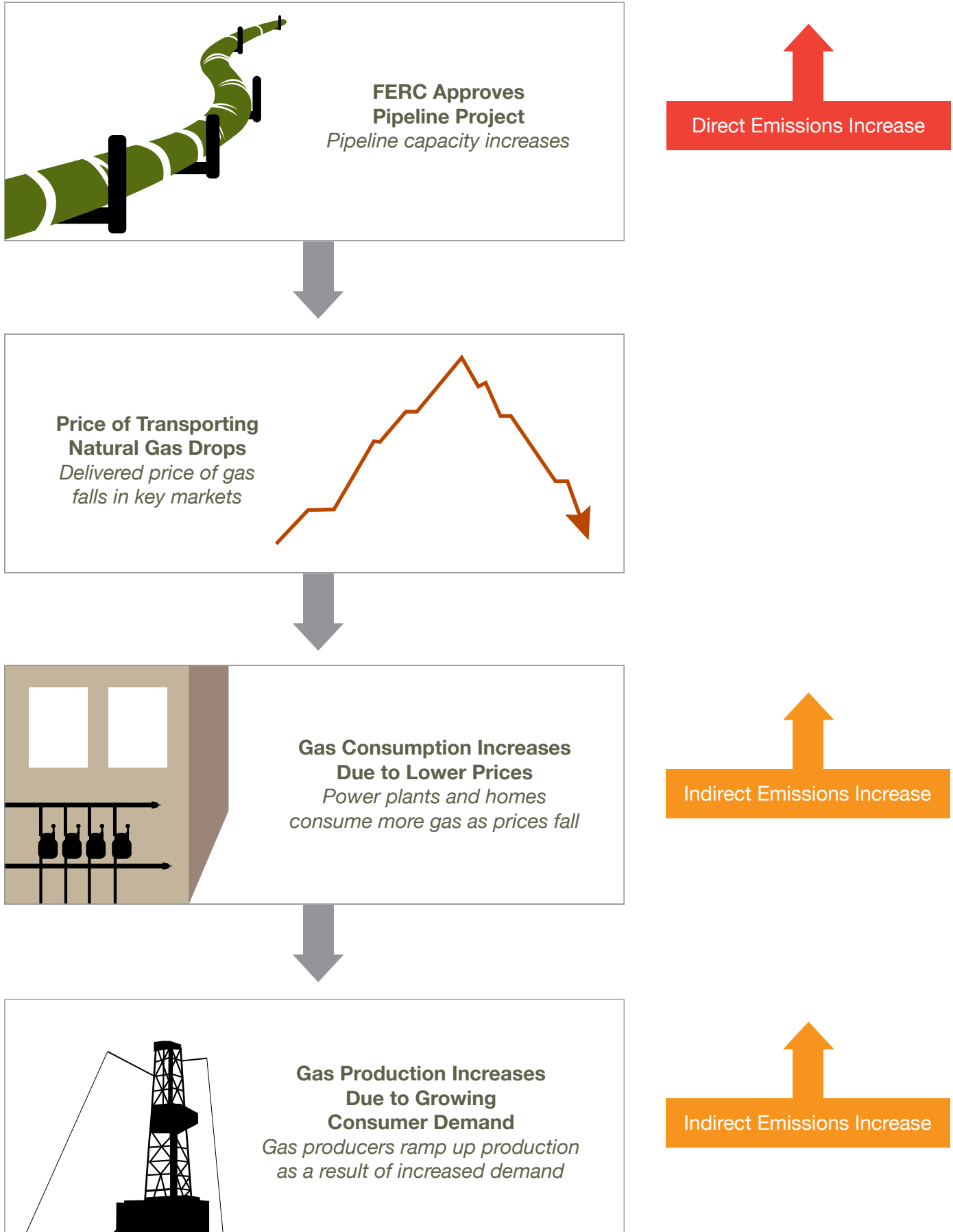
⁵⁹ See 40 C.F.R. §§ 1508.7, 1508.8, 1508.25.

⁶⁰ See *U.S. Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 768 (2004); see also Michael Burger & Jessica Wentz, *Downstream and Upstream Greenhouse Gas Emissions: The Proper Scope of NEPA Review*, 41 HARV. ENV. L. REV. 110, 144 (2017).

⁶¹ 40 C.F.R. § 1508.8.

⁶² *Id.*

Direct and Indirect Emissions from Pipeline Projects



FERC has repeatedly failed to properly analyze the direct and indirect climate effects of its pipeline approvals. For instance, FERC has claimed that it lacks “meaningful information” about potential upstream and downstream emissions effects associated with natural gas pipelines and similar project approvals; and therefore, such effects are not “reasonably foreseeable.”⁶³ But as described in Parts IV.A and IV.B, below, FERC must request all relevant information from project proponents before claiming such information is unavailable, and FERC can and must make reasonable assumptions with respect to likely emissions, just as other agencies do, in order to comply with NEPA.

FERC has also claimed that its pipeline approvals do not cause any indirect emissions because the gas to be transported would be produced and consumed even without the project, thus claiming a lack of a causal connection between a proposed pipeline project and indirect greenhouse gas emissions.⁶⁴ But as discussed below in Part IV.B.3 on energy substitution analysis, approval of a new transportation project reduces the costs of supplying the gas to the market, which reduces the gas’s market price to consumers, which increases consumers’ demand for the gas, which increases the amounts of gas that producers are willing to supply and that consumers will want to combust. That increased supply and demand for combustion causes upstream and downstream greenhouse emissions.

In the past, FERC has also failed to analyze upstream environmental effects associated with pipeline approvals because, it claims, “the highly localized impacts of [natural gas] production mak[e] any forecasting, by a state or federal agency, inherently speculative and impractical.”⁶⁵ However, as Part IV.B makes clear, greenhouse gas emissions are global in scope, not local. Courts have explained that “the fact that climate change is largely a global phenomenon that includes actions that are outside of [the agency’s] control . . . does not release the agency from the duty of assessing the effects of *its* actions on global warming within the context of other actions that also affect global warming.”⁶⁶ Further, upstream and downstream indirect effects are not so speculative that the agency can refuse to make informed assumptions; EPA has provided tools to estimate and quantify both upstream and downstream greenhouse gas emissions. And as described below, other federal agencies routinely provide this information, especially for climate change effects that are global in scope.

B. Caselaw Establishes that Upstream and Downstream Emissions Are “Reasonably Foreseeable” Effects of a Pipeline Project.

FERC has argued that upstream and downstream greenhouse gases are not indirect effects under NEPA because those emissions are not “reasonably foreseeable.”⁶⁷ As the D.C. Circuit held in *Sabal Trail*, the “reasonably foreseeable” effects of authorizing a pipeline that will transport natural gas to power plants are that: (1) natural gas will be burned in those

⁶³ *Policy Statement NOI*, 163 FERC ¶ 61,042 at 16 (“The Commission has generally declined to consider the upstream or downstream GHG emissions impacts of natural gas production or end use as indirect impacts of the proposed project because the Commission found no requisite causation and/or because the impacts of such production or end use were speculative and unknown, and therefore not reasonably foreseeable.”).

⁶⁴ *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at PP 41, 60-63; *Broad Run Project Rehearing Order*, 163 FERC ¶ 61190 at PP 14-15.

⁶⁵ *Id.* at P 13.

⁶⁶ *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (citations omitted). Notably, through the Social Cost of Greenhouse Gas methodology, agencies can calculate the incremental impact of an additional ton of emissions, given its interactions with global atmospheric concentrations over the next 300 years. See Institute for Policy Integrity et al., Comments to FERC on Using the Social Cost of Greenhouse Gases to Weigh the Climate Impacts of New Natural Gas Transportation Facilities in Environmental Analyses and in Reviews of Public Convenience and Necessity, Docket No. PL18-1-000 (submitted July 25, 2018).

⁶⁷ *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at P 31.

power plants, and (2) greenhouse gas emissions will be emitted as a result of burning the gas.⁶⁸ Indeed, these effects are not only “reasonably foreseeable,” but transporting and burning natural gas is generally the entire purpose of pipeline construction or expansion.⁶⁹

In *Sabal Trail*, the D.C. Circuit concluded that because greenhouse gas emissions are an indirect, reasonably foreseeable effect of authorizing the project that FERC has legal authority to mitigate, the EIS for the Southeast Market Pipelines Project should have given a quantitative estimate of the downstream greenhouse emissions that would result from burning the natural gas transported by the pipelines, or at least explained more specifically why the agency could not do so.⁷⁰ *Sabal Trail* reached the same conclusion as a growing number of other federal courts that have held that NEPA requires analysis of reasonably foreseeable upstream and downstream emissions.⁷¹

A small number of cases reaching a seemingly different result from *Sabal Trail* used reasoning that would not apply in the context of FERC approval of interstate natural gas pipelines under Section 7 of the Natural Gas Act. In *Department of Transportation v. Public Citizen*, the Supreme Court found that the Department of Transportation was not required to analyze certain environment effects in its NEPA review because the agency had *no legal authority* to prevent those effects.⁷² The Court explained:

It would not, therefore, satisfy NEPA’s ‘rule of reason’ to require an agency to prepare a full EIS due to the environmental impact of *an action it could not refuse to perform*. Put another way, the legally relevant cause of the entry of the Mexican trucks is *not FMCSA’s action*, but instead the actions of the President in lifting the moratorium and those of Congress in granting the President this authority while simultaneously limiting FMCSA’s discretion.⁷³

In three cases applying the rule from *Public Citizen* (the *Freeport* line of cases), the D.C. Circuit found that FERC, in licensing physical upgrades for a liquefied natural gas (LNG) terminal, was acting pursuant to narrow, delegated authority from the Department of Energy (DOE) and had no legal authority to consider the environmental effects of LNG exports. The court stated, “the Commission’s NEPA analysis did not have to address the indirect effects of the anticipated export of natural gas. . . because the Department of Energy, not the Commission, has sole authority to license the export of any natural gas going through the Freeport facilities.”⁷⁴ As a result, FERC had no authority to rely on the climate effects of LNG exports as a justification for denying an upgrade license, and therefore no NEPA obligation to evaluate the climate change effects of exporting natural gas.⁷⁵

FERC’s decision to grant or deny a certificate under Section 7 is clearly distinguishable from the circumstances that gave rise to the courts’ decisions in *Public Citizen* and the *Freeport* cases. FERC’s determinations under Section 7 of the Natural Gas Act are not constrained by a narrow delegation of authority. Unlike in *Public Citizen* and the *Freeport* cases,

⁶⁸ *Sabal Trail*, 867 F.3d at 1371–74.

⁶⁹ *See id.*

⁷⁰ *Id.* at 1374.

⁷¹ *See, e.g., WildEarth Guardians*, 870 F.3d at 1237-38; *Mid States*, 345 F.3d at 549-50; *Montana Env’tl. Info. Ctr.*, 274 F. Supp. 3d at 1090-91; *San Juan Citizens Alliance*, 326 F.Supp.3d at 1243-44; *W. Org. of Res. Councils*, No. CV-16-21-GF-BMM, at *13; *WildEarth Guardians v. Zinke*, 2019 WL at *14-18.

⁷² *See Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 766-70 (2004).

⁷³ *Id.* at 769 (emphasis added).

⁷⁴ *Sierra Club v. FERC*, 827 F.3d 36, 47 (D.C. Cir. 2016) (“*Freeport*”).

⁷⁵ *See id.*; *Sierra Club v. FERC*, 827 F.3d 59 (D.C. Cir. 2016) (“*Sabine Pass*”); *EarthReports, Inc. v. FERC*, 828 F.3d 949 (D.C. Cir. 2016).

no other agency or entity makes the determination as to whether a certificate should be granted under Section 7; FERC is the sole decisionmaker. As explained in Part II, FERC has clear legal authority to consider environmental effects—including greenhouse gas emissions—in deciding whether a project is required by the public convenience and necessity, and consequently, it *must* consider them fully in its NEPA analysis.

In fact, the D.C. Circuit in *Sabal Trail*—which was decided after the *Freeport* line of cases and explicitly distinguished Section 7 certificates from LNG terminal approvals—made clear that because FERC has legal authority to consider climate change effects in its pipeline certificate determinations, FERC must properly analyze those effects pursuant to NEPA.⁷⁶ The D.C. Circuit found that because “FERC could deny a pipeline certificate on the ground that the pipeline would be too harmful to the environment, the agency is a ‘legally relevant cause’ of the direct and indirect environmental effects of pipelines it approves.”⁷⁷

Though in *Sabal Trail* the D.C. Circuit knew which power plants would burn the gas from the pipeline, knowing the exact, individual end-uses is not a necessary precondition to assessing reasonably foreseeable downstream emissions.⁷⁸ As is explained further in Part IV.B.1, only a small percentage of U.S. natural gas supply ends up in non-combustion applications, and so nearly all pipeline gas will eventually be combusted and release emissions.⁷⁹ And, the gas that is combusted produces carbon dioxide at a relatively consistent rate. Consequently, the specific form and location of end use need not be known with certainty in order to develop reasonable estimates of downstream greenhouse emissions. As FERC has recognized, two projects with different “end users in different states” but with the same quantity of gas transported “will contribute identically to global climate change.”⁸⁰

The foreseeable and readily quantifiable downstream emissions from combustion of the transported natural gas contrasts with other indirect effects where quantification may not always be feasible. Quantification and monetization of the downstream climate consequences of combustion is a simple exercise of multiplying a reasonable estimate of the total gas transported by the accepted average emission factor of greenhouse emissions per volume of natural gas combusted.⁸¹

⁷⁶ See *Sabal Trail*, 867 F.3d at 1371–74 (citing *Minisink*, 762 F.3d at 101–02 (“*Minisink*”); *Myersville*, 783 F.3d at 1309).

⁷⁷ *Sabal Trail*, 867 F.3d at 1373.

⁷⁸ *Contra New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at P 39 (“[N]othing in the record . . . identifies any specific end use . . . [and] knowledge of these and other facts would indeed be necessary . . . to fully analyze the effects related to the production and consumption of natural gas.”).

⁷⁹ See, e.g., U.S. Energy Info. Admin., *About 7% of Fossil Fuels are Consumed for Non-Combustion Use in the United States*, TODAY IN ENERGY (April 6, 2018), <https://www.eia.gov/todayinenergy/detail.php?id=35672> (“Relatively small amounts of natural gas are consumed for non-combustion use in the industrial sector”).

⁸⁰ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at PP 28, 51.

⁸¹ See U.S. Env'tl. Protect. Agency, *Annex 2 Methodology and Data for Estimating CO₂ Emissions from Fossil Fuel Combustion*, at A74 to A76 (2018), https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_2.pdf (describing EPA's methodology for determining the carbon content of pipeline gas that will be released to the atmosphere when combusted). See also U.S. Env'tl. Protect. Agency Center for Corporate Climate Leadership, *Emission Factors for Greenhouse Gas Inventories* (March 9, 2018), https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf (providing emission factors for CO₂, CH₄, and N₂O that results from natural gas combustion).

C. The Practice of Other Federal Agencies Supports Quantification of Upstream and Downstream Emissions

The practice of other federal agencies, and relevant court decisions surrounding that practice, reinforce FERC's obligation to consider direct and indirect emissions. NEPA's requirement to take a "hard look" at the environmental impacts of federal actions, and to analyze both direct and indirect (including upstream and downstream) emissions, applies to both EISs and EAs.⁸² Federal courts increasingly hold that this requirement applies to quantification of greenhouse gas emissions associated with their major federal actions.⁸³

The Surface Transportation Board has, for instance, disclosed direct, upstream, and downstream greenhouse gas emissions in its EISs for rail lines that regularly transport coal.⁸⁴ In a 2015 EIS, the Surface Transportation Board's lifecycle greenhouse gas emissions analysis considered the direct emissions from construction and operation of a proposed rail line; the indirect upstream emissions from methane leaks from induced production at coal mines; and the indirect downstream emissions from the ultimate combustion of the coal (net of substitution effects).⁸⁵ In fact, this analysis followed a previous decision in the U.S. Court of Appeals for the Eighth Circuit that found the Surface Transportation Board's failure to consider downstream emissions that would result from coal combustion that were enabled by additional rail transport capacity violated the agency's obligations under NEPA.⁸⁶

Similarly, the State Department's final supplemental EIS for the Keystone XL pipeline, released in 2014, included direct construction and operating emissions, including fugitive emissions, as well as indirect emissions from production, refining, and combustion of the oil transported by the pipeline.⁸⁷ Recently, the United States District Court of the District of Montana held that the State Department's analysis of upstream emissions in the 2014 final supplemental EIS satisfied NEPA, in large part because it was supported by 140 pages of modeling.⁸⁸ However, the subsequent 2017 approval of Keystone XL violated NEPA because it reached similar conclusions about upstream emissions without any new modeling, despite substantial market changes that were likely to have changed the extent to which the pipeline enabled upstream development.⁸⁹ The court's conclusion makes clear that an EIS can fail to meet NEPA's "hard look" standard if

⁸² See 40 C.F.R. § 1508.9; *Ctr. for Env'tl. Law & Policy v. U.S. Bureau of Reclamation*, 655 F.3d 1000, 1006 (9th Cir. 2011) ("As part of the [EA] analysis, the agency must consider 'the direct, indirect, and cumulative impacts of the action.'"); *Montana Env'tl. Info. Ctr.*, 274 F. Supp. 3d at 1091.

⁸³ See *Sabal Trail*, 867 F.3d at 1371–74 (holding that FERC must quantify downstream greenhouse gas emissions in an EIS for a pipeline construction and operation or explain why it cannot do so); *Montana Env'tl. Info. Ctr.*, 274 F. Supp. 3d at 1094–97 (holding that an agency must quantify and monetize downstream emissions in an EA for a coal mine expansion); *High Country Conservation Advocates v. United States Forest Service*, 52 F. Supp. 3d 1174, 1190 (D. Col. 2014) ("*High Country*") (holding that, "[e]ven though NEPA does not require a cost-benefit analysis, it was nonetheless arbitrary and capricious to quantify the *benefits* of the [coal] lease modifications and then explain that a similar analysis of the costs was impossible when such an analysis was in fact possible and was included in an earlier draft EIS.") (emphasis original); see also *Ctr. for Biological Diversity*, 538 F.3d at 1198 (holding that it was arbitrary and capricious for an agency to fail to monetize the benefits of greenhouse gas emissions reduction when setting corporate average fuel economy standards because "it cannot put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards.").

⁸⁴ E.g., Surface Transp. Bd., *Draft Environmental Impact Statement for the Proposed Construction and Operation of the Tongue River Railroad* at F-2 (2015), [https://www.stb.gov/decisions/readingroom.nsf/UNID/E7DE39D1F6FD4A9A85257E2A0049104D/\\$file/AppF_Lifecycle+GHG.pdf](https://www.stb.gov/decisions/readingroom.nsf/UNID/E7DE39D1F6FD4A9A85257E2A0049104D/$file/AppF_Lifecycle+GHG.pdf) ("*Tongue River DEIS*") (quantifying not only downstream combustion emissions of a coal-rail project, but also upstream emissions including the production of the steel and other materials to construct the new rail track).

⁸⁵ See *id.*

⁸⁶ *Mid States*, 345 F.3d at 549–50.

⁸⁷ U.S. State Dept., *Final Supplemental Environmental Impact Statement for the Keystone XL Pipeline* at 4.14–4 (2014), <https://2012-keystone-pipeline-xl.state.gov/documents/organization/221190.pdf> ("*Keystone XL FSEIS*").

⁸⁸ *Indigenous Env'tl. Network v. U.S. Dep't of State*, No. CV-17-29-GF-BMM, 2018 WL 5840768 at *5 (D. Mont. 2018).

⁸⁹ *Id.* at *6.

does not contain a sufficiently rigorous consideration of indirect upstream emissions that may be spurred by additional transportation infrastructure.

The Bureau of Ocean Energy Management (BOEM) prepared a detailed assessment of the upstream and downstream greenhouse gas emissions associated with offshore oil and natural gas leasing pursuant to its five-year program for 2017 to 2022.⁹⁰ BOEM quantified (and monetized the cost of) the greenhouse gas emissions from the production, processing, storage, transportation, and ultimate consumption of oil and gas that could be produced in three different price scenarios.⁹¹

The legal obligation and common practice of quantifying both direct and indirect greenhouse gas emissions is not limited to EISs, but also applies to EAs. For example, in 2017, a federal district court held that an EA prepared by the Department of the Interior's Office of Surface Mining and Enforcement (OSMRE) for a mining plan modification and expansion violated NEPA by failing to take a hard look at the indirect and cumulative effects of coal combustion.⁹² The court found that the EA did not adequately address non-local impacts of non-greenhouse gas emissions from coal combustion, which the court found to be reasonably foreseeable rather than highly speculative or indefinite, as the agency had claimed. The court stated "[t]hat the coal extracted from the mine will be combusted is not so 'highly speculative' that *any* analysis of non-greenhouse gas emissions would be impractical, even if the precise locations of combustion are uncertain."⁹³ The court further held that the EA was deficient because it failed to quantify and monetize the indirect and cumulative greenhouse gas emissions associated with coal train transportation and downstream coal consumption.⁹⁴ The court noted that the agency had quantified the socioeconomic benefits of the coal mine expansion while failing to quantify the environmental costs even though a tool—the Social Cost of Greenhouse Gases—was available to do so.⁹⁵

In 2017, BLM and OSMRE issued a joint EA for a federal coal lease modification and mine permit revision that quantified direct carbon dioxide emissions from equipment to operate the mine and construct the improvements; indirect carbon dioxide emissions from the mine workers' commutes; methane emissions from the coal extraction process; indirect carbon dioxide emissions from transporting the coal;⁹⁶ and downstream carbon dioxide emissions from coal combustion.⁹⁷ Notably, even though the agencies did not know the exact end uses for all of the coal anticipated to be produced,

⁹⁰ U.S. Bureau of Ocean Energy Mgmt., *OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon* 15 (2016), <https://www.boem.gov/ocs-oil-and-natural-gas/>.

⁹¹ *Id.* at pp. 29-31. BOEM declined to conduct energy substitution analysis, and instead "assumed that, for purposes of this analysis and the analysis that forms the basis of the 2017-2022 Program, foreign sources of oil will substitute for reduced OCS supply, and the production and transport of that foreign oil would emit more [greenhouse gases]." *Id.* at foreword. This omission means that BOEM did not fully analyze greenhouse gas implications associated with its leasing decisions. See Part IV.B.3 for more information on how FERC should conduct substitution analysis.

⁹² *Montana Env'tl. Info. Ctr.*, 274 F. Supp. 3d at 1093-94.

⁹³ *Id.* at 1094 (emphasis original).

⁹⁴ *Id.* at 1085-99 (citing *High Country*, 538 F.3d at 1198).

⁹⁵ *Id.* at 1094.

⁹⁶ While the agencies only quantified emissions from coal transport "where a destination and quantity of delivered coal is known," that in no way suggests that end uses must be known before estimating the downstream emissions of combustion. Needing to know the destination of coal transportation to estimate emissions based on vehicle-miles travelled is more analogous to needing to know the length of a gas pipeline to estimate possible methane leaks. In fact, in a 2017 EA for the King II Mine, the agencies did estimate downstream emissions even though not all end uses were known. See Environmental Assessment, (DOI-BLM-CO-S010-2011-0074-EA), Federal Coal Lease (COC-62920) Modification and Federal Mine Permit (CO-0106A) Revision and Renewal (Oct. 12, 2017), available at <https://bit.ly/2ufWNSL> ("2017 King II Mine EA"). That said, reasonable assumptions about average vehicle-miles travelled per ton could have been applied to estimate all the coal transport-related emissions in the 2017 King II Mine EA.

⁹⁷ See *id.* at 76-82.

they “assume[d] that the remaining portion of the maximum year coal to be shipped . . . is eventually combusted,”⁹⁸ and made reasonable assumptions about the average emission factor (based on EPA data) to estimate carbon dioxide from combusting that coal.⁹⁹

Analysis of upstream and downstream greenhouse gas emissions associated with potential pipeline projects—in addition to analysis of foreseeable direct greenhouse gas emissions from construction, operation, and leaks—is required in order to comply with NEPA. The weight of federal caselaw and the consistent practice of other federal agencies leave little doubt as to the necessity of upstream and downstream emissions analysis.

⁹⁸ *Id.* at 81.

⁹⁹ *Id.* at 82. The agencies explained that, compared to the very facility-specific emissions of hazardous and criteria pollutants, “there are far fewer parameters” for estimating greenhouse gas emissions from coal combustion. *Id.* at 81. Greenhouse emissions from pipeline gas combustion are even more uniform than for coal combustion.

IV. FERC Must Quantify Greenhouse Gas Emissions Using Available Methods.

Recently FERC has argued that for the majority of pipeline projects where the upstream producer or downstream consumer of natural gas are not known with particularity, the emissions are not reasonably foreseeable, and so quantification of those emissions is not required under either NEPA or the Natural Gas Act.¹⁰⁰ However, NEPA’s “hard look” requirement encompasses a thorough investigation into the environmental effects of an agency’s action and, if necessary, the use of reasonable assumptions. As such, FERC cannot merely point to uncertainty about upstream production and downstream use in order to avoid analyzing and considering the relevant indirect emissions under NEPA. Nor can FERC point to uncertainty as a reason to ignore environmental considerations when evaluating whether a project is required by the public convenience and necessity.¹⁰¹

A. FERC Should Request That Certificate Applicants Provide as Much Information as Possible on the Expected Source, End Use, and Amount of Natural Gas to be Transported Through a Proposed Pipeline.

FERC must ask for relevant information about foreseeable environmental effects from pipeline certificate applicants before claiming that such information is not available. Information on expected pipeline capacity and throughput, the source of the natural gas, and its expected end use is highly relevant to FERC’s NEPA analysis as well as to its determination as to whether approving a pipeline is in the public interest pursuant to the Natural Gas Act.

NEPA was enacted to ensure that “environmental information is available to public officials and citizens *before decisions are made and before actions are taken*.”¹⁰² Courts review agencies’ NEPA compliance by “mak[ing] a pragmatic judgment whether the EIS’s [or EA’s] form, content and *preparation* foster both informed decision-making and informed public participation.”¹⁰³ The inquiries that an agency makes, or fails to make, are relevant to compliance with NEPA.¹⁰⁴

¹⁰⁰ See, e.g., *New Market Project Rehearing Order*, 163 FERC ¶ 61, 128 at PP 62-66; *Broad Run Project Rehearing Order*, 163 FERC ¶ 61, 190 at PP 60-61 (rejecting the need for additional analysis of upstream and downstream analysis as part of an EA because Commission stated that upstream and downstream emissions were not reasonably foreseeable given the information before it).

¹⁰¹ *U.S. v. Detroit and Cleveland Nav. Co.*, 326 U.S. 236, 241 (1945) (“uncertainties as to the future . . . need [not] paralyze the [Interstate Commerce] Commission into inaction” when considering a certificate of public convenience and necessity required for the operation of certain transportation services); *American Airlines v. Civil Aeronautics Bd.*, 192 F.2d 417, 421 (D.C. Cir. 1951) (when evaluating an application for a certificate of public convenience and necessity required to transport certain property by air, the Civil Aeronautics Board must “examine the relevant past and present and then [] exercise a rational judgment upon that data to ascertain the public convenience and necessity in the reasonably foreseeable future”).

¹⁰² See 40 C.F.R. § 1500.1 (emphasis added); see *id.* § 1500.2.

¹⁰³ *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 368 (1989) (emphasis added).

¹⁰⁴ See *Nat’l Audubon Soc’y v. Dep’t of Navy*, 422 F.3d 174, 185 (4th Cir. 2005) (stating that the “hard look” requirement “encompasses a *thorough investigation* into the environmental impacts of an agency’s action...”) (emphasis added); see also *American Wild Horse Preservation Campaign v. Perdue*, 873 F.3d 914, 931 (D.C. Cir. 2017) (finding that an agency’s EA did not “accurately identif[y] the relevant environmental concern”—the effect of a boundary modification on the wild horse population—and instead took a “head-in-the-sand approach to past agency practice” which the court stated “is the antithesis of NEPA’s requirement that an agency’s environmental analysis candidly confront the relevant environmental concerns.”).

FERC has pointed to uncertainty or lack of knowledge about upstream and downstream greenhouse gas emissions in order to conclude those emissions are *not* significant.¹⁰⁵ But FERC cannot point to uncertainty about the amount of emissions in an EA as grounds for issuing a FONSI; rather, it must show why any such emissions are not significant, and if it cannot do so, it must prepare an EIS. Lack of relevant information, such as lack of information on expected upstream or downstream emissions, weighs towards preparing an EIS in order to gather that missing information, rather than issuing a FONSI after an EA.¹⁰⁶ Nor may FERC point to uncertainty in the amount of greenhouse gas emissions to claim that those emissions are not significant as part of an EIS.¹⁰⁷ Instead, FERC must gather relevant data on upstream and downstream emissions in order to take a “hard look” at the environmental consequences of its action. Claiming that such emissions are “too speculative” breaks with legal precedent and cannot support a FONSI, nor a finding that a specific category of emissions are not significant.¹⁰⁸ It is preferable to quantify and monetize upstream and downstream emissions rather than fail to disclose this information, which can subject the agency to legal risk under NEPA.¹⁰⁹

The collection of relevant information, including information on environmental consequences of a project, is also required under the Natural Gas Act. FERC’s obligation under Section 7 is to grant a certificate only “if it is *found* . . . that the proposed service, sale, operation, construction, extension, or acquisition . . . is or will be required by the present or future public convenience and necessity.”¹¹⁰ It would be impossible for FERC to make an affirmative finding regarding a project without sufficient information relevant to critical factors that drive whether a project is in the public interest, including environmental effects. For this reason, the Natural Gas Act gives FERC explicit authority to establish information collection requirements as part of the certificate application process.¹¹¹ FERC has previously recognized that the collection of additional information from applicants may be necessary when it revises the criteria by which it determines

¹⁰⁵ *Spire STL Certificate Order*, 164 FERC ¶ 61,085 at P 252-53 (relying on the uncertainty of upstream and downstream emissions to support a FONSI); *Nexus Rehearing Order*, 164 FERC ¶ 61,054 at P 94-95 (supporting a finding in an EIS that downstream greenhouse gas emissions are not significant based on the conclusion that “the Commission lacks meaningful information about downstream use of the gas”).

¹⁰⁶ See 40 C.F.R. § 1502.22; *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (“Preparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects.”); *Montana Env’tl. Info. Ctr.*, 274 F. Supp. 3d at 1085-87, 1091 (vacating the Office of Surface Mining and Enforcement’s mining plan EA on several grounds and stating, “an agency should not attempt to travel the easy path and hastily label the impact of the [action] as too speculative and not worthy of agency review.”) (internal citations omitted); *Scientists’ Inst. for Pub. Info., Inc. v. U.S. Atomic Energy Comm’n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973) (noting that the courts must “reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as ‘crystal ball inquiry’”); *WildEarth Guardians v. U.S. Office of Surface Mining, Reclamation & Envt’t*, 104 F. Supp. 3d 1208, 1230-31 (D. Colo. 2015), *order vacated, appeal dismissed*, 652 F. App’x 717 (10th Cir. 2016) (The OSMRE failed to take hard look at environmental impacts when issuing FONSI, including downstream greenhouse gas emissions).

¹⁰⁷ See, e.g., 40 C.F.R. § 1502.22(b) (describing how agencies are to address incomplete or missing information in an EIS); *High Country*, 52 F. Supp. 3d at 1195 (in reviewing an EIS, finding that “the proffered explanation that future activities are too speculative to analyze is belied by the agencies’ decision to include detailed projections and analysis of tax revenue, employment statistics, and other environmental interests. It is arbitrary to offer detailed projections of a project’s upside while omitting a feasible projection of the project’s costs.”) (internal citations omitted); see also *S. Fork Band Council of W. Shoshone Of Nevada v. U.S. Dep’t of Interior*, 588 F.3d 718, 726 (9th Cir. 2009) (holding that BLM’s failure to consider the transport and processing of five million tons of refractory ore over a ten-year period in its EIS shows that it did not take the requisite “hard look” at the environmental impacts of the proposed project).

¹⁰⁸ See *id.*; *Montana Env’tl. Info. Ctr.*, 274 F. Supp. 3d at 1085-87, 1091.

¹⁰⁹ See *id.*; see also *Ocean Advocates v. U.S. Army Corps. of Engineers*, 402 F.3d 846, 871 (9th Cir. 2005) (holding that the Army Corps failed to consider the potential for increased tanker traffic and oil spill and “acted arbitrarily and capriciously in failing to gather this quantifiable data”).

¹¹⁰ 15 U.S.C. § 717f(e) (emphasis added).

¹¹¹ 15 U.S.C. § 717f(d) (“Application for certificates shall . . . contain such information . . . as the Commission shall, by regulation, require”).

that projects are in the public interest under the Natural Gas Act.¹¹² And courts have upheld FERC's rejection of certificate applications on the basis that insufficient information was provided by the applicant to judge whether the project was required by the public convenience and necessity, including based on the lack of information that the applicant would have been required to obtain from a downstream counterparty.¹¹³ To the extent that direct, upstream, and downstream emissions are relevant factors for evaluating whether a project is in the public interest—and, as discussed above, they are—FERC must try to obtain relevant information in order to make an affirmative finding that a project is required by the public convenience and necessity.

Therefore, FERC should ask certificate applicants and other stakeholders for relevant information on expected pipeline capacity, natural gas throughput, and the likely source and end use of the gas to be transported through a pipeline. This information is relevant to both its NEPA and Natural Gas Act analysis. Failure to do so would mean that FERC is making decisions without the full scope of information regarding the consequences of its actions, exposing it to legal risk.¹¹⁴

B. Barring More Precise Information from Project Applicants, FERC Should Use Reasonable Default Estimates and Available Tools to Calculate Upstream and Downstream Greenhouse Gas Emissions.

Despite requesting relevant information, project applicants may not always have or provide sufficient reliable information to fine-tune the estimates of upstream and downstream greenhouse gas emissions that will result from a project. This need not limit FERC's consideration of environmental consequences caused by an increase in upstream and downstream greenhouse gas emissions facilitated by a proposed project. Reasonably accurate, useful estimates of upstream and downstream emissions can be made even without project-specific information on precise end uses or supply sources. In the absence of more specific information relevant to environmental effects, FERC can and should make reasonable assumptions in order to conduct proper NEPA analysis and make an informed decision under Section 7 of the Natural Gas Act.

When making its public convenience and necessity determination under the Natural Gas Act, FERC currently permits applicants to rely on generic, default studies and information to justify market need.¹¹⁵ Applicants are not required to provide evidence of specific contracts and agreements; and while applicants are free to do so, relying on such agreements to estimate emissions may *understate* total emissions because they represent only one narrow category of pipeline use: contracted firm capacity. Project-specific and reliable information on capacity, throughput, and emissions should be used in NEPA and Natural Gas Act analyses when it is provided by a project applicant. But if such information is not comprehensive, reliable, or available, generic default studies and information can provide FERC with information needed to evaluate alternatives under NEPA and to assess whether the project is in the public interest under the Natural Gas Act.

¹¹² See *Revisions to Forms, Statements, and Reporting Requirements for Natural Gas Pipelines*, Order No. 710, FERC Stats. & Regs. ¶ 31,267 at P 23 (2008) (describing information requirements regarding a company's individual rate treatments for services in order for FERC to fully evaluate whether a project meets the criteria in its Policy Statement).

¹¹³ *Altamont Gas Transmission Co. v. FERC*, 965 F.2d 1098 (D.C. Cir. 1992) (upholding FERC's rejection of a certificate application on the ground that it did not show the availability of downstream facilities adequate to carry new load).

¹¹⁴ See, e.g., *Ocean Advocates*, 402 F.3d at 871 (finding that the Army Corps failed to consider the potential for increased tanker traffic and oil spill and "acted arbitrarily and capriciously in failing to gather this quantifiable data").

¹¹⁵ *1999 Policy Statement*, 88 FERC ¶ 61,227 at 61,748 (moving away from a requirement that applicants show actual contracts and permitting use of market studies, including "generally available studies by EIA or GRI, for example, showing projections of market growth").

Federal case law makes clear that the lack of available information is not a license to assume that a project will have *no* reasonably foreseeable indirect effects. Courts have held that agencies need not have “perfect foresight when considering indirect effects,” but that they must do their best to estimate those effects and cannot write them off as too speculative.¹¹⁶ For example, in 2015, the U.S. District Court for the District of Colorado found that: “If OSM can predict how much coal will be produced, it can likewise attempt to predict the environmental effects of its combustion. Just because it does not possess perfect foresight as to the timing or rate of combustion or as to the state of future emissions technology does not mean that it can ignore the effects completely.”¹¹⁷

Failing to make reasonable estimates of upstream and downstream greenhouse gas emissions wrongly treats a project’s climate consequences as worthless and irrelevant. FERC should instead use reasonable default assumptions and available tools to quantify and then monetize upstream and downstream greenhouse gas emissions. This section identifies assumptions and tools that would allow the Commission to develop reasonable estimates of the change in upstream and downstream greenhouse gas emissions that are the foreseeable consequences of a project, including:

- Default assumptions for estimating the amount of additional natural gas that will be produced upstream and combusted downstream;
- Emission factors to quantify the amount of greenhouse gas emissions that result from the production and combustion of the additional natural gas; and
- Tools to conduct substitution analysis to evaluate the relative change in greenhouse gas emissions if the additional transportation of natural gas displaces other energy sources.

Each of these is discussed in turn.

1. FERC Can Use Default Assumptions as Estimates for the Amount of Natural Gas that Will Be Produced Upstream and Combusted Downstream.

In order to quantify foreseeable upstream and downstream greenhouse gas emissions associated with a pipeline project, FERC first needs to know or estimate the amount of additional natural gas that will be transported by the pipeline and ultimately combusted. In the absence of more credible information provided by project applicants and stakeholders, FERC can use reasonable “default” assumptions. Specifically, FERC can establish default “upper bound” and “lower bound” estimates to help guide predictable and orderly analysis. However, FERC should also provide project applicants and other stakeholders with the opportunity to present credible evidence that replaces the parameters used to arrive at the default assumptions with more accurate or specific data.

¹¹⁶ See *Mid States*, 345 F.3d at 549 (stating, “[W]hen the *nature* of the effect is reasonably foreseeable but its extent is not ... the agency may not simply ignore the effect.”).

¹¹⁷ *WildEarth Guardians v. U.S. Office of Surface Mining, Reclamation & Enft*, 104 F. Supp. 3d at 1230–31; see also *Sabal Trail*, 867 F.3d at 1374 (“We understand that emission estimates would be largely influenced by assumptions rather than direct parameters about the project, but some educated assumptions are inevitable in the NEPA process. And the effects of assumptions on estimates can be checked by disclosing those assumptions so that readers can take the resulting estimates with the appropriate amount of salt.” (citations and quotations omitted)); *High Country*, 52 F. Supp. 3d at 1196; *Ctr. for Biological Diversity*, 538 F.3d at 1200 (finding the agency’s failure to monetize carbon emissions to be arbitrary and capricious and stating, “while the record shows that there is a range of values, the value of carbon emissions reduction is certainly not zero.”).

As a default, upper-bound estimate, it is reasonable for FERC to assume that a pipeline will continuously transport 100 percent of its capacity, that all transported gas will be combusted, and that all combusted gas is additional and displaces no other fuels. The Commission has called this a “full burn” assumption.¹¹⁸

A full burn assumption is consistent with EISs and EAs prepared by other agencies. For example, in the State Department’s 2014 final supplemental EIS for the Keystone XL Pipeline, the agency calculated the accumulated incremental lifecycle greenhouse gas emissions from the proposed pipeline based on “the maximum throughput of the proposed project (830,000 bpd), assuming operation over the full 365 days in a year.”¹¹⁹ The agency assumed both maximum throughput per day and constant year-round operation. Similarly, to assess the downstream emissions from combustion of coal produced at mines induced by the approval of a new coal rail line, the Surface Transportation Board “conservatively modeled coal production for each of the proposed and potentially induced mines,”¹²⁰ based on “the total recoverable coal reserves” for each mine.¹²¹ The Surface Transportation Board also made the simplifying assumption that all transported coal would be combusted rather than used for other purposes.¹²²

Other agencies take a similar approach. For example, BLM and OSMRE prepared estimates of all environmental effects, including upstream and downstream emissions, associated with a coal mine expansion based upon “maximum allowable coal recovery.”¹²³ The agencies acknowledged that “[u]ltimately, the *actual* produced, transported, and combusted coal would be dependent upon coal markets, alternative fuel markets (i.e., natural gas, tires, petcoke, industrial waste), and the coal supply at the mine,” but stated that, “[f]or this [EA], a worst-case scenario of maximum allowable production limit of 1.3 million tons per year... and transport is assumed.”¹²⁴ In addition, BOEM has assessed projected production levels and corresponding greenhouse gas emissions for its five-year offshore leasing program based upon “that portion of the undiscovered technically recoverable oil and gas resources that could be explored, developed, and commercially produced at given cost and price considerations using present or reasonably foreseeable technology.”¹²⁵

Similarly, when issuing an air permit under the Prevention of Significant Deterioration and nonattainment provisions of the Clean Air Act, EPA evaluates a source’s *potential* to emit—that is, the maximum emissions of a pollutant assuming the new or modified source operated at maximum design capacity continuously, 24 hours a day, 365 days per year.¹²⁶ Like mines and power plants, pipelines may be expected to operate at less than 100 percent capacity; but for assessing the potential environmental consequences of a new project, it is appropriate to analyze the maximum possible effect.¹²⁷

¹¹⁸ See, e.g., *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 24.

¹¹⁹ *Keystone XL FSEIS* at Table 4.14-8.

¹²⁰ *Tongue River DEIS* at F-33.

¹²¹ *Tongue River DEIS* at C.3-13. The agency modeled three different overall coal production scenarios—low, medium, and high production—but for each mine calculates “the maximum annual coal production at each mine for the given production [scenario] level and route alternative.” *Id.* at F-22; see also *id.* at C.3-23 (explaining that, across the three scenarios, it calculates a “more conservative maximum amount of Tongue River coal that could be induced (i.e., tending to overstate the production of Tongue River coal).”); see also *id.* at C.3-25 (estimating the number of trains per day by assuming 365 days per year of operation, and trains operating with the maximum number of coals and the maximum loads per car).

¹²² See *Tongue River DEIS* at F-32 (dismissing as “negligible” the portion of coal that goes to gasification or otherwise is not directly combusted, and assuming instead that all coal transported by a rail project is combusted for electricity generation).

¹²³ See *2017 King II Mine EA* at 5.

¹²⁴ *Id.*

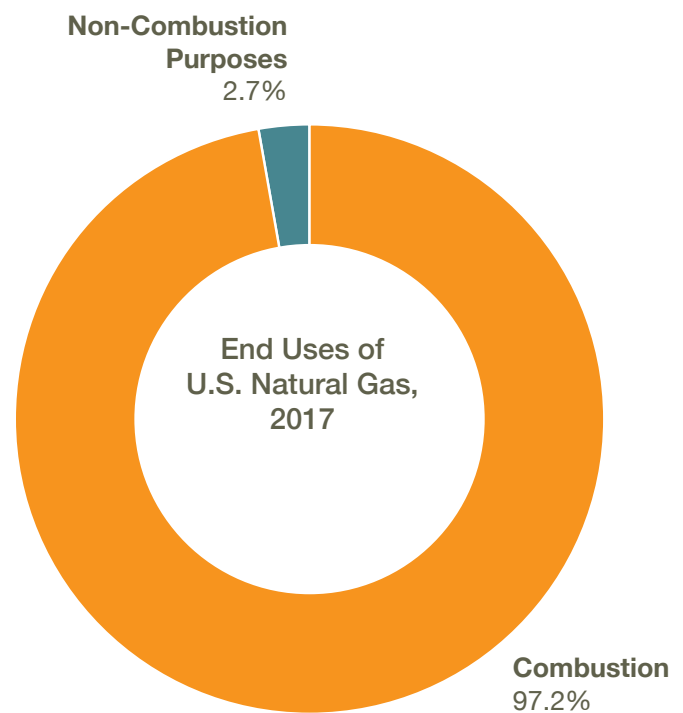
¹²⁵ U.S. Bureau of Ocean Energy Mgmt., *OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon* 15 (2016), <https://perma.Cc/2mxn-Qxbv>.

¹²⁶ See U.S. Env’tl. Protect. Agency, *New Source Review Workshop Manual*, app. C, at c.1 (1990), <https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf>.

¹²⁷ As a counter example, the Ninth Circuit has rejected analysis in an EIS that was based upon the lowest possible amount of oil that was economically viable to produce. See *Native Village of Point Hope v. Jewell*, 740 F.3d 489, 499-503 (9th Cir. 2014) (holding that BOEM “has not justified its choice of the lowest possible amount of oil that was economical to produce as the basis for its [NEPA] analysis.”).

In addition to adopting the full burn assumption as a default upper bound, FERC could adopt a default lower-bound estimate. A lower-bound could be based on the assumption that a project will transport *at least* the amount of natural gas equivalent to the subscribed firm capacity of the project. This is a reasonable assumption because firm capacity commitments represent an obligation by shippers to pay for a given volume of gas and so will likely be made based on assumptions that that level of gas will be needed. While some shippers may not use their firm capacity at all times, these shippers can and do resell that capacity to those who can use it pursuant to FERC’s Capacity Release Program.¹²⁸ Moreover, a significant amount of natural gas transported through pipelines is not firm capacity, but interruptible capacity that is not reflected in firm capacity contracts or precedent agreements.¹²⁹ Therefore, this estimate likely underestimates the volume of gas to be transported by the pipeline. Finally, setting the lower-bound default emission estimate as a project’s subscribed firm capacity can help counteract misaligned incentives that may cause an applicant to overstate the expected capacity demand when justifying the project for the purpose of FERC’s public need determination.¹³⁰

The lower-bound estimate could also assume that not all of the transported gas would be combusted, and instead use the national average percentage of natural gas that is combusted rather than used for non-combustion purposes. According to the Energy Information Agency, in 2017, 748 billion cubic feet of natural gas was used for non-combustion purposes,¹³¹ out of a total of 27,126 billion cubic feet.¹³² That is, in 2017, 2.7 percent of natural gas was used for non-combustion purposes and 97.2 percent was combusted. Notably, other agencies have used even lower estimates of the percent of gas used for non-combustion purposes.¹³³ Under this default lower-bound approach, if a new pipeline project has held an open season and has precedent agreements or firm transportation agreements for 80 percent of its total capacity, FERC could quantify the expected downstream emissions based on an assumption that $0.80 \times 0.972 = 77.8$ percent of the pipeline’s capacity will be combusted.



Source: Energy Information Agency

As with the upper-bound default estimate based on a full burn scenario, the lower-bound default estimate could be overcome by additional, reliable information provided by the certificate applicant or other parties to a pipeline certificate proceeding. For example, organizations could provide information showing that a pipeline is likely to operate at high

¹²⁸ See *Promotion of a More Efficient Capacity Release Market*, Order No. 712, FERC Stats. & Regs. ¶ 31,284 (2008).

¹²⁹ See Tyler Hodge & Chris Cassar, *Natural Gas Power Plants Purchase Fuel Using Different Types of Contracts*, U.S. ENERGY INFO. ADMIN: TODAY IN ENERGY (Feb. 27, 2018), <https://www.eia.gov/todayinenergy/detail.php?id=35112>.

¹³⁰ Comment of the Environmental Defense Fund at 29-35, Docket No. PL18-1-000 (July 25, 2018), <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14982569> (“EDF NOI Comments”).

¹³¹ See U.S. Energy Info. Admin., January 2019 Monthly Energy Review at 22 (released January 28, 2019), <https://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf>.

¹³² *Id.* at 99.

¹³³ See, e.g., BLM, *Draft Supplemental EIS: Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project*, at Appendix H (2018), https://eplanning.blm.gov/epl-front-office/projects/nepa/65817/127980/155727/Appendix_H_BOEM_Greenhouse_Gas_Lifecycle_Model_Methodology.pdf (“Alpine Satellite DSEIS”) (using an estimate that 1.65% of natural gas is not combusted, which BLM attributed to the U.S. Energy Information Agency).

capacity in the near term but gradually lower capacity as the natural gas end uses are replaced by new electric generating technologies, energy storage, and home appliances. Or the pipeline developer could provide evidence that a larger share of the transported gas will go to non-combustion purposes than the national average. Providing stakeholders the opportunity to more accurately estimate the amount of gas that will be transported by the project will further align incentives as the applicant justifies the project based on need and FERC evaluates adverse environmental consequences of the project.

By including both default upper-bound and default lower-bound estimates, FERC can provide a range of quantified emissions, determined using reasonable and predictable assumptions. Such a range provides useful context to inform FERC's certificate decision, and therefore would serve the purposes of both NEPA and the Natural Gas Act.

2. Once an Estimated Volume of Natural Gas Is Determined, FERC Should Use Established Emission Factors to Quantify the Direct, Upstream, and Downstream Emissions Associated with that Natural Gas.

Given reasonable assumptions about the amount of additional natural gas that will be produced, transported, and combusted, FERC can use default emission factors to estimate the quantity of emissions that will result from that upstream production and downstream combustion.

For downstream emissions, the specific form of combustion and location of end use need not be known with certainty in order to develop reasonable estimates. Because natural gas transported by pipeline must conform to a narrow band of characteristics, when pipeline gas is combusted it produces greenhouse gases at a relatively consistent rate.¹³⁴ EPA offers a single set of emission factors for carbon dioxide, methane, and nitrous oxide emissions from pipeline gas combustion, which FERC should use to quantify downstream emissions.¹³⁵ FERC, therefore, need only multiply its estimates of the amount of additional natural gas that will be combusted due to the pipeline by the emission factors provided by EPA to arrive at a reasonably foreseeable estimate of downstream greenhouse gas emissions.¹³⁶

Of course, not all natural gas that is delivered to homes, businesses, and power plants will be combusted. As explained above, a relatively small amount will be used for non-combustion purposes, which can be taken into account in the default lower bound estimate. Some amount of gas will also leak into the atmosphere. To the extent that the Commission has reliable information on downstream uses and leakage rates, it should use that information to develop more accurate emission estimates.¹³⁷ In fact, because uncombusted natural gas—predominantly methane—is an even more potent greenhouse gas than carbon dioxide,¹³⁸ using an assumption that natural gas is fully combusted produces a lower estimate of climate damages than an estimate that more accurately accounts for leakage.

¹³⁴ U.S. Env'tl. Protect. Agency, Annex 2 Methodology and Data for Estimating CO₂ Emissions from Fossil Fuel Combustion at A75 to A77, https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_2.pdf (describing EPA's methodology for determining the carbon content of pipeline gas that will be released to the atmosphere when combusted). *See also* U.S. Env'tl. Protect. Agency Center for Corporate Climate Leadership, Emission Factors for Greenhouse Gas Inventories (March 9, 2018), https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf (providing emission factors for CO₂, CH₄, and N₂O that results from natural gas combustion).

¹³⁵ *See id.*; *see also* U.S. Env'tl. Protect. Agency, Detailed Comments on FERC NOI for Policy Statement on New Natural Gas Transportation Facilities at 3, Docket No. PL18-01-000, (June 21, 2018) ("EPA NOI Comments").

¹³⁶ *Id.* (providing a simple formula for calculating downstream emissions); *see also Broad Run Project Rehearing Order*, 163 FERC ¶ 61,190 at 2-3 (LaFleur, Comm'r, *concurring*) (explaining EPA's suggested methodology).

¹³⁷ *See Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 25 & n. 57 (describing use of conservative fugitive methane leakage rate for power plants).

¹³⁸ U.S. Env'tl. Protect. Agency, National Level U.S. Greenhouse Gas Inventory 1990-2016: Fast Facts at 3 (2018), https://www.epa.gov/sites/production/files/2018-04/documents/9509_fastfacts_20180410v2_508.pdf.

Unlike local pollutants such as particulate matter, greenhouse gases are global pollutants. The location of emissions is unrelated to the magnitude of damage that will occur due to those emissions. Therefore, it is not necessary for FERC to know whether natural gas will be combusted in particular homes, businesses, or power plants in order to estimate the climate consequences of that combustion. This distinguishes the appropriate level of environmental analysis when evaluating greenhouse gases with what may be required for evaluating other environmental consequences. In fact, in the *Sabal Trail* Supplemental EIS, FERC correctly acknowledged that downstream combustion emissions would result in identical greenhouse gas emissions regardless of the precise end point, stating: “Any project with a 1.1 bcf/day capacity serving a different set of states would result in a different percentage for context, despite an *identical contribution to climate change*.”¹³⁹

This approach is consistent with other agencies’ NEPA analyses and legal precedent. BLM for instance, like FERC, often does not have perfect information on the end use of the resource at issue when it prepares EAs and EISs for coal, oil, and natural gas leases. It makes an educated estimate based on the type of resource at issue and the narrow universe of possible end uses where fossil fuel resources will be combusted and result in predictable levels of downstream greenhouse gas emissions. For example, in the 2017 EA prepared for a modification of the King II Mine in Colorado, BLM and OSMRE acknowledged that the bulk of the coal produced “will be combusted . . . potentially anywhere in northern Mexico and in the southwestern U.S.”¹⁴⁰ While this made an accurate accounting of expected local criteria pollutants too difficult to include in the EA, BLM had no trouble disclosing and quantifying expected greenhouse gas emissions using emissions factors published by EPA.¹⁴¹

For upstream greenhouse gas emissions, reasonable average emission factors are available that can be used to estimate the quantity of greenhouse gases that will be emitted by induced upstream natural gas production that is the reasonably foreseeable consequence of a proposed pipeline project. In a recent order, FERC stated that, “the Commission generally does not have sufficient information to determine *the origin of the gas* that will be transported on a pipeline,” and thus failed to analyze or quantify upstream emissions.¹⁴² However, for estimating upstream greenhouse gas emissions, the agency need not know the precise origin of the gas. EPA has a set of methods and emission factors that can be used to calculate the quantity of greenhouse gases emitted by oil and gas production wells, gathering lines, and processing facilities that were developed to help industry meet its obligations for greenhouse gas reporting.¹⁴³ And in fact, EPA pointed to these available tools in its own set of comments to FERC in the NOI proceeding.¹⁴⁴ Alternatively, FERC could return to its past practice of using generic estimates for upstream emissions from natural gas production developed by the Department of Energy’s National Energy Technology Laboratory and Energy Information Agency.¹⁴⁵

¹³⁹ Final Supplemental Environmental Impact Statement at 6, *Florida Southeast Connection, LLC*, Docket Nos. CP-14-554-002, CP15-16-003, CP15-17-002 (2017) (“*Sabal Trail FSEIS*”) (emphasis added).

¹⁴⁰ 2017 *King II Mine EA* at 81.

¹⁴¹ *Id.* at 81-83. See also U.S. State Dept., *Draft Supplemental Environmental Impact Statement for the Keystone XL Pipeline* at 15-82 (2012), <https://keystonepipeline-xl.state.gov/documents/organization/205654.pdf> (“*Keystone XL DSEIS*”) (using greenhouse gas emission factors modeled by the National Energy Technology Laboratory); *Tongue River DEIS* at F-4 (explaining that the Surface Transportation Board developed its own emission factors for downstream combustion of Tongue River coal).

¹⁴² *Broad Run Project Rehearing Order*, 163 FERC ¶ 61,190 at P52 (emphasis added).

¹⁴³ *EPA NOI Comments* at 2 (discussing EPA regulations at 40 C.F.R. Part 98 Subpart W).

¹⁴⁴ *Id.*

¹⁴⁵ See *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at 2-3 & nn. 5-6 (LaFleur, Comm’r, dissenting in part) (identifying available tools and previous Commission orders utilizing those tools). See also *Tongue River DEIS* at F-8, F-24, F-25, F-27 (calculating upstream greenhouse gas emissions from induced mine activity based on emission factors from BLM, EPA, and Franklin Associates).

While there is some variation in emission rates among sources, production sources need not be known with certainty in order to be useful in a NEPA analysis or when making a determination that a project is required by the present or future public convenience and necessity. Even if FERC and applicants do not know the exact wells that would be used to produce gas to supply a project, they may know the region from which natural gas will be supplied. Reasonable forecasting of emissions—including using national average or regional average emission rates—is required when tools such as those used in previous FERC orders are available.¹⁴⁶ As with assumptions about the volume of gas to be transported, the Commission should make clear that it will consider any specific information provided by applicants and other stakeholders regarding leakage, flaring, and other upstream greenhouse gas emissions in place of regional or national default emission factors.

Even without stakeholder-provided information on upstream sources or downstream uses of the natural gas that will be transported by a project, use of reasonable default estimates is better than leaving substantial emissions completely unquantified, thus treating them as non-existent. Omitting such emissions would result in a serious underestimate of likely environmental effects, as important, unquantified effects are often ignored entirely.¹⁴⁷ Because courts have struck down administrative decisions for failing to give weight to non-monetized effects, ignoring upstream and downstream emissions on the basis of uncertainty puts FERC's certificate decisions at legal risk.¹⁴⁸

3. *FERC Should Compare the Relative Emissions of Energy Substitutes Using a Sophisticated, Transparent Model.*

FERC has repeatedly assumed that if a particular transportation project is not approved, some other source of gas will enter the market as a perfect and costless substitute, such that the ultimate combustion of natural gas and associated emissions would be exactly the same.¹⁴⁹ This “perfect substitution” assumption is an irrational contradiction of basic economic principles and leads FERC to falsely assume that its project approvals have no impact on fossil fuel combustion and the related climate consequences.

Project applicants seek certificates for particular transportation facilities because those particular facilities will generate the greatest profits for them. Other options for transporting natural gas are almost by definition more expensive, or else those would be their preferred alternatives. The difference in the cost of transporting natural gas is reflected in the difference in the regional price of gas (called “basis”) from the benchmark “Henry Hub” price.¹⁵⁰ Consequently, approving a particular project will lower the cost of supplying natural gas into the market by eliminating supply constraints.

¹⁴⁶ *Sabal Trail*, 867 F.3d at 1374 (“NEPA analysis necessarily involves some ‘reasonable forecasting,’ and that agencies may sometimes need to make educated assumptions about an uncertain future”) (quoting *Del. Riverkeeper Network v. FERC*, 753 F.3d 1304, 1310 (D.C. Cir. 2014)).

¹⁴⁷ See, e.g., Richard Revesz, *Quantifying Regulatory Benefits*, 102 Cal. L. Rev. 1424, 1434-35, 1442 (2014).

¹⁴⁸ See *id.* at 1428, 1434; *Ctr. for Biological Diversity*, 538 F.3d at 1199 (finding it arbitrary and capricious to give zero value “to the most significant benefit of more stringent [fuel economy] standards: reduction in carbon emissions”).

¹⁴⁹ E.g. *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 55 (“[T]he No Action Alternative would only eliminate one potential source of fuel but would not decrease the ultimate consumption of fossil fuel to satisfy demand for electricity or reduce [greenhouse gas] emissions. For example, the project’s shippers might . . . seek[] the construction of other new facilities.”); *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at P 60 (“Nothing in the record supports the dissent’s assertion that approval of transportation projects spurs the production of natural gas”); *Broad Run Project Rehearing Order*, 163 FERC ¶ 61,190 at P 61 (“nothing in the record showing that specific end uses would not occur absent the proposed project facilities.”).

¹⁵⁰ U.S. Energy Info. Admin., *Spread Between Henry Hub, Marcellus Natural Gas Prices Narrows as Pipeline Capacity Grows*, TODAY IN ENERGY (Jan. 27, 2016), <https://www.eia.gov/todayinenergy/detail.php?id=24712>.

Basic principles of supply and demand predict that lowering the cost of supply of a commodity like natural gas will increase the supply of that product; that increasing the supply of gas will lower the market price of gas to the consumer; and that lowering the price will lead to increased consumer demand for and consumption of that commodity.¹⁵¹

If the increased consumption of gas due to the increased supply from the transportation project displaces dirtier energy sources like coal, the net effect may be a decrease in greenhouse gas emissions; but if increased consumption of gas comes at the expense of energy conservation or of cleaner energy sources like renewables, the end result would be an increase in greenhouse gas emissions. The overall effect may vary with time, as the relative fuel mix of energy substitutes in the market changes. In the near term, gas may be somewhat more likely to displace coal; but in the longer term, as renewables continue to become price-competitive and increase their market share, gas competition against renewables may become increasingly the norm. Forecasting and balancing out all these mixed environmental consequences requires a sophisticated model.

Multiple courts have recognized the need for agencies to assess such demand effects and energy substitution patterns in their EISs. Most recently, the U.S. Court of Appeals for the Tenth Circuit explained that it was irrational for BLM to fail to consider how, if its action issuing a coal mine lease will increase the supply of coal, then the price for coal will also drop, demand will rise, and greenhouse gas emissions will increase.¹⁵² In another notable case, the U.S. Court of Appeals for the Eighth Circuit sharply criticized the Surface Transportation Board for “illogical[ly]” concluding that approving new railroad lines to Powder River Basin coal mines would not affect the demand for and consumption of coal, and for ignoring “widely used” models capable of forecasting such effects.¹⁵³ On remand, the Board undertook just such a study using the Energy Information Administration’s (EIA) National Energy Modeling System (NEMS) . . . ‘[which] not only forecasts coal supply and demand but also quantifies environmental impacts.’”¹⁵⁴ Most recently, the U.S. District Court for the District of Montana vacated the Department of State’s approval of a presidential permit for the Keystone XL Pipeline on the grounds that the Department had failed to consider the effect that significant changes in the oil market would have on upstream greenhouse gas emissions due to the relationship between new pipeline capacity and upstream production.¹⁵⁵

¹⁵¹ See N. GREGORY MANKIW, *PRINCIPLES OF ECONOMICS* 74–78, 80–81 (5th ed. 2008). The NOI contains some confusing language on supply, demand, and price. FERC writes “Increases in both domestic and international demand for natural gas produced in the United States, combined with the availability of competitively-priced gas from shale reserves . . . have reduced prices . . .” *Policy Statement NOI*, 163 FERC ¶ 61,042, at P 21. It is hard to understand how an “increase in . . . demand” could have “reduced prices.” For a commodity like natural gas, for a given amount of supply, an increase in demand would be expected to increase prices. Of course, the other effect that FERC mentions in that sentence, the increased supply from shale, would reduce prices.

¹⁵² *WildEarth Guardians*, 870 F.3d at 1235 (“this perfect substitution assumption [is] arbitrary and capricious because the assumption itself is irrational (i.e., contrary to basic supply and demand principles).”). See also *Ctr. for Sustainable Economy v. Jewell*, 779 F.3d 588, 609 (D.C. Cir. 2015) (“forgoing additional leasing on the [outer continental shelf] would cause an increase in the use of substitute fuels such as renewables, coal, imported oil and natural gas, and a reduction in overall domestic energy consumption from greater efforts to conserve in the face of higher prices”); *Montana Env’tl. Info. Ctr.*, 274 F. Supp. 3d at 1098 (holding that it was “illogical” for the agency to assume that choosing not to approve federal coal leases would have no effect on coal supply, demand, or consumption, because “other coal would be burned in its stead”); *High Country*, 52 F. Supp. 3d at 1197 (recognizing that increased production of coal could affect “the demand for coal relative to other fuel sources, and coal that otherwise would have been left in the ground will be burned” (quotation marks omitted)).

¹⁵³ *Mid States*, 345 F.3d at 549–50.

¹⁵⁴ *Mayo Found. v. Surface Transp. Bd.*, 472 F.3d 545, 555 (8th Cir. 2006). See also *Tongue River DEIS* at C.1-13 to 1-14 (conducting a substitution analysis, though ultimately finding that the new coal rail line would not change delivered coal prices enough to increase total demand for coal).

¹⁵⁵ *Indigenous Env’tl. Network*, No. CV-17-29-GF-BMM, at *6.

Several models exist to assess substitution effects.¹⁵⁶ NEMS, developed by the EIA, has been used by the Surface Transportation Board, as described above. NEMS models the energy economy in detail, but that detail does add some complexity and so reduces transparency. BOEM has used some inputs from NEMS to develop its own model, MarketSim, which simplifies the details and focuses on oil and gas. BOEM has used MarketSim to conduct substitution analysis of offshore oil and gas leases for several decades.¹⁵⁷ BLM has also started using MarketSim recently,¹⁵⁸ perhaps in response to the Tenth Circuit's ruling that failure to consider energy substitution effects is irrational. ICF International has produced the Gas Market Model, which can quantify changes in regional natural gas prices due to changes in gas infrastructure.¹⁵⁹ The Gas Market Model integrates with ICF International's model of the electric system, the Integrated Planning Model. Using these models would allow FERC to evaluate how gas market changes influence natural gas consumption patterns, including the substitution effects on the electric sector. However, the Gas Market Model is a proprietary model and so lacks transparency. As one final example, the State Department commissioned EnSys Inc. to apply its World Oil Refining Logistics & Demand Model to the Keystone XL Pipeline environmental review. In the draft supplemental environmental impact statement, the State Department reported that "If all such pipeline capacity were restricted . . . the incremental increase in cost . . . could result in a decrease in production . . . associated with a decrease in greenhouse gas emissions in the range of 0.35 to 5.3 MMTCO₂e annually."¹⁶⁰ FERC should undertake a review of existing gas market models, including those discussed above, as well as others that are available on the market.¹⁶¹ Based on that review, it should institute a process to evaluate and choose among competing models based on its expert judgment of what model would be most appropriate to meet its needs. In doing so, FERC should balance the transparency of a model with its sophistication for developing useful conclusions.

If fully modeling substitution effects is not feasible, FERC will have to make a reasonable default assumption. Some default assumptions that FERC has made in the past are, in fact, not reasonable. As explained above, courts have held, in parallel contexts, that an assumption of perfect substitution is irrational. FERC has also recently proposed a "net potential-to-emit scenario" analysis. Unfortunately, that approach is over-simplified to the point where it risks being seriously misleading. In the net potential-to-emit analysis, FERC has started with the potential-to-emit levels of pollution from new natural gas power plants that a new pipeline project will serve, and then subtracted out the full potential-to-emit from retiring coal plants that are ostensibly being displaced by those power plants.¹⁶² However, it is not clear that coal plant retirements can always be attributed wholly to the approval of a single pipeline, and it is not clear that the coal plant's retirement would be the only effect in the energy market. For example, the net potential-to-emit analysis does not seem to consider near-term or long-term effects of gas displacing renewable energy or energy conservation.

¹⁵⁶ See generally PETER HOWARD, THE BUREAU OF LAND MANAGEMENT'S MODELING CHOICES FOR THE FEDERAL COAL PROGRAMMATIC REVIEW (Policy Integrity Report, 2016), <http://policyintegrity.org/publications/detail/BLM-model-choice> (explaining the criteria for assessing the usefulness of different models to conduct substitution analysis).

¹⁵⁷ Bureau of Ocean Energy Mgmt., Dep't. of Interior, *Draft Environmental Impact Statement: Liberty Development Project* at 4-50 (Aug. 2017) ("Liberty Development DEIS"); see also Bureau of Ocean Energy Mgmt., *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program 2012-2017*, 110 (2012) (calculating that if the offshore acreage were not leased, 6% of the forgone oil and gas would be replaced by energy conservation). See generally Amicus Brief of the Institute for Policy Integrity, *WildEarth Guardians v. BLM*, No. 15-8109, at pp.19-24 (10th Cir. Feb. 5, 2016), http://policyintegrity.org/documents/10th_Cir_BLM_Brief.pdf (detailing the history of BOEM's use of MarketSim).

¹⁵⁸ *Alpine Satellite DSEIS*, Appendix H, https://eplanning.blm.gov/epl-front-office/projects/nepa/65817/127980/155727/Appendix_H_BOEM_Greenhouse_Gas_Lifecycle_Model_Methodology.pdf.

¹⁵⁹ ICF INT'L, NATURAL GAS PIPELINE AND STORAGE INFRASTRUCTURE PROJECTIONS THROUGH 2030, at 96-100 (2009), <https://www.ingaa.org/File.aspx?id=10509> (describing the Gas Market Model).

¹⁶⁰ *Keystone XL DSEIS* at 1.4-1.

¹⁶¹ See Lauren K. Busch, *Review of Natural Gas Models* (2014), <https://www.eia.gov/outlooks/documentation/workshops/pdf/Review%20of%20Natural%20Gas%20Models.pdf>.

¹⁶² *Sabal Trail FSEIS* at 4-6.

Therefore, if use of a model to estimate net emissions is not feasible, the only remaining reasonable default assumption to make is to assume no substitution. In other words, the default assumption in lieu of modeling should be that all the natural gas transported by the pipeline is additional into the market, without offsetting any other resource. This assumption—though somewhat unlikely under near-term market conditions given the current competition between coal and natural gas—is at least consistent with assumptions that FERC routinely makes to calculate the economic benefits of projects. For example, when FERC reports the regional tax revenue from a project or other “long-term benefits to the local and regional economy,”¹⁶³ the agency does not discuss how those taxes or other benefits would come at the expense of other taxes from other development opportunities in the region. In a dynamic and robust economy, investment in and employment at one construction project will divert labor and capital from other construction opportunities.¹⁶⁴ Yet when FERC calculate tax revenue and other economic benefits in its environmental assessments, it does so on a gross, not a net basis. Therefore, it is consistent to also calculate gross emission increases under a no substitution default assumption. In order to avoid misleadingly putting its thumb on the scales in favor of pipeline approvals,¹⁶⁵ in the absence of more sophisticated modeling, FERC should use a no substitution default rather than the perfect substitution default assumption it currently uses.

¹⁶³ E.g., Final Environmental Impact Statement for Southeast Market Pipelines Project at 3-185 to 3-214, *Florida Southeast Connection, LLC*, Docket Nos. CP-14-554-002, CP15-16-003, CP15-17-002 (2015).

¹⁶⁴ See generally Policy Integrity, *The Regulatory Red Herring: The Role of Job Impact Analyses in Environmental Policy Debates* 4-6 (2012) (explaining how in a dynamic labor market with low unemployment, new employment at one project will come at the expense of employment elsewhere in the market), http://policyintegrity.org/files/publications/Regulatory_Red_Herring.pdf.

¹⁶⁵ *Ctr. for Biological Diversity*, 538 F.3d at 1198.

V. FERC Should Adopt a Policy That It Will Monetize All Quantified Greenhouse Gas Emissions.

Quantification of the direct and indirect upstream and downstream greenhouse gas emissions associated with new pipeline projects is required under NEPA and the Natural Gas Act. Once those emissions have been quantified, the Commission must also evaluate their significance and decide how the environmental consequences of the emissions influence the question of whether to approve a certificate. The best way for FERC to achieve these goals is to monetize the climate damages associated with the level of quantified emissions. Monetizing the climate damages associated with the tons of carbon dioxide, methane, and nitrous oxide emitted can also provide important and necessary context to these effects, in line with NEPA's information disclosure purpose. Therefore, FERC should adopt a policy that it will monetize all quantified direct, upstream and downstream greenhouse gas emissions in all NEPA and Natural Gas Act analyses.

There is a well-accepted, easy-to-use tool to monetize all quantified greenhouse gas emissions: the federal Interagency Working Group on Social Cost of Greenhouse Gases (IWG)'s 2016 estimates of the Social Cost of Greenhouse Gases.¹⁶⁶ The Social Cost of Greenhouse Gases reflects the best available science and economics of the monetized climate consequences of a marginal ton of greenhouse gases.¹⁶⁷ Therefore, notwithstanding a recent executive order disbanding the group,¹⁶⁸ FERC should continue to use these estimates, or those of a similar or higher value.¹⁶⁹ FERC has raised a number of concerns and objections to the monetization of greenhouse gases and, in particular, to the use of the IWG's Social Cost of Greenhouse Gases metrics as a means of doing so. However, as discussed in Part V.B, these objections rest on misunderstandings about the applicability, scientific validity, and legal status of the metrics.

A. Monetizing Climate Damages Fulfills FERC's Obligations and Goals Under NEPA and the Natural Gas Act.

When a project has climate consequences that must be assessed under NEPA, monetizing the climate damages from an increase in emissions and avoided damages from a decrease in emissions fulfills an agency's legal obligations under NEPA

¹⁶⁶ 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* (2016), available at https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf ("2016 TSD").

¹⁶⁷ See Richard L. Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCIENCE 6352 (2017).

¹⁶⁸ Exec. Order No. 13,873 § 5 disbands the IWG and instructs "agencies" to use the "best available science and economics," "consistent with the guidance contained in OMB Circular A-4," to "monetize[e] the value of changes in greenhouse gas emissions." First, the IWG's 2016 estimates are consistent with the best available science and economics, and with Circular A-4. Second, neither Circular A-4 nor, presumably, Executive Order 13,873 is strictly binding on an independent agency such as FERC.

¹⁶⁹ A higher value is appropriate because, while the 2016 estimates from the IWG draw from the best available data, see Revesz et al., 357 SCIENCE 6352, the IWG estimates nevertheless omit key damage categories and are widely recognized as almost certainly severe underestimates of actual climate damages, see, e.g. Richard L. Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 NATURE 173 (2014) (co-authored with Nobel laureate Kenneth Arrow); R.S. Pindyck, *The Social Cost of Carbon Revisited* (Nat'l Bureau of Econ. Res. Working Paper w22807, 2016) (estimating the Social Cost of Carbon as between \$100 and \$200 per metric ton, based on expert elicitation to capture willingness to pay to avoid catastrophes).

in ways that simple quantification of tons of greenhouse gas emissions cannot. Similarly, monetizing climate damages would allow FERC to transparently and systematically evaluate the already-quantified greenhouse gas emissions in its review of whether a project is necessary for the public convenience and necessity.

1. Monetizing Climate Damages Discloses Information, Facilitates Significance Determinations, and Informs Decisionmaking As Required By NEPA.

NEPA requires “hard look” consideration of beneficial and adverse effects of each alternative option for major federal government actions. The U.S. Supreme Court has called the disclosure of impacts the “key requirement of NEPA,” and held that agencies must “consider and disclose the actual environmental effects” of a proposed project in a way that “brings those effects to bear on [the agency’s] decisions.”¹⁷⁰ NEPA requires “a reasonably thorough discussion of the significant aspects of the probable environmental consequences,” to “foster both informed decisionmaking and informed public participation.”¹⁷¹ In particular, “[t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impact analysis that NEPA requires,” and it is arbitrary to fail to “provide the necessary contextual information about the cumulative and incremental environmental impacts.”¹⁷² Similarly, the analyses included in EAs and EISs “cannot be misleading.”¹⁷³ An agency must provide sufficient informational context to ensure that decisionmakers and the public will not misunderstand or overlook the magnitude of a proposed action’s climate risks compared to the no action alternative.

FERC’s practice is to quantify only the volume of greenhouse gas emissions and compare that to the volume to state-wide or nation-wide greenhouse gas emissions in a given year.¹⁷⁴ By reporting only the volume of greenhouse gas emissions, however, FERC fails to assess and disclose the actual climate *consequences* of an action and misleadingly presents information in ways that will cause decisionmakers and the public to overlook important climate consequences. The tons of greenhouse gases emitted by a project are not the “actual environmental effects.” Rather, the actual effects are the incremental climate impacts caused by those emissions, including:¹⁷⁵

- property lost or damaged by sea-level rise, coastal storms, flooding, and other extreme weather events, as well as the cost of protecting vulnerable property and the cost of resettlement following property losses;
- changes in energy demand, from temperature-related changes to the demand for cooling and heating;
- lost productivity and other impacts to agriculture, forestry, and fisheries, due to alterations in temperature, precipitation, CO₂ fertilization, and other climate effects;

¹⁷⁰ *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 96 (1983); *see also* 40 C.F.R. § 1508.8(b) (requiring assessment of the “ecological,” “economic,” “social,” and “health” “effects”) (emphasis added).

¹⁷¹ *Ctr. for Biological Diversity*, 538 F.3d at 1194 (citations omitted).

¹⁷² *Id.* at 1217.

¹⁷³ *High Country*, 52 F. Supp. 3d at 1182; *accord.* *Johnston v. Davis*, 698 F.2d 1088, 1094-95 (10th Cir. 1983) (disapproving of “misleading” statements resulting in “an unreasonable comparison of alternatives”).

¹⁷⁴ *See, e.g., Sabal Trail Remand Rehearing Order*, 164 FERC ¶ 61,099 at P 55 (“The Commission fully considered [greenhouse gas] emissions in the Final SEIS by quantifying them and providing information that put the [greenhouse gas] emissions in context”).

¹⁷⁵ These impacts are all included to some degree in the three IAMs used by the IWG (DICE, FUND, PAGE), though some impacts are modeled incompletely, and many other important damage categories are currently omitted from these IAMs. *See* IWG, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (2010), <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf> (“2010 TSD”); Peter Howard, *Omitted Damages: What’s Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014), http://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf.

- human health impacts, including cardiovascular and respiratory mortality from heat-related illnesses, changing disease vectors like malaria and dengue fever, increased diarrhea, and changes in associated pollution;
- changes in fresh water availability;
- ecosystem service impacts;
- impacts to outdoor recreation and other non-market amenities; and
- catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.

Calculating only the tons of greenhouse gases emitted or a percent comparison to sectoral or national emissions, FERC fails to meaningfully assess the actual incremental impacts to property, human health, productivity, etc.¹⁷⁶ Similarly, courts have held that just quantifying the acres of timber to be harvested or the miles of road to be constructed does not constitute a “description of *actual* environmental effects,” even when paired with a qualitative “list of environmental concerns such as air quality, water quality, and endangered species,” when the agency fails to assess “the degree that each factor will be impacted.”¹⁷⁷ And when considering NEPA requirements for the disclosure of radioactive emissions, the D.C. Circuit has concluded that merely listing the quantity of the emissions is insufficient.¹⁷⁸ If FERC limits itself to an assessment of the volume of greenhouse gas emissions, it has fallen short of its legal obligations and statutory goals.

In fact, the use of annual volumes of emissions is particularly inappropriate for climate change. The climate damage generated by each additional ton of greenhouse gas emissions depends on the background concentration of greenhouse gases in the global atmosphere. Once emitted, greenhouse gases can linger in the atmosphere for centuries, building up the concentration of radiative-forcing pollution and affecting the climate in cumulative, non-linear ways.¹⁷⁹ As physical and economic systems become increasingly stressed by climate change, each marginal additional ton of emissions has a greater, non-linear impact. The climate damages generated by a given amount of greenhouse pollution is therefore a function not just of the pollution’s total volume but also the year of emission, and with every passing year an additional ton of emissions inflicts greater damage. As a result, focusing just on the volume or rate of emissions is insufficient to reveal the incremental effect on the climate. The change in the rate of emissions (flow) must be compared against the background concentration of emissions (stock).

Use of volumes is also misleading because of the immense scope of the climate problem. Without proper context, numbers like 22 million metric tons of carbon dioxide, or 0.41% of national emissions, will be misinterpreted by people as meaningless, as zero. FERC has admitted as much in its NOI, explaining that “calculating a proposed project’s emissions

¹⁷⁶ See *High Country*, 52 F. Supp. 3d at 1190 (“Beyond quantifying the amount of emissions relative to state and national emissions and giving general discussion to the impacts of global climate change, [the agencies] did not discuss the impacts caused by these emissions.”); *Montana Env’tl. Info. Ctr.*, 274 F. Supp. 3d at 1096–99 (rejecting the argument that the agency “reasonably considered the impact of greenhouse gas emissions by quantifying the emissions which would be released if the [coal] mine expansion is approved, and comparing that amount to the net emissions of the United States”).

¹⁷⁷ *Klamath-Siskiyou Wildlands v. U.S. Bureau of Land Management*, 387 F.3d 989, 995 (9th Cir. 2004) (“A calculation of the total number of acres to be harvested in the watershed is ... not a sufficient description of the actual environmental effects that can be expected from logging those acres.”); see also *Oregon Nat. Resource Council v. U.S. Bureau of Land Management*, 470 F.3d 818 (9th Cir.2006).

¹⁷⁸ *NRDC v. U.S. Nuclear Reg. Comm’n*, 685 F.2d 459, 486 (D.C. Cir. 1982) (“NRC”), *rev’d sub nom. on other grounds Baltimore Gas & Elec. Co.*, 462 U.S. at 106-07 (1983).

¹⁷⁹ Carbon dioxide also has cumulative effects on ocean acidification, in addition to cumulative radiative-forcing effects.

as a percentage of sector, nationwide, or global emissions” will “[g]enerally” be “too low to be considered meaningful because project emissions would be miniscule compared to nationwide or global emissions.”¹⁸⁰ Indeed, in a country of over 300 million people and over 6.5 billion tons of annual greenhouse gas emissions, it is far too easy to make highly significant effects appear relatively “miniscule.” But while 0.41% of national emissions may seem small, the *consequences* (the relevant consideration in a NEPA analysis) are not. By applying the Social Cost of Greenhouse Gases (about \$50 per ton of carbon dioxide-equivalent emissions in 2018\$), decisionmakers and the public can readily comprehend that 0.041% of national emissions emitted in the year 2020 (approximately 22 million tons of carbon dioxide) will generate over \$1 billion in climate damages

By monetizing climate damages, FERC can satisfy its legal obligations and statutory goals. Monetization represents how the emission of an additional unit of greenhouse gases contributes to the above list of economic damages, including property damages, energy demand effects, lost agricultural productivity, human mortality and morbidity, lost ecosystem services and non-market amenities, and so forth.¹⁸¹ By using a tool, such as the IWG Social Cost of Greenhouse Gases, that takes into account not just the amount of emissions, but also the year of emissions, monetization can also address the stock vs. flow problem. And monetization provides the necessary informational context to usefully inform the public and decisionmakers about the actual scope of the damages.

2. Monetizing Climate Damages Allows FERC to Balance Climate Consequences Against Public Need as Required by the Natural Gas Act.

Monetizing climate damages also advances the Natural Gas Act’s goals of reasoned decisionmaking. To assess whether a project is “required by present or future public convenience and necessity,”¹⁸² FERC must “evaluate *all factors* bearing on the public interest.”¹⁸³ When FERC “articulate[s] the critical facts upon which it relies” to review public convenience and necessity, “[a] passing reference to relevant factors . . . is not sufficient to satisfy the Commission’s obligation to carry out ‘reasoned’ and ‘principled’ decisionmaking. [Courts] have repeatedly required the Commission to ‘fully articulate the basis for its decision.’”¹⁸⁴ Consequently, when FERC weighs a project’s climate consequences directly into its review of public convenience and necessity, monetization using the Social Cost of Greenhouse Gas metrics achieves the goal of fully articulating a relevant factor, while quantification alone would obscure important details.

Monetization of climate damages would also allow the Commission to incorporate climate damages more clearly into its public convenience and necessity analysis. By using the common metric of dollars, monetization of climate damages allows the Commission to incorporate those consequences into its “economic test,” to compare the varying climate consequences over time of different project alternatives, and to weigh those consequences, along with all other adverse consequences, against the public benefits of the project.

¹⁸⁰ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 46.

¹⁸¹ 2010 TSD.

¹⁸² 15 U.S.C. 717f(e).

¹⁸³ *Missouri Public Serv. Comm’n v. FERC*, 234 F.3d 36, 38 (D.C. Cir. 2000) (quoting *Atlantic Ref. Co. of N.Y.*, 360 U.S. at 391) (emphasis added).

¹⁸⁴ *Missouri Public Serv. Comm’n*, 234 F.3d at 40, 41 (citations omitted).

FERC has historically evaluated environmental consequences on a separate track from the “economic test” that it uses to weigh the public benefits of a project against potential adverse consequences.¹⁸⁵ And FERC’s current Policy Statement includes language that appears to limit the “affected interests” that are considered in the economic test to “the interests of customers, competitors, landowners and local communities.”¹⁸⁶ But by facilitating increased greenhouse gas emissions that exacerbate climate change, pipelines result in adverse consequences even beyond the local community through which a pipeline runs, including damage to the global environment.¹⁸⁷ FERC risks undervaluing the climate consequences of a project when it fails to put those consequences on equal footing with the adverse consequences to customers, competitors, landowners and local communities, even though they are a reasonably foreseeable consequence of the project. The climate consequences that result from an increase in greenhouse gas emissions due to a pipeline project are just as “real” as the adverse consequences that FERC already considers in its balancing test. And greenhouse gas emissions caused by increased combustion of natural gas have properties that make their incorporation into the economic test that FERC currently uses relatively straightforward. This includes, as described in Part IV.B, a relatively consistent emission rate when combusted, the fact that the consequences of emissions are unconnected to the location of emissions, and the availability of a widely accepted, straightforward tool to monetize the damages of climate change—the IWG’s Social Cost of Greenhouse Gases methodology. Therefore, climate consequences should be just as relevant to FERC’s decision regarding whether a project is in the public interest and should be directly incorporated into the economic test under which FERC weighs the benefits and adverse consequences of a project.

Monetization of the climate consequences of a proposed project and alternatives would allow FERC to better assess the tradeoffs among competing pipeline proposals or project alternatives. By monetizing environmental effects and incorporating those monetized values into the economic test used to weigh whether a project is in the public interest, FERC can distinguish between projects that have substantial climate consequences and limited public benefits and those that have substantial public benefits with limited or positive limited climate consequences. Even those projects that have significant consequences may be in the public interest if the public benefit of additional natural gas capacity is substantial. But FERC cannot rationally and responsibly make such a decision without actually weighing the full suite of readily discernable consequences against the discernable benefits of a project.

In order to ensure that FERC approves project alternatives that enhance rather than detract from social welfare, it should quantify the full scope of greenhouse gases that are the direct and indirect consequence of the project, monetize the economic value of those increased or decreased greenhouse gas emissions, and incorporate those costs and benefits into its evaluation of whether a project is in the public interest.

¹⁸⁵ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 18.

¹⁸⁶ *1999 Policy Statement*, 88 FERC ¶ 61,227 at 61,745 (“If the proposed project will not have any adverse effect on the existing customers of the expanding pipeline, existing pipelines in the market and their captive customers, or the economic interests of landowners and communities affected by the route of the new pipeline, then no balancing of benefits against adverse effects would be necessary”); *id.* at 61,747 (“there are three major interests that may be adversely affected by approval of major certificate projects, and that must be considered by the Commission. These are: the interests of the applicant’s existing customers, the interests of competing existing pipelines and their captive customers, and the interests of landowners and surrounding communities.”).

¹⁸⁷ Of course, in the long run, customers, landowners, and local communities will also experience negative economic social, and environmental effects from climate change.

B. A Widely Accepted and Applicable Tool to Monetize Climate Damages—the IWG Social Cost of Greenhouse Gases—Is Available.

The IWG developed a Social Cost of Greenhouse Gas methodology that can serve as a clear and widely accepted tool to monetize the climate damages of upstream, downstream, and direct greenhouse gas emissions. The IWG’s methodology is rigorous, transparent, and based on the best available data.

Beginning in 2009, the IWG assembled experts from a dozen federal agencies and White House offices to “estimate the monetized damages associated with an incremental increase in carbon dioxide emissions in a given year” based on “a defensible set of input assumptions that are grounded in the existing scientific and economic literature.”¹⁸⁸ IWG’s methods combined three frequently used models built to predict the economic costs of the physical impacts of each additional ton of carbon dioxide.¹⁸⁹ The models together incorporate such damage categories as: agricultural and forestry impacts, coastal impacts due to sea level rise, impacts from extreme weather events, impacts to vulnerable market sectors, human health impacts including malaria and pollution, outdoor recreation impacts and other non-market amenities, impacts to human settlements and ecosystems, and some catastrophic impacts.¹⁹⁰ IWG ran these models using a baseline scenario including inputs and assumptions drawn from the peer-reviewed literature, and then ran the models again with an additional unit of carbon emissions to determine the increased economic damages.¹⁹¹ IWG’s initial estimates, the “Social Cost of Carbon,” were first issued in 2010 and have been updated several times to reflect the latest and best scientific and economic data.¹⁹²

Following the development of estimates for carbon dioxide, the same basic methodology was used to develop the social cost of methane and social cost of nitrous oxide—estimates that capture the distinct heating potential of methane and nitrous oxide emissions.¹⁹³ These additional metrics used the same economic models, the same treatment of uncertainty, and the same methodological assumptions that IWG applied to the Social Cost of Carbon, and these new estimates underwent rigorous peer-review.¹⁹⁴ Together, these estimates are the “Social Cost of Greenhouse Gases.”

In 2016, the IWG published updated central estimates for the Social Cost of Greenhouse Gases: about \$50 per ton of carbon dioxide, \$1470 per ton of methane, and \$18,370 per ton of nitrous oxide (in 2018 dollars for year 2020 emissions).¹⁹⁵

¹⁸⁸ See 2010 TSD.

¹⁸⁹ *Id.* at 5. These models are DICE (the Dynamic Integrated Model of Climate and the Economy), FUND (the Climate Framework for Uncertainty, Negotiation, and Distribution), and PAGE (Policy Analysis of the Greenhouse Effect).

¹⁹⁰ *Id.* at 6-8.

¹⁹¹ *Id.* at 24-25.

¹⁹² 2016 TSD at 5-29.

¹⁹³ See 2016 IWG Addendum at 2.

¹⁹⁴ *Id.* at 3.

¹⁹⁵ 2016 TSD; IWG, Addendum: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide (2016), https://www.epa.gov/sites/production/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf (“2016 IWG Addendum”). Values were inflated from 2007 dollars using the Bureau of Labor CPI Calculator, available at <https://data.bls.gov/cgi-bin/cpicalc.pl>.

Social Cost of Carbon (in 2018 dollars per metric ton of CO₂)

Year of Emission	Average estimate at 5% discount rate	IWG Central Estimate: Average estimate at 3% discount rate	Average estimate at 2.5% discount rate	High Impact Estimate: 95th percentile estimate at 3% discount rate
2020	\$14	\$51	\$74	\$152
2025	\$17	\$56	\$82	\$170
2030	\$19	\$61	\$88	\$186
2035	\$23	\$68	\$94	\$207
2040	\$26	\$74	\$101	\$225
2045	\$29	\$79	\$107	\$242
2050	\$32	\$85	\$114	\$260

The IWG’s methodology has been repeatedly endorsed by reviewers. In 2014, the U.S. Government Accountability Office concluded that IWG had followed a “consensus-based” approach, relied on peer-reviewed academic literature, disclosed relevant limitations, and adequately planned to incorporate new information through public comments and updated research.¹⁹⁶ In 2016 and 2017, the National Academies of Sciences issued two reports that, while recommending future improvements to the methodology, supported the continued use of the existing IWG estimates.¹⁹⁷ And in 2016, the U.S. Court of Appeals for the Seventh Circuit held that the Department of Energy’s reliance on IWG’s Social Cost of Carbon was reasonable.¹⁹⁸ It is, therefore, unsurprising that leading economists and climate policy experts have endorsed the Working Group’s values as the best available estimates.¹⁹⁹

Consistent with this precedent and best practices, the Commission should adopt the use of the IWG’s Social Cost of Greenhouse Gases in order to ensure that it is transparently and systematically evaluating whether proposed pipeline projects and their alternatives are in the public interest as required by Section 7 of the Natural Gas Act.

FERC has raised a number of objections to the use of the IWG’s Social Cost of Greenhouse Gases and has pointed to those objections as a reason not to monetize greenhouse gas emissions at all. However, a review of each of those objections shows that they are unfounded and should not serve as an obstacle to monetization.

¹⁹⁶ Gov’t Accountability Office, *Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates* 12-19 (2014). Available at <http://www.gao.gov/assets/670/665016.pdf>.

¹⁹⁷ Nat’l Acad. Sci., Engineering & Med., *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide* 3 (2017), <https://www.nap.edu/read/24651/chapter/1> (“First NAS Report”); Nat’l Acad. Sci., Engineering & Med., *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update* 1–2 (2016); <https://www.nap.edu/read/21898/chapter/1> (“Second NAS Report”).

¹⁹⁸ *Zero Zone*, 832 F.3d at 679.

¹⁹⁹ See, e.g., Revesz et al., 357 SCIENCE 6352; Michael Greenstone et al., *Developing a Social Cost of Carbon for U.S. Regulatory Analysis: A Methodology and Interpretation*, 7 REV. ENVTL. ECON. & POL’Y 23, 42 (2013); Revesz et al., 508 NATURE 173.

1. *The Social Cost of Greenhouse Gases Was Specifically Designed to Measure Marginal Climate Damages From Discrete Federal Actions.*

FERC has argued that the Social Cost of Greenhouse Gas “tool does not measure the actual incremental impacts of a project on the environment.”²⁰⁰ FERC now admits that statement was wrong, and the metric does capture the incremental physical impacts of climate change.²⁰¹ Nevertheless, FERC continues to repeat that “there is no standard methodology to determine how a project’s relatively small incremental contribution to [greenhouse gases] would translate into physical effects on the global environment.”²⁰² Such statements are also misleading.

The Social Cost of Greenhouse Gas methodology is well suited to measure the marginal climate damages of individual projects because these protocols were specifically developed to assess the cost of actions with “marginal” impacts on cumulative global emissions, and the metrics estimate the dollar figure of damages for one extra ton of greenhouse gas emissions. This marginal cost is calculated using integrated assessment models that translate emissions into their corresponding economic damages. The marginal cost is attained by first running the models using a baseline emissions trajectory, and then running the same models again with one additional ton of emissions. The difference in damages between the two runs is the marginal cost of one additional ton. Therefore, the Social Cost of Greenhouse Gases tools are perfectly suited to measuring the marginal effects of individual projects or other discrete agency actions.

2. *The Social Cost of Greenhouse Gas Metrics Provides a Tool to Assess the Significance of Individual Physical Impacts.*

FERC claims there is a lack of any “standard” or “criteria” to determine the significance of a project’s greenhouse gas emissions, and insists that “any attempt by the Commission to create a significance threshold would be arbitrary.”²⁰³ More specifically, FERC has argued that “although the integrated assessment models could be run through a first phase to estimate . . . physical climate change impacts . . . , we would still have to arbitrarily determine what potential increase in atmospheric [greenhouse gas] concentration, rise in sea level, rise in sea water temperatures, and other calculated physical impacts would be significant for that particular pipeline project.”²⁰⁴ FERC suggests that monetizing the climate damages will not help, “because we have no basis to designate a particular dollar figure . . . as ‘significant.’”²⁰⁵ However, FERC’s concerns about significance misunderstand the value of using the Social Cost of Greenhouse Gas tool. The need to identify significant environmental consequences is actually a strong reason for FERC to monetize emissions using the Social Cost of Greenhouse Gases.

²⁰⁰ See *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 47.

²⁰¹ *Id.* at P 48.

²⁰² FERC, *Rivervale South to Market Project Environmental Assessment* at 59 (2018). See also *Rivervale South to Market Project NOI* at 18,029 (“the difficulty in identifying the extent to which a specific action or project may contribute to overall climate change, given that climate change results from the cumulative buildup of carbon dioxide and other [greenhouse gases], rather than from the incremental emissions of any one project.”).

²⁰³ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 46 (“there is no standard established by international or federal policy, or by a recognized scientific body that the Commission could rely on in determining whether project-specific [greenhouse gas] emissions are significant.”).

²⁰⁴ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 48.

²⁰⁵ *Id.* at P 51; see also *id.* at P 50.

First, a key advantage of using the Social Cost of Greenhouse Gas tool is that each physical impact—such as sea-level rise and increasing temperatures—need not be assessed in isolation. Instead, the tool conveniently groups together the multitude of climate impacts and, consistent with NEPA regulations,²⁰⁶ enables agencies to assess whether all those impacts are cumulatively significant and to then compare those impacts with other impacts or alternatives using a common metric.

Second, monetization actually makes it easier for FERC to use its expert judgment to assess whether climate damages are significant, especially in light of other costs and benefits. While the relative significance of 20,000 additional tons per year of carbon dioxide versus 2 million additional tons per year may be challenging to discern, the relative significance of \$1 million per year in climate damages versus \$100 million per year in climate damages is much easier to discern, especially when compared to FERC’s reasonable judgments about the project’s other qualitative, quantitative, and monetized costs and benefits. While judging the significance of \$100 million in climate damages will require FERC’s professional judgment, by monetizing the effects FERC will be on familiar territory, as the Commission routinely evaluates the relative importance of millions, hundreds of millions, and billions of dollars’ worth of costs and benefits in many contexts. Using the Social Cost of Greenhouse Gas metrics helps FERC apply its expertise and judgment as an economic regulator to the climate context.

In fact, it is for this reason that the D.C. Circuit has concluded that agencies have a legal obligation to go beyond mere quantification of the amount of emissions. In a 1982 case, the D.C. Circuit considered whether the Nuclear Regulatory Commission had failed to “proper[ly] consider[] or disclos[e] the actual environmental impact of the [nuclear] fuel cycle,”²⁰⁷ The court concluded that merely listing “the quantity of . . . heat, chemicals, and radioactivity released” is insufficient under NEPA if the agency “does not reveal the meaning of those impacts in terms of human health or other environmental values.”²⁰⁸ The court reasoned that “the environmental cost-effectiveness of a proposed action [cannot] be compared to that of alternative actions if the environmental effects of each are not disclosed in such commensurable terms. . . . [I]t is not releases of [quantities of radiation] that Congress wanted disclosed; it is the effects, or environmental significance, of those releases.”²⁰⁹ Monetization using the Social Cost of Greenhouse Gases is specifically designed to disclose the effects of emission releases and to assist in evaluating whether those effects are significant by putting them in terms comparable to other effects that FERC regularly considers when evaluating certificate applications.

Third, while there may not be a bright-line test for significance, several cases suggest that, minimally, projects with estimated emissions of over 1 million tons of carbon dioxide-equivalent emissions per year deserve monetization—and projects with fewer emissions may have significant climate damages as well. In *High Country*, the U.S. District Court for the District of Colorado found that it was arbitrary for the Forest Service not to monetize the “1.23 million tons of carbon dioxide equivalent emissions [from methane] the West Elk mine emits annually.”²¹⁰ That suggests that emissions in that range are significant and warrant monetization. In *Montana Environmental Information Center*, the U.S. District Court for the District of Montana found it was arbitrary for the OSMRE not to monetize the 23.16 million metric tons

²⁰⁶ 40 C.F.R. § 1508.27 (actions are significant if related to individually insignificant but cumulatively significant impacts).

²⁰⁷ *NRC*, 685 F.2d at 486.

²⁰⁸ *Id.* This case was reversed by the Supreme Court on other grounds that do not undercut FERC’s obligation to go beyond mere listing of emissions when doing so fails to provide the context of what that level of emissions will mean. See *Baltimore Gas & Elec. Co.*, 462 U.S. at 106-07 (“agree[ing] with the Court of Appeals that NEPA requires an EIS to disclose the significant health, socioeconomic, and cumulative consequences of the environmental impact of a proposed action,” but finding that the specific “consequences of effluent releases” could be assessed at a subsequent stage in the particular proceeding under review).

²⁰⁹ *NRC*, 685 F.2d at 487.

²¹⁰ *High Country*, 52 F. Supp. 3d at 1191 (quoting an e-mail comment on the draft statement for the quantification of tons).

per year from that mine expansion.²¹¹ In *Center for Biological Diversity*, the U.S. Court of Appeals for the Ninth Circuit found that it was arbitrary for the Department of Transportation not to monetize the 35 million metric ton difference in lifetime emissions from increasing the fuel efficiency of motor vehicles,²¹² which could represent as little two million metric tons per year. In a recent environmental impact statement from the BOEM published in August 2017, the agency explained that the Social Cost of Carbon was “a useful measure” to apply to a NEPA analysis of an action anticipated to have a difference in greenhouse gas emissions compared to the no-action baseline of about 25 million metric tons over a 5-year period,²¹³ or about 5 million metric tons per year. These cases and agency actions can serve as guidance for the amount of monetized climate damages that would be considered significant.

3. *Monetization Is Appropriate and Useful to Inform any Decision with Significant Climate Impacts, Including Project-Level Actions.*

FERC has argued that the Social Cost of Greenhouse Gas metrics were designed for and only appropriate to be used to analyze regulatory, rather than project level, action.²¹⁴ That misunderstands the nature of the estimates. FERC is correct that the federal IWG originally developed its estimates of the social cost of greenhouse gases to harmonize the metrics used by agencies in their various regulatory impact analyses. However, there is nothing in the methodology used to arrive at the numbers that would limit their application in other decisionmaking contexts. The Social Cost of Greenhouse Gases measures the marginal cost of any additional unit of greenhouse gases emitted into the atmosphere. The government action that precipitated that unit of emissions—a regulation, the granting of a permit, or a project approval—is irrelevant to the marginal climate damages caused by the emissions. Whether emitted by a leaking pipeline or the extraction process, whether emitted because of a regulation or a resource management decision, whether emitted in Alaska or Maine, the marginal climate damages per unit of emissions remain the same. Indeed, the Social Cost of Greenhouse Gases has been used by many federal and state agencies in environmental impact reviews²¹⁵ and in resource management decisions.²¹⁶

In fact FERC has taken an even more narrow view of the Social Cost of Greenhouse Gases tool, arguing it is only “appropriate[]” for “regulators whose responsibilities are tied more directly” to “authoriz[ing] a quantity of coal, oil, or natural gas production from federal lands,” or “directly control[ing] whether some quantity of fossil fuels is burned.”²¹⁷ In contrast, FERC argues that its certifications have “no direct connection to the production or end use of natural gas.”²¹⁸

²¹¹ *Montana Env'tl. Info. Ctr.*, 274 F. Supp. 3d at 1095-096.

²¹² *Ctr. for Biological Diversity*, 538 F.3d at 1187.

²¹³ *Liberty Development DEIS* at 3-129, 4, 50 (2017) (89,940,000 minus 64,570,000 is about 25 million).

²¹⁴ *Sabal Trail FSEIS* at 8 (“The SCC tool may be useful for rulemakings”).

²¹⁵ In August 2017, the Bureau of Ocean Energy Management called the Social Cost of Carbon “a useful measure to assess the benefits of CO₂ reductions and inform agency decisions,” and applied the metric in an environmental impact statement to monetize the emissions difference of about 5 million metric tons per year between the proposed oil and gas development project and the no-action baseline, *Liberty Development DEIS* at 3-129, 4-50. Agencies have used IWG’s social cost of greenhouse gas estimates not only in scores of rulemakings but also in NEPA analyses for resource management decisions. See Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 COLUMBIA J. ENVTL. L. 203, 270-84 (2017) (listing all uses by federal agencies through July 2016).

²¹⁶ States have used the Social Cost of Greenhouse Gases in decisions about electricity planning. See Iliana Paul et al., *The Social Cost of Greenhouse Gases and State Policy: A Frequently Asked Questions Guide* (Policy Integrity Report, 2017), http://policyintegrity.org/files/publications/SCC_State_Guidance.pdf.

²¹⁷ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 37.

²¹⁸ *Id.* at P 38.

The use of the Social Cost of Greenhouse Gases by other agencies makes clear that FERC’s understanding that the Social Cost of Greenhouse Gases is appropriate only in production and consumption regulatory actions is incorrect. For example, the Department of Energy’s appliance efficiency standards—which FERC cites as an appropriate context for the use of the Social Cost of Greenhouse Gases—regulate neither production or consumption of fossil fuels. Appliance efficiency standards change greenhouse gas emissions only by changing consumer demand for energy, as mediated by changing prices and by the fuel mix of the electricity generators and other energy sources that supply the consumers. Quite similarly, FERC’s pipeline certifications affect greenhouse gas emissions by changing the supply, price, and demand of natural gas. It is notable that the Department of Energy has routinely used the Social Cost of Greenhouse Gases to monetize the climate effects of its appliance efficiency standards, and the U.S. Court of Appeals for the Seventh Circuit has ruled that the Department of Energy’s use of the Social Cost of Greenhouse Gas estimates in analyzing and setting such standards was reasonable.²¹⁹

Many other agencies have used the Social Cost of Greenhouse Gases outside of the context of direct authorizations of fossil fuel production or direct controls of combustion. For example, the Pipeline and Hazardous Materials Safety Administration has used the Social Cost of Methane and Social Cost of Carbon in analyses of regulations that will affect the accidental or intentional release or flaring of natural gas.²²⁰ The Army Corps of Engineers has used the Social Cost of Carbon when its river management plans could affect hydropower generation and so indirectly “leads to an increase in thermal power generation to meet the demand, which increases carbon dioxide, methane, and nitrous oxide emissions.”²²¹ And the Environmental Protection Agency has used the Social Cost of Carbon to assess its regulation of coal power plants’ water pollution,²²² which does not “directly control” the air emissions from burning fossil fuels, but rather only changes the price of operations that combust fossil fuels. Agencies have appropriately used the social cost of greenhouse gas metrics in a variety of contexts where their actions will directly or indirectly affect climate change.

Ultimately, if quantifiable changes in greenhouse gas emissions are appropriately attributed to actions taken by FERC—and as outlined above, they are—then the climate *damages* associated with those quantified emission changes can be monetized and the Social Cost of Greenhouse Gases is the appropriate tool for doing so.

²¹⁹ *Zero Zone*, 832 F.3d.

²²⁰ Pipeline Hazardous Materials Safety Admin., *Regulatory Impact Analysis of Proposed Rule*, (2015), <https://www.regulations.gov/document?D=PHMSA-2011-0009-0030>; Pipeline Hazardous Material Safety Admin., *Preliminary Regulatory Impact Assessment of Proposed Rule* (2016), <https://www.regulations.gov/document?D=PHMSA-2011-0023-0117>.

²²¹ U.S. Army Corps. Engineers, *Draft Missouri River Recovery Management Plan & EIS* at 3-335 (2016), <https://cdm16021.contentdm.oclc.org/digital/collection/p16021coll7/id/3095> (further explaining that the “social cost of carbon (SCC) value was used to approximate a monetary value associated with carbon emissions”).

²²² Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 80 Fed. Reg. 67,837 (Nov. 3, 2015); National Pollutant Discharge Elimination System: Cooling Water Intake Structures at Existing Facilities, 79 Fed. Reg. 48,300 (Aug. 15, 2014).

4. *Monetizing Climate Damages Is Appropriate and Useful Regardless of Whether Every Effect Can Be Monetized in a Full Cost-Benefit Analysis.*

FERC has argued that while the Social Cost of Greenhouse Gas metrics are useful in the context of a cost-benefit analysis,²²³ FERC ostensibly “does not conduct a monetary cost-benefit analysis in its NEPA review,”²²⁴ and its assessment of public convenience and necessity in pipeline certifications is “qualitative” only—“we do not monetize.”²²⁵ According to FERC, adding the social cost of greenhouse gases to either the NEPA review or the review of certificate applications would require quantifying and monetizing “all” of the project’s other positive and negative effects.²²⁶ Similarly, FERC’s NOI assumes that using the Social Cost of Greenhouse Gases will necessitate that FERC “acquire complete information to appropriately quantify all of the monetized costs/negative impacts and monetized benefits of a proposed project.”²²⁷ This is wrong for two reasons.

First, FERC does at times rely on both quantified and monetized values to inform its NEPA analyses and its certificate reviews. As discussed above, FERC’s environmental impact statements regularly monetize “economic benefits” including direct and indirect labor income, expenditures, tax revenues, and other “long-term benefits to the local and regional economy.”²²⁸ Nothing about those economic benefits suggests a stronger case for monetizing them than for monetizing climate costs. Employment effects, for example, could easily be presented quantitatively as changes in job-years rather than monetized as labor income, or could be discussed qualitatively in terms of the general effect on regional and sectoral labor markets. Agencies instead monetize the labor income to help present employment effects with the kind of informational context that the public and decisionmakers need to understand the nature and degree of the effect. But the same is true of the Social Cost of Greenhouse Gas metrics.

Examples from past certificate applications also show that, contrary to FERC’s claims of qualitative-only assessments, FERC does rely on quantitative and monetized data to weigh public convenience and necessity, and has done so without necessarily undertaking a full cost-benefit analysis. For example, in 2012 FERC issued a certificate to Millennium Pipeline Company to construct and operate the Minisink Compressor Project.²²⁹ FERC concluded that “the benefits of the project” justified “the minimal adverse effect on existing shippers, other pipelines and their captive customers.”²³⁰ To make that determination, FERC had asked Millennium to “explain how [the company] will protect the shippers on the existing system from any rate impact or costs.”²³¹ In response, Millennium submitted a spreadsheet listing quantitative data on loads and monetized fuel cost forecasts.²³² This quantitative and monetized data with respect to possible adverse effects surely informed FERC’s majority decision to issue the certificate. Similarly, Chairman Wellinghoff’s dissent from that order preferred an alternative to the proposed compressor project in part because of monetized estimates of the \$1.6 million difference in annual fuel costs.²³³ Even without a full cost-benefit analysis, FERC considered quantitative and monetized data to determine the public convenience and necessity.

²²³ *Sabal Trail FSEIS* at 8 (“The SCC tool may be useful for rulemakings or comparing regulatory alternatives using cost-benefit analyses where the same discount rate is consistently applied”).

²²⁴ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 40.

²²⁵ *Id.* at P 43.

²²⁶ *Id.* at P 41; *id.* at P 44 (“We do not monetize the social benefits of the proposed project itself, which would be necessary to appropriately balance against the Social Cost of Carbon tool’s monetized damages.”).

²²⁷ *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 58.

²²⁸ E.g., *Sabal Trail FEIS* at 3-185 to 3-214.

²²⁹ Millennium Pipeline Company, L.L.C., 140 FERC ¶ 61,045 (July 17, 2012) (“*Minisink Compressor Project Certificate Order*”).

²³⁰ *Id.* at P 15.

²³¹ Millennium Response to FERC Staff Data Requests, Docket No. CP11-515-000 (filed Sept. 30, 2011) (see request No. 2(c)).

²³² *Id.* (attachment DR-AR-2.xls).

²³³ *Minisink Compressor Project Certificate Order*, 140 FERC ¶ 61,045 at 2 (Wellinghoff, Comm’r, dissenting).

Second, climate damages can and should be monetized even if other costs and benefits are discussed qualitatively because they are harder to quantify or monetize. While NEPA regulations do state that if there are “important qualitative considerations,” then the ultimate “weighing of the merits and drawbacks of the various alternatives” should not be displayed exclusively as a “monetary cost-benefit analysis,” nevertheless NEPA regulations also acknowledge that when monetization of costs and benefits is “relevant to the choice among environmentally different alternatives,” “that analysis” can be presented alongside “any analyses of unquantified environmental impacts, values, and amenities.”²³⁴ In other words, the monetization of some impacts does not require the monetization of all impacts.

Some effects are notoriously difficult to quantify and monetize. For example, water quality is generally not quantified and monetized due to the geographically idiosyncratic nature of individual water bodies. Greenhouse gases, by comparison, have the same impact on climate change no matter where they are emitted, and those impacts are readily monetized using the social cost of greenhouse methodology. Regardless of whether all other effects can be monetized, using the Social Cost of Greenhouse Gases provides useful and necessary information to the public and decisionmakers. In particular, whether or not other effects are monetized, using the Social Cost of Greenhouse Gases will facilitate comparison between alternative options along the dimension of climate change. Different alternatives could have varying greenhouse gas consequences over time, and monetization provides the best means of comparison project alternatives along the dimension of climate change.

FERC’s reasoning implies that no agency should monetize any benefits or costs since almost every action involves some benefits or costs that may not be monetizable. Yet, the practice of monetizing those costs and benefits that can readily be monetized, while evaluating other costs and benefits qualitatively, is common practice across federal agencies, consistent with the Office of Management and Budget’s *Circular A-4* guidance to agencies on conducting economic analysis.²³⁵

In fact, analytical frameworks exist to weigh qualitative effects alongside monetized effects. For example, *Circular A-4* provides a framework for weighing monetized and qualitative costs and benefits, called break-even analysis:

It will not always be possible to express in monetary units all of the important benefits and costs. When it is not, the most efficient alternative will not necessarily be the one with the largest quantified and monetized net-benefit estimate. In such cases, you should exercise professional judgment in determining how important the non-quantified benefits or costs may be in the context of the overall analysis. If the non-quantified benefits and costs are likely to be important, you should carry out a “threshold” analysis to evaluate their significance. Threshold or “break-even” analysis answers the question, “How small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits?” In addition to threshold analysis you should indicate, where possible, which non-quantified effects are most important and why.²³⁶

Even without using something as formal as a break-even analysis, it is clear that monetizing climate damages provides useful information whether or not every effect can be monetized in a full cost-benefit analysis.

²³⁴ 40 C.F.R. § 1502.23.

²³⁵ Office of Mgmt and Budget, Exec. Office of the Pres., Circular A-4 on Regulatory Analysis at 2 (2003), <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf> (“Circular A-4”) (“A good regulatory analysis should include . . . an evaluation of the benefits and costs—quantitative and qualitative—of the proposed action”). Though FERC is not bound by Executive Order 12,866, and though *Circular A-4* focuses on agencies’ regulatory analyses under Executive Order 12,866, the document nevertheless more generally has distilled best practices on economic analysis and is a useful guide to all agencies undertaking an assessment of costs and benefits

²³⁶ *Circular A-4* at 2.

5. *A Recent Executive Order Does Not Change the Requirements to Monetize Climate Damages.*

In March 2017, President Trump disbanded the IWG and withdrew their technical support documents.²³⁷ Nevertheless, Executive Order 13,783 assumes that federal agencies will continue to “monetiz[e] the value of changes in greenhouse gas emissions” and instructs agencies to ensure such estimates are “consistent with the guidance contained in OMB Circular A-4.”²³⁸ Consequently, while federal agencies no longer benefit from ongoing technical support from the IWG on use of the Social Cost of Greenhouse Gases, by no means does the new Executive Order imply that agencies should not monetize important effects in their environmental impact statements. Moreover, the Executive Order does not prohibit agencies from relying on the same choice of models as the IWG, the same inputs and assumptions as the IWG, the same statistical methodologies as the IWG, or the same ultimate values as derived by the IWG. To the contrary, because the Executive Order requires consistency with Circular A-4, as agencies follow the Circular’s standards for using the best available data and methodologies, they will necessarily choose similar data, methodologies, and estimates as the IWG, since the IWG’s work continues to represent the best available estimates.²³⁹ The Executive Order does not preclude agencies from using the same range of estimates as developed by the IWG, so long as the agency explains that the data and methodology that produced those estimates are consistent with Circular A-4 and, more broadly, with standards for rational decisionmaking.

Similarly, the Executive Order’s withdrawal of the Council on Environmental Quality’s guidance on greenhouse gases,²⁴⁰ does not—and legally cannot—remove agencies’ statutory requirement to fully disclose the environmental impacts of greenhouse gas emissions. As the Council on Environmental Quality explained in its withdrawal, the “guidance was not a regulation,” and “[t]he withdrawal of the guidance does not change any law, regulation, or other legally binding requirement.”²⁴¹ In other words, when the guidance originally recommended the appropriate use of the Social Cost of Greenhouse Gases in environmental impact statements,²⁴² it was simply explaining that the Social Cost of Greenhouse Gases is consistent with longstanding NEPA regulations and case law, all of which are still in effect today.

Notably, some agencies under the Trump administration have continued to use the IWG estimates even following the Executive Order. For example, in August 2017, BOEM called the Social Cost of Carbon “a useful measure” and applied it to analyze the consequences of offshore oil and gas drilling.²⁴³ And in July 2017, DOE used the IWG’s estimates for carbon and methane emissions to analyze energy efficiency regulation, describing the social cost of methane as having “undergone multiple stages of peer review.”²⁴⁴

²³⁷ Exec. Order No. 13,783 § 5(b), Promoting Energy Independence and Economic Growth, 82 Fed. Reg. 16,093 (Mar. 28, 2017).

²³⁸ *Id.* § 5(c).

²³⁹ See Revesz et al., 357 *SCIENCE* 6352 (explaining that, even after Trump’s Executive Order, the Social Cost of Greenhouse Gas estimate of around \$50 per ton of carbon dioxide is still the best estimate).

²⁴⁰ Exec. Order 13,783 § 3(c).

²⁴¹ Withdrawal of Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 82 Fed. Reg. 16,576, 16,576 (Apr. 5, 2017).

²⁴² See CEQ, *Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* at 16 (Dec. 2014), available at https://obamawhitehouse.archives.gov/sites/default/files/docs/nepa_revised_draft_ghg_guidance_searchable.pdf (“[A]lthough developed specifically for regulatory impact analyses, the Federal social cost of carbon, which multiple Federal agencies have developed and used to assess the costs and benefits of alternatives in rulemakings, offers a harmonized, interagency metric that can provide decisionmakers and the public with some context for meaningful NEPA review.”).

²⁴³ *Liberty Development DEIS* at 3-129.

²⁴⁴ Energy Conservation Program: Energy Conservation Standards for Walk-In Cooler and Freezer Refrigeration Systems, 82 Fed. Reg. 31,808, 31,811, 31,857 (July 10, 2017).

6. *Uncertainty Is Not a Reason to Abandon the Social Cost of Greenhouse Gases.*

FERC has discounted the use of the Social Cost of Greenhouse Gases by claiming that “[w]ithout complete information,” it is “based on multiple assumptions” and so is “[m]isleading.”²⁴⁵ However, uncertainty is *not* a reason to abandon the Social Cost of Greenhouse Gas methodologies;²⁴⁶ quite the contrary, uncertainty supports higher estimates of the social cost of greenhouse gases, because most uncertainties regarding climate change entail tipping points, catastrophic risks, and unknown unknowns about the damages of climate change. The key uncertainties of climate change include the risk of irreversible catastrophes, which should lead FERC to adopt the more conservative approach of applying the social cost of greenhouse gases.

7. *A Strong Consensus Exists to Use a 3% or Lower Discount Rate for a Central Estimate.*

FERC has pointed specifically to uncertainty regarding the appropriate discount rate to use when justifying past choices to ignore the social cost of greenhouse gases.²⁴⁷ However, uncertainty about discount rates has been specifically rejected by the Ninth Circuit in *Center for Biological Diversity*—“while . . . there is a range of values, the value of carbon emissions reduction is certainly not zero.”²⁴⁸ Moreover, the range of discount rate values recommended by the IWG²⁴⁹ and endorsed by the National Academies of Sciences²⁵⁰ is both manageable and informative. In 2016, the IWG recommended values at discount rates from 2.5% to 5%,²⁵¹ and agencies have successfully applied that range to inform decisionmaking.²⁵² Others have focused on the central estimate at a 3% discount rate.²⁵³

There is widespread consensus that the central estimate calculated at a 3% or lower discount rate, or else using a declining discount rate, is most appropriate. In 2017, the National Academies of Sciences explained that a consumption rate of interest—consistent with the 3% rate used in the IWG central estimate—is the appropriate basis for a discount rate for climate effects, and has recommended moving toward a declining discount rate framework.²⁵⁴ Notwithstanding this consensus, FERC has suggested that it may be required to use a “7 percent (or higher)” discount rate.²⁵⁵ However, use of a 7% discount would be inconsistent with best economic practices.

²⁴⁵ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 41.

²⁴⁶ *Ctr for Bio Diversity*, 538 F.3d at 1200 (“[W]hile the record shows that there is a range of values, the value of carbon emissions reductions is certainly not zero.”).

²⁴⁷ *Sabal Trail FSEIS* at 5.

²⁴⁸ *Ctr for Bio Diversity*, 538 F.3d at 1200.

²⁴⁹ See 2016 TSD.

²⁵⁰ See NATIONAL ACADEMIES OF SCIENCES, ASSESSMENT OF APPROACHES TO UPDATING THE SOCIAL COST OF CARBON (2016) (endorsing continued near-term use of the IWG numbers; in 2017, the NAS recommended moving to a declining discount rate, see NATIONAL ACADEMIES OF SCIENCES, VALUING CLIMATE DAMAGES (2017)).

²⁵¹ 2016 TSD. The values given here are in 2007\$. The IWG also recommended a 95th percentile value of \$123.

²⁵² *Liberty Development DEIS* at 3-129, 4-247.

²⁵³ BLM, *Envntl. Assessment—Waste Prevention, Prod. Subject to Royalties, and Res. Conservation* at 52 (2016); BLM, *Final Envntl. Assessment: Little Willow Creek Protective Oil and Gas Lease*, DOI-BLM-ID-B010-2014-0036-EA, at 82 (2015); Office of Surface Mining, *Final Envntl. Impact Statement—Four Corners Power Plant and Navajo Mine Energy Project* at 4.2-26 to 4.2-27 (2015) (explaining the Social Cost of Greenhouse Gases “provide[s] further context and enhance[s] the discussion of climate change impacts in the NEPA analysis.”); U.S. Army Corps of Engineers, *Draft Envntl. Impact Statement for the Missouri River Recovery Mgmt. Project* at 3-335 (2016); U.S. Forest Serv., *Rulemaking for Colorado Roadless Areas: Supplemental Final Envntl. Impact Statement* at 120-123 (Nov. 2016) (using both the Social Cost of Carbon and Social Cost of Methane relating to coal leases); NHTSA EIS at 9-77, available at http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FINAL_EIS.pdf.

²⁵⁴ NATIONAL ACADEMIES OF SCIENCES, VALUING CLIMATE DAMAGES at 28.

²⁵⁵ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at P 49; see also *id.* at P 46.

In 2015, OMB explained that “Circular A-4 is a *living document*. . . . [T]he use of 7 percent is not considered appropriate for intergenerational discounting. There is wide support for this view in the academic literature, and it is recognized in Circular A-4 itself.”²⁵⁶ While Circular A-4 tells agencies generally to use a 7% discount rate in addition to lower rates for typical rules,²⁵⁷ the guidance does not intend for default assumptions to produce analyses inconsistent with best economic practices. Circular A-4 clearly supports using lower rates to the exclusion of a 7% rate for the costs and benefits occurring over the extremely long, 300-year time horizon of climate effects. Use of a 7% discount rate would also violate both NEPA’s and Natural Gas Act’s requirements to consider impacts on future generations. NEPA requires agencies to weigh the “relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity,” as well as “any irreversible and irretrievable commitments of resources.”²⁵⁸ That requirement is prefaced with a congressional declaration of policy that explicitly references the needs of future generations:

The Congress, recognizing the profound impact of man’s activity on the interrelations of all components of the natural environment . . . declares that it is the continuing policy of the Federal Government . . . to use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.²⁵⁹

Similarly, the Natural Gas Act requires weighing both “the present or *future* public convenience and necessity.”²⁶⁰ FERC has interpreted this broadly to require consideration of “the effects of the project on all the affected interests.”²⁶¹

Because applying a 7% discount rate to the Social Cost of Greenhouse Gases could drop the valuation essentially to \$0, use of such a rate effectively ignores the needs of future generations. Doing so would arbitrarily fail to consider an important statutory factor that Congress wrote into the requirements of both NEPA and the Natural Gas Act.

8. A Global Perspective on the Social Cost of Greenhouse Gases Is Required to Capture All Factors Bearing on U.S. Public Welfare.

FERC has suggested that because “[t]he ability to determine localized impacts from greenhouse gases by use of these models is not possible at this time,” therefore “[i]t would be inappropriate to run the integrated assessment models to estimate global and broad regional physical climate change impacts from the project.”²⁶² This is false. Not only is FERC statutorily required to consider the worldwide character of environmental problems, but attempting to calculate a domestic-only estimate of the Social Cost of Greenhouse gases would ignore how U.S. welfare is directly impacted through international spillover effects, foreign reciprocity, and the extraterritorial interests of U.S. residents.

²⁵⁶ Interagency Working Group on the Social Cost of Carbon, *Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12,866* at 36 (July 2015).

²⁵⁷ Circular A-4 at 34 (“For regulatory analysis, you should provide estimates of net benefits using both 3 percent and 7 percent If your rule will have important intergenerational benefits or costs you might consider a further sensitivity analysis using a lower but positive discount rate in addition to calculating net benefits using discount rates of 3 and 7 percent.”).

²⁵⁸ 42 U.S.C. § 4332(2)(c).

²⁵⁹ 42 U.S.C.A. § 4331.

²⁶⁰ 15 U.S.C. § 717f(e).

²⁶¹ 1999 *Policy Statement*, 88 FERC ¶ 61,227 at 61,748.

²⁶² *New Market Project Rehearing Order*, 163 FERC ¶ 61,128 at P 68.

NEPA contains a provision on “International and National Coordination of Efforts” that broadly requires that “all agencies of the Federal Government *shall* . . . recognize the worldwide and long-range character of environmental problems.”²⁶³ Using a global Social Cost of Greenhouse Gases to analyze and set policy fulfills these instructions. Furthermore, the Act requires agencies to, “where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind’s world environment.”²⁶⁴ By continuing to use the global Social Cost of Greenhouse Gases to spur reciprocal foreign actions, federal agencies “lend appropriate support” to the NEPA’s goal of “maximiz[ing] international cooperation” to protect “mankind’s world environment.” From 2010 through 2016, federal agencies based their regulatory decision and NEPA reviews on global estimates of the social cost of greenhouse gases. Though agencies often also disclosed a “highly speculative” range that tried to capture exclusively U.S. climate costs, emphasis on a global value was recognized as more accurate given the science and economics of climate change, as more consistent with best economic practices, and as crucial to advancing U.S. strategic goals.²⁶⁵

Opponents of climate regulation challenged the global number in court and other forums, and often attempted to use Circular A-4 as support.²⁶⁶ Specifically, opponents have seized on Circular A-4’s instructions to “focus” on effects to “citizens and residents of the United States,” while any significant effects occurring “beyond the borders of the United States . . . should be reported separately.”²⁶⁷ Importantly, despite this language and such challenges, the U.S. Court of Appeals for the Seventh Circuit had no trouble concluding that a global focus for the Social Cost of Greenhouse Gases was reasonable:

AHRI and Zero Zone [the industry petitioners] next contend that DOE [the Department of Energy] arbitrarily considered the global benefits to the environment but only considered the national costs. They emphasize that the [statute] only concerns “national energy and water conservation.” In the New Standards Rule, DOE did not let this submission go unanswered. It explained that climate change “involves a global externality,” meaning that carbon released in the United States affects the climate of the entire world. According to DOE, national energy conservation has global effects, and, therefore, those global effects are an appropriate consideration when looking at a national policy. Further, AHRI and Zero Zone point to no global costs that should have been considered alongside these benefits. Therefore, DOE acted reasonably when it compared global benefits to national costs.²⁶⁸

²⁶³ 42 U.S.C. § 4332(2)(f) (emphasis added).

²⁶⁴ *Id.*; see also *Environmental Defense Fund v. Massey*, 986 F.2d 528, 535 (D.C. Cir. 1993) (confirming that Subsection F is mandatory); *Natural Resources Defense Council v. NRC*, 647 F.2d 1345, 1357 (D.C. Cir. 1981) (“This NEPA prescription, I find, looks toward cooperation, not unilateral action, in a manner consistent with our foreign policy.”); cf. COUNCIL ON ENVIRONMENTAL QUALITY, GUIDANCE ON NEPA ANALYSIS FOR TRANSBOUNDARY IMPACTS (1997), available at <http://www.gc.noaa.gov/documents/transguide.pdf>; Exec. Order No. 12,114, *Environmental Effects Abroad of Major Federal Actions*, 44 Fed. Reg. 1957 §§ 1-1, 2-1 (Jan. 4, 1979) (applying to “major Federal actions . . . having significant effects on the environment outside the geographical borders of the United States,” and enabling agency officials “to be informed of pertinent environmental considerations and to take such considerations into account . . . in making decisions regarding such actions”).

²⁶⁵ See generally Howard & Schwartz, 42 COLUMBIA J. ENVTL. L. 203.

²⁶⁶ Ted Gayer & W. Kip Viscusi, *Determining the Proper Scope of Climate Change Policy Benefits in U.S. Regulatory Analyses: Domestic versus Global Approaches*, 10 REV. ENVTL. ECON. & POL’Y 245 (2016) (citing Circular A-4 to argue against a global perspective on the social cost of carbon); see also, e.g., Petitioners Brief on Procedural and Record-Based Issues at 70, *West Virginia v. EPA*, No. 15-1363, (D.C. Cir. Feb. 19, 2016) (challenging EPA’s use of the global Social Cost of Carbon).

²⁶⁷ Circular A-4 at 15. Note that A-4 slightly conflates “accrue to citizens” with “borders of the United States”: U.S. citizens have financial and other interests tied to effects beyond the borders of the United States, as discussed further below.

²⁶⁸ *Zero Zone*, 832 F.3d at 679.

Circular A-4's reference to effects "beyond the borders" confirms that it is appropriate for agencies to consider the global effects of U.S. greenhouse gas emissions. While Circular A-4 may suggest that most typical decisions should focus on U.S. effects, the Circular cautions agencies that special cases call for different emphases:

[Y]ou cannot conduct a good regulatory analysis according to a formula. Conducting high-quality analysis requires competent professional judgment. *Different regulations may call for different emphases in the analysis, depending on the nature and complexity of the regulatory issues and the sensitivity of the benefit and cost estimates to the key assumptions.*²⁶⁹

Perhaps more than any other issue, the nature of the issue of climate change requires precisely such a "different emphasis" from the default domestic-only assumption. To avoid a global "tragedy of the commons" that could irreparably damage all countries, including the United States, every nation should ideally set policy according to the global Social Cost of Greenhouse Gases.²⁷⁰ Climate and clean air are global common resources, meaning they are freely available to all countries, but any one country's use—i.e., pollution—imposes harms on the polluting country as well as the rest of the world. Because greenhouse pollution does not stay within geographic borders but rather mixes in the atmosphere and affects climate worldwide, each ton emitted by the United States not only creates domestic harms, but also imposes large externalities on the rest of the world. Conversely, each ton of greenhouse gases abated in another country benefits the United States along with the rest of the world.

If all countries set their greenhouse gas emission levels based on only domestic costs and benefits, ignoring the large global externalities, the aggregate result would be substantially sub-optimal climate protections and significantly increased risks of severe harms to all nations, including the United States. Thus, basic economic principles demonstrate that the United States stands to benefit greatly if all countries apply global social cost of greenhouse gas values in their regulatory decisions and project reviews. Indeed, the United States stands to gain hundreds of billions or even trillions of dollars in direct benefits from efficient foreign action on climate change.²⁷¹

The domestic-only value of the social cost of greenhouse gases fails to take into consideration the likely reactions of other countries to the leadership of the United States.²⁷² In order to ensure that other nations continue to act consistent with global social cost of greenhouse gas values, it is important that the United States itself continue to do so.²⁷³ Departing from the collaborative dynamic that currently exists by reverting to a domestic-only estimate would jeopardize emissions reductions underway in other countries, which are already benefiting the United States.

²⁶⁹ Circular A-4 at 3 (emphasis added).

²⁷⁰ See Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968) ("[E]ach pursuing [only its] own best interest . . . in a commons brings ruin to all.").

²⁷¹ Policy Integrity, *Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action* (2015), <http://policyintegrity.org/files/publications/ForeignActionDomesticWindfall.pdf>.

²⁷² Howard & Schwartz, 42 COLUMBIA J. ENVTL. L. 203; see also Matthew Kotchen, Which Social Cost of Carbon? A Theoretical Perspective (Aug. 12, 2016), <https://cenrep.ncsu.edu/cenrep/wp-content/uploads/2015/07/Kotchen-paper.pdf>.

²⁷³ See ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* 10-11 (1984) (on repeated prisoner's dilemma games).

9. The Contrary Caselaw Cited by FERC Is Distinguishable.

FERC has regularly cited two D.C. Circuit cases, *EarthReports v. FERC*,²⁷⁴ and *Minisink Residents for Environmental Preservation and Safety v. FERC*,²⁷⁵ in order to undermine arguments that it should use the social cost of greenhouse cases when issuing certificates of public convenience and necessity. However, these cases are distinguishable.

In *EarthReports*, the D.C. Circuit had excused FERC's failure to use the Social Cost of Carbon in a 2014 environmental assessment of an LNG facility because of (1) the alleged lack of consensus about the appropriate discount rates, (2) the alleged disconnect between the tool and actual environmental impacts, and (3) the alleged lack of criteria for significance.²⁷⁶ Advancements in the economic literature, in FERC's own understanding of the Social Cost of Greenhouse Gases, and in the case law since the 2014 environmental assessment at stake in *EarthReports* all make that case now distinguishable.

First, to the extent there ever was a lack of consensus about the appropriate discount rate, recent reports from the National Academies of Sciences, among other sources, make clear that a 3% discount rate or lower—or optimally a declining discount rate—are appropriate, while a 7% discount rate is wholly inappropriate.²⁷⁷ Therefore, the first basis for the decision in *EarthReports* no longer holds true.

Second, FERC now admits that “[o]n further review, we accept that the Social Cost of Carbon methodology does constitute a tool that can be used to estimate incremental physical climate change impacts.”²⁷⁸ Therefore, the second basis for the decision in *EarthReports*—the alleged disconnect between the tool and actual environmental impacts—no longer holds true.

Third, Part V.B.2 explores the reasons why the alleged lack of criteria for significance does not justify rejecting the Social Cost of Greenhouse Gases. In addition, case law since *EarthReports* has made clear that it is arbitrary to tout the monetized upside of a project in an environmental assessment or impact statement while refusing to apply available tools to monetize the project's costs. Crucially, the court in *EarthReports* never considered or ruled on the need for parity in the treatment of costs and benefits. By translating costs and benefits into the common metric of money, monetization facilitates comparing the significance of various effects. FERC and other agencies routinely translate economic benefits like employment effects into monetized terms to gauge their significance; the significance of monetizable costs, like climate damages, should be gauged on the same basis.

The D.C. Circuit has not yet ruled on whether these changed circumstances undermine FERC's reasoning for rejecting the Social Cost of Greenhouse Gases. Perhaps recognizing that the facts have changed since *EarthReports*, the D.C. Circuit in the *Sabal Trail* case directed FERC to explain “whether the position on the Social Cost of Carbon that the agency took in *EarthReports* still holds.”²⁷⁹ In its order reissuing the *Sabal Trail* certificate on remand, FERC discarded some of its reasons, reaffirmed some, and identified others (all of which are addressed in this Part).²⁸⁰ That order went unchallenged

²⁷⁴ 828 F.3d 949 (D.C. Cir. 2016).

²⁷⁵ *Minisink*, 762 F.3d 97 (D.C. Cir. 2014).

²⁷⁶ *EarthReports* 828 F.3d at 956.

²⁷⁷ NATIONAL ACADEMIES OF SCIENCES, VALUING CLIMATE DAMAGES at 28.

²⁷⁸ *Sabal Trail Remand Order*, 162 FERC ¶ 61,233, at P 48.

²⁷⁹ *Sabal Trail*, 867 F.3d at 1375.

²⁸⁰ See *Sabal Trail Remand Order*, 162 FERC ¶ 61,233 at PP 30-51.

in court. The only other case that has considered the question involved a challenge to the Mountain Valley Pipeline.²⁸¹ In that case, the D.C. Circuit determined that petitioners challenging FERC's reasons for rejecting the Social Cost of Greenhouse Gases had failed to include needed arguments in their opening brief.²⁸² As a result, FERC's reasoning in the *Sabal Trail* remand order has not yet been substantively evaluated by the courts.

Another case, *Minisink*, is also distinguishable on the facts.²⁸³ The D.C. Circuit disagreed with petitioners' argument that NEPA required FERC to "focus[] more" than it had "on the monetary costs and benefits of the respective proposals."²⁸⁴ However, in that case, FERC's "fail[ure] to undertake a more fulsome cost-benefit analysis"²⁸⁵ did not constitute a failure to consider the actual, relevant impacts of the project. Petitioners' complaint was that, in comparing two project alternatives, FERC had not explicitly compared monetized estimates of long-term operating costs and savings against monetized estimates of capital costs; petitioners also cited insufficient supporting data for the estimates of capital costs.²⁸⁶ In other words, petitioners wanted FERC to base its choice between alternatives on a summing of monetized costs and cost-savings, to use a monetized cost-benefit equation as the exclusive tool for weighing the relevant factors that the agency had identified.²⁸⁷ That court, therefore, was answering a very different question than the one raised here. The issue is not whether FERC is required to use a cost-benefit analysis, but rather whether doing so would be preferable and, even if not, whether specifically monetizing greenhouse gas emission is required or preferable. FERC can use the Social Cost of Greenhouse Gases without necessarily conducting a full cost-benefit analysis. Because climate damages are diffused geographically and temporally and vary with increasing stock concentrations, monetization is especially crucial to capture the actual environmental impacts. Unlike the *Minisink* petitioners' complaints about under-analyzed operating costs, failing to consider the actual incremental climate impacts of a project in an environmental impact statement is not mere "flyspecking."²⁸⁸ And whereas the *Minisink* petitioners did not identify an alternate methodology for estimating the operating and capital costs, a readily available and widely accepted tool exists to monetize climate damages: the Social Cost of Greenhouse Gases.

Finally, at most *EarthReports* and *Minisink* gave FERC some deference constrained by rationality, and FERC can always change its mind based on the current record and standards of rationality. Based on everything that FERC now knows about the Social Cost of Greenhouse Gases, FERC should use the tool in both environmental reviews under NEPA and when evaluating certificate applications.

²⁸¹ *Appalachian Voices v. FERC*, No. 17-1271, 2019 WL 847199, (D.C. Cir. Feb. 19, 2019).

²⁸² *Id.* at *2 (rejecting argument that FERC failure to adequately consider the environmental consequences of greenhouse gas emissions because petitioners' "opening brief also fails to address several of the reasons FERC gave for rejecting the Social Cost of Carbon tool").

²⁸³ *Minisink*, 762 F.3d 97 (D.C. Cir. 2014).

²⁸⁴ *Id.* at 112.

²⁸⁵ *Id.*

²⁸⁶ Reply Brief at 12, 2013 WL 5935149; Opening Brief at 42, 2013 WL 5935148; *see also* Respondent Brief at 35, 2013 WL 5935151 ("Residents assert that the Commission violated NEPA by failing to include in the Environmental Assessment a cost-benefit analysis that compares the cost of the Project versus the Wagoner Alternative.").

²⁸⁷ Reply Brief at 12, 2013 WL 5935149 ("Over a 30-year project lifetime, the reduced operating expenses readily exceed the capital costs of Wagoner if they are fifty percent more and come close to offsetting the capital costs of Wagoner if it costs twice as much."); Opening Brief at 42-43, 2013 WL 5935148 ("EA lacks any rigorous analysis of whether the savings in fuel costs over the life of the project make the Wagoner project more cost effective overall [after comparison to the capital costs].").

²⁸⁸ Note that the *Minisink* case concerned an environmental assessment, and the court acknowledged that the requirements to monetize costs and benefits may be different for environmental impact statements. *Minisink*, 762 F.3d at 112 ("we disagree that NEPA requires such an approach, particularly where only an environmental assessment, rather than an environment impact statement, is involved."). [See also various cases requiring at least an informal cost-benefit assessment under NEPA: *Sigler*; *Chelsea Neighborhood Assoc. v. U.S. Postal Service*, 516 F.2d 378, 386 (2d Cir. 1975) ("NEPA, in effect, requires a broadly defined cost-benefit analysis of major federal activities.")]

VI. FERC's Alternatives Analysis Under NEPA Should Better Inform Its Decisions Under the Natural Gas Act.

FERC's obligation under NEPA is not merely to evaluate the reasonably foreseeable direct and indirect environmental consequences of the project proposed in a certificate application, but also to analyze the environmental consequences of potential alternatives that meet the purpose and need of the project.²⁸⁹ One of those alternatives must be the "no action alternative"—in this case denying a certificate of public convenience and necessity.²⁹⁰ This alternatives analysis required by NEPA should facilitate FERC's obligations to evaluate projects under Section 7 of the Natural Gas Act.

FERC's primary decision under Section 7 is to approve or deny a certificate of public convenience or necessity.²⁹¹ This aligns with FERC's obligation under NEPA to analyze both the proposed project as the preferred alternative, and the "no action alternative" in which the Commission denies a Section 7 certificate. However, the Natural Gas Act also allows FERC to establish "reasonable terms and conditions as the public convenience and necessity may require."²⁹² This authority can be exercised to require the applicant to make certain construction, operational, or other changes that would mitigate the extent of environmental damage.

For direct environmental consequences, FERC could, for instance, require applicants to deploy more aggressive leak mitigation. Currently, FERC generally requires new pipeline projects to comply with air permits regarding methane leaks.²⁹³ However, additional mitigation, including more aggressive leak detection and repair regimes, may be feasible and particularly valuable to the extent that EPA regulations limiting methane emissions from new oil and gas sources are repealed or weakened.²⁹⁴

FERC could also attach conditions intended to address reasonably foreseeable indirect emissions. For example, FERC could require applicants to limit the quantity of gas transported through a pipeline, and therefore the extent to which the pipeline facilitates upstream natural gas production and downstream combustion and their related emissions. If a pipeline's primary benefit is to provide greater natural gas availability only at peak times or to improve reliability during grid stress, those benefits could be obtained with conditions that limit contracts that result in high load factor for the pipeline in favor of contracts intended to supply natural gas only during peak demand. Additionally, FERC could limit the time

²⁸⁹ 40 C.F.R. § 1502.14(a) (calling the alternatives analysis "the heart of the environmental impact statement" because it "sharply defin[es] the issues and provid[es] a clear basis for choice among options by the decisionmaker and the public").

²⁹⁰ 40 C.F.R. § 1502.14(d) Note that contrary to the NOI's assertion that "an agency need only evaluate alternatives that can satisfy the purpose and need of the proposed project," *Policy Statement NOI*, 163 FERC ¶ 61,042 at P 10, NEPA requires agencies to consider a broader range of alternatives including, minimally, taking no action.

²⁹¹ 15 U.S.C. § 717f(e) ("a certificate shall be issued to any qualified applicant . . . if it is found that the applicant is able and willing properly to do the acts and to perform the service proposed . . . and that the [project] . . . is or will be required by the present or future public convenience and necessity; *otherwise such application shall be denied*") (emphasis added).

²⁹² *Id.*

²⁹³ See Atlantic Bridge Project Environmental Assessment at 2-96, Docket No. CP16-9-000 (2016) (requiring compliance with EPA's oil and gas new source performance standards, including leak detection and repair, at 40 C.F.R. Part 60 Subpart OOOOa), <https://www.ferc.gov/industries/gas/enviro/eis/2016/CP16-9-000-EA.pdf>.

²⁹⁴ See Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Reconsideration, 83 Fed. Reg. 52,056 (proposed Oct. 15, 2018).

period over which a pipeline operates. Such conditions could include a time-limited certificate of public convenience and necessity that is only operative for a set number of years. For example, the Environmental Defense Fund has recommended that FERC require better alignment of the economic useful life proposed in certificate applications with the length of service contracts that a pipeline has signed and the depreciation schedules used in pipeline ratemaking proceedings.²⁹⁵ The Commission can use its widely supported pre-filing program to work with pipeline applicants on these conditions so that they can be efficiently integrated into project development at early stages.²⁹⁶

The climate implications of a proposed project, including the change in upstream and downstream greenhouse gas emissions, can and should be evaluated for each of the various reasonable alternatives (including the proposed project, project with reduced capacity, project with conditions such as operational limits, and no action alternative). The Commission can then balance each alternatives' public benefits against its potential adverse consequences and select the approach that is most in the public interest.

²⁹⁵ *EDF NOI Comments* at 21-28

²⁹⁶ *See Policy Statement NOI*, 163 FERC ¶ 61,042 at P 37 (describing the pre-filing program).

VII. FERC Should Consider Adopting a More Holistic Cost-Benefit Analysis Framework for Evaluating Projects Under the Natural Gas Act.

Even if it is not required by NEPA or the Natural Gas Act, there are a number of reasons why FERC should use cost-benefit analysis to evaluate certificate applications. FERC’s assessment of whether a project is required by the public convenience and necessity would benefit from a more systematic evaluation of the public interest. FERC’s current Policy Statement describes its task as “a flexible balancing process during which it weighs the factors presented in a particular application.”²⁹⁷ FERC explains that this balancing process involves directly comparing the benefits of a project with at least some of the costs and proceeding to environmental review only if “the benefits outweigh” those costs.²⁹⁸ As explained above, environmental considerations—at least those that are easily monetizable like greenhouse gas emissions—should be incorporated into this economic test. But, even in this initial economic test, FERC does not make a determination that benefits outweigh costs using any particular methodology or process.

FERC should adopt the suite of tools that economists have developed and that agencies generally use to evaluate whether the benefits of a particular action will outweigh the costs: cost-benefit analysis. The Office of Management and Budget provides a set of best practices and guidance for agency use of cost-benefit analysis: OMB Circular A-4. While Circular A-4 is primarily intended to aid agencies conduct cost-benefit analysis in the context of regulatory decisions and is not required to be used by independent agencies,²⁹⁹ its reasoning and best practices can nonetheless be useful to FERC when evaluating certificate applications.³⁰⁰ As OMB Circular A-4 states, cost-benefit analysis “provides a formal way of organizing the evidence on the key effects—good and bad—of the various alternatives that should be considered.”³⁰¹

A. Cost Benefit Analysis Can Lead to Better Decisionmaking Under the Natural Gas Act.

There are many reasons cost-benefit analysis would be an appropriate decision framework for the public convenience and necessity test. First, cost-benefit analysis is particularly useful for picking the most economically rational choice among a set of options. As OMB explains, “where all benefits and costs can be quantified and expressed in monetary units, benefit-cost analysis provides decision makers with a clear indication of the most efficient alternative, that is, the alternative that generates the largest net benefits to society (ignoring distributional effects).”³⁰² By studying and estimating

²⁹⁷ 1999 Policy Statement, 88 FERC ¶ 61,227 at 61,743.

²⁹⁸ *Id.* at 61,746 (“Only when the benefits *outweigh* the adverse effects on economic interests will the Commission then proceed to complete the environmental analysis”) (emphasis added).

²⁹⁹ Circular A-4 at 1 (explaining that purpose of Circular A-4 is to assist agencies conducting regulatory analysis that is required by Executive Order 12866, which does not apply to independent regulatory agencies).

³⁰⁰ See *Cape Hatteras Access Preservation Alliance v. U.S. Dept. of Interior*, 344 F.Supp.2d 108, 130 (D.D.C. 2004) (using Circular A-4 to evaluate the Department of Interior’s approach to critical habitat designation).

³⁰¹ Circular A-4 at 1-2.

³⁰² Circular A-4 at 2.

the consequences of an action, putting those consequences into a common metric of dollars, and identifying the option that maximizes net benefits, cost-benefit analysis would allow FERC to rationally and confidently balance the tradeoffs inherent in any certificate proceeding. Moreover, because FERC has already committed to an approach that weighs costs and benefits, cost-benefit analysis merely acts as a transparent and systematic tool for accomplishing its goals. When used properly, cost-benefit analysis can cut down on the influence of ideology and special-interest politics. It facilitates sound analysis, evidence-based decisionmaking, and is a pragmatic approach to government action. Cost-benefit analysis helps decisionmakers recognize the relative magnitude of consequences while minimizing the risk that FERC leans too heavily on individual, salient factors or succumbs to unintended bias in favor of or in opposition to individual projects or the expansion of natural gas infrastructure more broadly. Armed with a tool that recognizes the trade-offs that are an inherent part of its certificate choices, the Commission can demonstrate its willingness to take seriously the divergent interests of multiple stakeholders and to make hard choices that recognize the real and meaningful costs of a project, while nonetheless facilitating those infrastructure projects that will maximize social welfare.

If FERC decided to adopt cost-benefit analysis as part of its process for issuing certificates under the Natural Gas Act, it would anticipate, describe, quantify, and, when possible, monetize the positive and negative consequences of the project and relevant alternatives. Circular A-4 provides detailed guidance for how agencies can think about each of these steps.³⁰³

The use of expert judgment by individual Commissioners is, of course, important for weighing the variety of interests that are implicated by a new pipeline project. It may not be possible to quantify and monetize all benefits and costs of a pipeline project. This fact does not mean that cost-benefit analysis should be abandoned. Rather, cost-benefit analysis can be paired with approaches that allow agencies to incorporate unquantified benefits and costs into their decisionmaking.³⁰⁴ FERC can continue to apply its expert judgment when ultimately deciding on pipeline applications, but with the help and transparency of cost-benefit analysis.

B. The Costs and Benefits to Consider When Applying Cost-Benefit Analysis to Evaluation of Certificate Applications.

In order to use cost-benefit analysis as a decision framework when evaluating projects under Section 7 of the Natural Gas Act, FERC should evaluate and monetize the following categories of costs and benefits.

The economic value of the additional natural gas that a project brings to market. One of the key benefits of additional natural gas pipeline service is the ability to facilitate the consumption of additional natural gas. In order to quantify the amount of additional natural gas that will be brought to market as the result of a pipeline, FERC can use the same approach it uses when quantifying greenhouse gases. As described above, this can include upper bound and lower bound default assumptions, information provided by stakeholders, and sophisticated tools that model the natural gas system under particular conditions. FERC can then monetize the value of the increased natural gas (as compared to the no action alternative baseline) using current and projected future prices of natural gas.³⁰⁵

³⁰³ See generally Circular A-4 at 14-42.

³⁰⁴ See Circular A-4 at 27 (describing how agencies can approach decisions in the face of benefits and costs that are difficult to quantify); *id.* at 2 (describing, “break-even analysis” as a tool agencies can use to harmonize expert judgment about unquantified costs and benefits with more traditional cost-benefit analysis).

³⁰⁵ See Circular A-4 at 19 (describing the benefits of using market prices as the best estimate of consumer willingness-to-pay); U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2018 at 64 (2018), <https://www.eia.gov/outlooks/aeo/pdf/AEO2018.pdf> (describing natural gas price projections).

The economic value of reduced gas prices. Construction of new projects that bring additional natural gas to market can provide benefits to consumers, including those that do not purchase the new gas. When additional natural gas is available, the price of natural gas in a region is reduced and consumers of that gas see benefits by paying lower prices for each unit of natural gas.³⁰⁶ The price effect of introducing additional natural gas to an area can be monetized using a number of the tools and models described in Part IV.B. It is important to note that new pipeline capacity in one region can increase the price of natural gas in other regions. To the extent modeling shows such countervailing cost increases, FERC should them into account in any cost-benefit analysis.

Cost of pipeline construction, operation, and maintenance. One primary direct cost of a new natural gas pipeline project is the economic cost of constructing, maintaining and operating the pipeline, compressor stations, or other project element. The cost of land acquisitions or the value of land acquired through eminent domain would also be included in this category. These costs would be provided by the applicant or estimated using aggregate data.

Costs of greenhouse gas emissions. Because the climate damage caused by greenhouse gas emissions is not location-dependent and tools for monetizing those damages (i.e., the Social Cost of Greenhouse Gases) are available, the cost of greenhouse gas emissions can be incorporated into the cost-benefit analysis of a proposed project. The Commission can do so using the tools and methodologies described throughout these comments and should include both the direct and indirect greenhouse gas emissions associated with a project.

Potential benefits of displacing greenhouse gas emissions. To the extent that a natural gas project facilitates the displacement of higher emitting fuels such as coal or oil, the project may cause a reduction in greenhouse gas emissions. The extent of emission reductions can be estimated using the tools described in Part IV.B.3. The economic value of those reduced emissions can then be monetized using the Social Cost of Greenhouse Gases and counted as a benefit of the project.

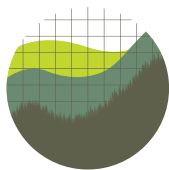
Additional benefits and costs. Some costs and benefits may be more difficult to quantify or monetize, including:

- The value of difficult to measure or difficult to monetize environmental damage, such as public health damage caused by direct and indirect local air pollution; the risk of land or water contamination due to natural gas production, pipeline construction, and accidents; loss of threatened or endangered species; and other environmental consequences.
- Other economic consequences of pipeline construction on community land values and the tax base.

When monetization is possible, these costs and benefits can be directly included in a cost-benefit analysis. When it is not possible, FERC should describe these costs and benefits qualitatively. It can then exercise its expert judgment to evaluate the extent to which unmonetized costs and benefits are significant enough to change its decision regarding whether a project is in the public interest.

In short, cost-benefit analysis can be a useful tool as FERC wrestles with its politically contentious statutory responsibility to evaluate whether new pipeline projects are required by the public convenience and necessity. By systematically and transparently quantifying and comparing the costs and benefits of pipeline projects, FERC can evaluate proposed projects and alternatives through an economically rational, politically accountable, and more predictable process.

³⁰⁶ See U.S. Energy Info. Admin., *Natural Gas Explained: Natural Gas Prices* (Oct. 31, 2017), https://www.eia.gov/energyexplained/index.php?page=natural_gas_prices (describing factors influencing consumer gas prices, including pipeline capacity).



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