

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

_____)	
SABINE PASS LIQUEFACTION, LLC)	FE DOCKET NO. 13-30-LNG
)	FE DOCKET NO. 13-42-LNG
)	FE DOCKET NO. 13-121-LNG
_____)	(Consolidated)

OPINION AND ORDER DENYING REQUEST FOR REHEARING
OF ORDER GRANTING LONG-TERM, MULTI-CONTRACT AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS BY VESSEL
FROM THE SABINE PASS LNG TERMINAL
LOCATED IN CAMERON AND CALCASIEU PARISHES, LOUISIANA,
TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO. 3669-A

MAY 26, 2016

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	PROCEDURAL BACKGROUND.....	3
	A. Environmental Review Procedures.....	3
	1. FERC’s Environmental Assessment and Final Order.....	3
	2. DOE’s Environmental Documents and Order.....	8
	B. Sierra Club’s Request for Rehearing of DOE’s Order.....	10
III.	DISCUSSION.....	10
	A. The Rebuttable Presumption Derives from the Natural Gas Act.....	10
	1. Sierra Club’s Position.....	10
	2. SPL’s Answer.....	11
	3. DOE/FE Analysis.....	12
	B. DOE/FE’s Analysis of Direct, Indirect, and Cumulative Environmental Effects Satisfied the National Environmental Policy Act.....	13
	1. Sierra Club’s Position.....	13
	2. SPL’s Answer.....	17
	3. DOE/FE Analysis.....	18
	C. DOE/FE Complied with the Endangered Species Act and the National Historic Preservation Act.....	29
	1. Sierra Club’s Position.....	29
	2. SPL’s Answer.....	29
	3. DOE/FE Analysis.....	30
	D. The Methodology Underlying the Life Cycle Greenhouse Gas (LCA GHG) Report Was Reasonable.....	32
	1. Methane Leakage Rate.....	32
	2. Global Warming Potential of Methane.....	37
	E. Consideration of Climate Impacts.....	40
	1. Sierra Club’s Position.....	40
	2. DOE/FE Analysis.....	41
	F. DOE/FE Correctly Evaluated Economic Impacts in Determining That SPL’s Proposed Exports Are in the Public Interest.....	44
	1. Sierra Club’s Position.....	44
	2. DOE/FE Analysis.....	46
IV.	CONCLUSION.....	48
V.	ORDER.....	48

FREQUENTLY USED ACRONYMS

Bcf/d	Billion Cubic Feet per Day
Bcf/yr	Billion Cubic Feet per Year
CEQ	The Council on Environmental Quality
CH ₄	Methane
CO ₂	Carbon Dioxide
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FE	Office of Fossil Energy, U.S. Department of Energy
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
FTA	Free Trade Agreement
GHG	Greenhouse Gas
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Analysis
LNG	Liquefied Natural Gas
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NERA	NERA Economic Consulting
NETL	National Energy Technology Laboratory
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
SPL	Sabine Pass Liquefaction, LLC
VOC	Volatile Organic Compound

I. INTRODUCTION

On June 26, 2015, the Department of Energy's (DOE or the Department) Office of Fossil Energy (DOE/FE) issued DOE/FE Order No. 3669 (Order)¹ to Sabine Pass Liquefaction, LLC (SPL or Sabine Pass)² under section 3 of the Natural Gas Act (NGA).³ In that final Opinion and Order, DOE/FE granted three export applications (collectively, Applications) filed by SPL in 2013 in FE Docket Nos. 13-30-LNG, 13-42-LNG, and 13-121-LNG, respectively. Those three Applications and their respective dockets have been consolidated for purposes of this proceeding. As set forth below, Sierra Club timely filed a Request for Rehearing of the Order on July 27, 2015.⁴

In the portion of the Applications at issue, SPL requested long-term, multi-contract authorization under section 3(a) of the NGA to export domestically produced liquefied natural gas (LNG) by vessel to nations with which the United States has not entered into a free trade agreement requiring national treatment for trade in natural gas and with which trade is not prohibited by U.S. law or policy (non-FTA nations).⁵ The exports of LNG would originate from the existing Sabine Pass LNG import, storage, and vaporization terminal located in Cameron Parish, Louisiana (Sabine Pass LNG Terminal). The first four LNG liquefaction trains at the Terminal (Trains 1, 2, 3, and 4) are either currently exporting LNG from the United States or

¹ *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 3669, FE Docket Nos. 13-30-LNG, 13-42-LNG, 13-121-LNG, Final Opinion & Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Sabine Pass LNG Terminal Located in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations (June 26, 2015) [hereinafter *SPL Order*].

² SPL is an indirect subsidiary of Cheniere Energy Partners, L.P., a limited partnership majority owned by Cheniere Energy, Inc., a developer of LNG terminals and natural gas pipelines on the Gulf Coast of the United States.

³ The authority to regulate the imports and exports of natural gas, including liquefied natural gas, under section 3 of the NGA (15 U.S.C. § 717b) has been delegated to the Assistant Secretary for FE in Redelegation Order No. 00-006.02F issued on November 17, 2014.

⁴ Sierra Club, Request for Rehearing, FE Docket Nos. 13-30-LNG, 13-42-LNG, 13-121-LNG (July 27, 2015) [hereinafter *Rehearing Request*].

⁵ 15 U.S.C. § 717b(a). DOE/FE separately issued export authorizations granting the portion of the Applications requesting authority to export LNG to FTA countries, pursuant to NGA section 3(c), 15 U.S.C. § 717b(c).

remain under construction.⁶ In the Applications at issue, SPL’s exports of LNG would originate from two additional liquefaction trains to be constructed at the Terminal—Trains 5 and 6—which together constitute SPL’s “Liquefaction Expansion Project.” As discussed below, on April 6, 2015, the Federal Energy Regulatory Commission (FERC) issued an order authorizing SPL and two other entities (Sabine Pass LNG, L.P., and Sabine Pass Liquefaction Expansion, LLC) to construct Trains 5 and 6.⁷ In the same order, FERC authorized an affiliated entity, Cheniere Creole Trail Pipeline, L.P., to construct and operate interstate natural gas pipelines, compression, and related facilities to deliver feed gas to the Liquefaction Expansion Project.⁸

In granting the three Applications in the SPL Order, DOE/FE approved exports of domestically produced LNG from Trains 5 and 6 in a total volume equivalent to 503.3 billion cubic feet per year (Bcf/yr) (or 1.38 Bcf per day (Bcf/d)) of natural gas as follows:

- **First Application (FE Docket No. 13-30-LNG):** LNG in a volume equivalent to approximately 101 Bcf/yr of natural gas, pursuant to the LNG Sale and Purchase Agreement (SPA) between SPL as seller and Total Gas & Power North America, Inc. (TGPNA or TOTAL) as buyer, dated December 14, 2012 (TGPNA SPA).⁹

⁶ SPL’s exports of LNG from Trains 1-4 are subject to other DOE/FE export authorizations not relevant here.

⁷ *Sabine Pass Liquefaction Expansion, LLC, et al.*, Order Granting Authorization Under Section 3 of the Natural Gas Act and Issuing Certificate, 151 FERC ¶ 61,012 (Apr. 6, 2015) [hereinafter FERC Order]. FERC subsequently denied rehearing of the FERC Order. *Sabine Pass Liquefaction Expansion, LLC, et al.*, Order Denying Rehearing, 151 FERC ¶ 61,253 (June 23, 2015) [hereinafter FERC Rehearing Order].

⁸ *See id.*; *see also see* SPL App. at 6 n.20 (discussing Cheniere Creole Trail Pipeline, L.P.’s request for a proposed extension and expansion of the existing Cheniere Creole Trail Pipeline system).

⁹ Sabine Pass Liquefaction, LLC, Application for Long-Term Authorization to Export Liquefied Natural Gas, FE Docket No. 13-30-LNG (Feb. 27, 2013) [hereinafter SPL App. 1]. The TPGNA SPA is appended to SPL App. 1 as Appendix A.

- **Second Application (FE Docket No. 13-42-LNG):** LNG in a volume equivalent to approximately 88.3 Bcf/yr of natural gas, pursuant to the terms of the LNG SPA between SPL as seller and Centrica plc (Centrica) as buyer, dated March 22, 2013 (Centrica SPA).¹⁰
- **Third Application (FE Docket No. 13-121-LNG):** LNG in a volume equivalent to approximately 314 Bcf/yr of natural gas, which SPL states represents the volume of LNG that can be produced from Trains 5 and 6 that is not already committed for export under the TGPNA and Centrica SPAs.¹¹

In sum, the Order authorizes SPL to export LNG in a volume equivalent to 503.3 Bcf/yr of natural gas from Trains 5 and 6, to be allocated as follows: (i) up to 101 Bcf/yr under the TGPNA SPA; (ii) up to 88.3 Bcf/yr under the Centrica SPA; and (iii) up to 314 Bcf/yr from Trains 5-6.

Sierra Club timely filed a Request for Rehearing of the Order.¹² For the reasons set forth below, DOE/FE hereby denies Sierra Club's Request for Rehearing, and affirms the findings and conclusions in the Order.

II. PROCEDURAL BACKGROUND

A. Environmental Review Procedures

1. FERC's Environmental Assessment and Final Order

When an applicant seeks authority both to export LNG to non-FTA countries and to construct a LNG terminal for that purpose, DOE and FERC work together to avoid duplication of

¹⁰ Sabine Pass Liquefaction, LLC, Application for Long-Term Authorization To Export Liquefied Natural Gas, FE Docket No. 13-42-LNG (April 2, 2013) [hereinafter SPL App. 2]. The Centrica SPA is appended to SPL App. 2 as Appendix A.

¹¹ Sabine Pass Liquefaction, LLC, Application of Sabine Pass Liquefaction, LLC for Long-Term Authorization To Export Liquefied Natural Gas, FE Docket No. 13-121-LNG (Sept. 10, 2013) [hereinafter SPL App. 3]. In this Application alone, SPL requested (and was granted) authorization to export LNG on its own behalf and as agent for other entities that hold title to the LNG, after registering each such entity with DOE/FE.

¹² See *supra* n.4.

effort in the environmental review required under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 *et seq.* In such cases, FERC is the “lead agency” and DOE/FE is the “cooperating agency” within the meaning of the regulations of the Council on Environmental Quality (CEQ) that implement NEPA.¹³ FERC’s lead agency role was codified by section 313 of the Energy Policy Act of 2005 (Pub. L. 109-58 (Aug. 8, 2005)), which amended section 15 of the NGA (15 U.S.C. § 717n).¹⁴

The present case follows that framework. In February 2013, Sabine Pass commenced FERC’s mandatory pre-filing process under NEPA for the Liquefaction Expansion Project in FERC Docket No. PF13-8-000.¹⁵ Shortly thereafter, FERC issued a Notice of Intent to Prepare an Environmental Assessment (NOI) for the proposed Liquefaction Expansion Project and the related Cheniere Creole Trail Pipeline Expansion Project.¹⁶ The NOI stated that DOE/FE had agreed to participate as a cooperating agency in FERC’s proceeding to satisfy its NEPA responsibilities.¹⁷ In September 2013, Sabine Pass filed its application with FERC to site, construct, and operate the Liquefaction Expansion Project in FERC Docket No. CP13-552-000.¹⁸ Likewise, in FERC Docket No. CP13-553-000, Cheniere Creole Trail Pipeline, L.P. requested a certificate of public convenience and necessity to construct and operate the interstate natural gas

¹³ The CEQ regulations implementing NEPA define a “cooperating agency” as “any Federal agency other than a lead agency which has jurisdiction by law or special expertise” with respect to any proposed action for which a NEPA analysis is prepared. 40 C.F.R. § 1508.5. The selection and responsibilities of a cooperating agency are described in 40 C.F.R. § 1501.6. DOE’s regulations state that it will perform its NEPA responsibilities in accordance with the CEQ regulations. 10 C.F.R. §§ 1021.101, 1021.103.

¹⁴ *See* 15 U.S.C. § 717n (b)(1).

¹⁵ Cheniere Creole Trail Pipeline, L.P., *et al.*, Request to Initiate Pre-Filing Review Process for Liquefaction Expansion Project and Pipeline Extension and Expansion, FERC Docket No. PF13-8-000 (Feb. 27, 2013).

¹⁶ Sabine Pass Liquefaction Expansion, LLC, *et al.*, Notice of Intent to Prepare an Environmental Assessment for the Proposed Sabine Pass Liquefaction Expansion Project and Cheniere Creole Trail Pipeline Expansion Project, 78 Fed. Reg. 35,625 (June 13, 2013) [hereinafter FERC NOI].

¹⁷ *See id.*, 78 Fed. Reg. at 35,626.

¹⁸ Sabine Pass Liquefaction Expansion, LLC, *et al.*, Application for Authorizations Under the Natural Gas Act, FERC Docket Nos. CP13-552-000 and CP13-553-000 (Sept. 30, 2013) [hereinafter Sabine Pass FERC App.]; *see also* 78 Fed. Reg. 62,344 (Oct. 18, 2013) [Notice of Application].

pipeline, compression, and related facilities to deliver additional domestic natural gas to the Sabine Pass LNG Terminal (Cheniere Creole Trail Pipeline Expansion Project) under NGA section 7(c), 15 U.S.C. § 717f(c).¹⁹

On December 12, 2014, FERC issued the Environmental Assessment (EA) for the Sabine Pass Liquefaction Expansion Project and Cheniere Creole Trail Pipeline Expansion Project (collectively, Expansion Projects) and placed it into the public record.²⁰ FERC provided a 30-day public comment period on the EA. During this time, FERC held a public meeting and accepted written comments on the EA from Sierra Club, several federal agencies, and interested individuals.²¹

The EA addressed numerous environmental issues, including potential impacts on geology, soils, water resources, wetlands, vegetation, fisheries, wildlife, threatened and endangered species, land use, recreation, visual resources, cultural resources, air quality, noise, safety, socioeconomics, and alternatives.²² Based on its environmental analysis, FERC staff concluded that “the impacts associated with these Projects can be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted.”²³ FERC staff therefore recommended 64 mitigation measures for the Project. FERC staff further stated that, “approval of the Projects would not constitute a major federal action significantly affecting the quality of the human environment.”²⁴ On this basis, FERC staff recommended in the EA that FERC issue

¹⁹ See 78 Fed. Reg. at 62,344.

²⁰ See 79 Fed. Reg. 76,997 (Dec. 23, 2014) [Notice of availability of EA].

²¹ FERC Order at P 60.

²² *Id.* at P 59.

²³ EA at 5.

²⁴ *Id.* at 183.

an order that contains a Finding of No Significant Impact and includes the mitigation measures (also referred to as environmental conditions) as conditions of the requested authorizations.²⁵

Thereafter, FERC issued the FERC Order authorizing Sabine Pass and Cheniere Creole Pipeline to site, construct, and operate the Expansion Projects, pursuant to NGA section 3(a) and 7(c), respectively.²⁶ FERC observed that the proposed Liquefaction Expansion Project is located entirely within the footprint of the existing Sabine Pass LNG Terminal site. FERC reasoned that, because it will not require additional storage facilities or land acquisition, the Liquefaction Expansion Project will have “relatively small and well-defined environmental impacts.”²⁷ Based on its consideration of the analysis in the EA, FERC determined that, “with the conditions we require, the Liquefaction Expansion Project would result in minimal environmental impacts and can be constructed and operated safely,” and thus Sabine Pass’s Liquefaction Expansion Project is not inconsistent with the public interest.²⁸ On this basis, FERC adopted all 64 mitigation measures recommended in the EA as environmental conditions of its Order, set forth in the Appendix.

In addition, FERC adopted its own additional Environmental Condition. After considering comments submitted by the U.S. Environmental Protection Agency (EPA) on the EA about the Chicot Aquifer, a sole-source aquifer in Louisiana, FERC agreed that Sabine Pass and Cheniere Creole Trail Pipeline should consult with EPA about additional sole-source aquifer consultation that may be required pursuant to the Safe Drinking Water Act. FERC adopted this Environmental Condition as the 65th condition.²⁹

²⁵ *See id.*

²⁶ FERC Order at P 124.

²⁷ *Id.* at P 30.

²⁸ *Id.*

²⁹ *See id.* at P 79.

FERC rejected arguments from Sierra Club and other commenters that FERC was required under NEPA to prepare an environmental impact statement (EIS) for the Liquefaction Expansion Project, instead of an EA.³⁰ FERC reiterated the FERC staff's explanation that an EIS was not warranted for several reasons: the Liquefaction Expansion Project will be adjacent to the existing Sabine Pass LNG Terminal within the existing leased 853-acre terminal site; the pipeline project will be co-located to the extent practicable for the majority of the route; and the impacts associated with these projects can be sufficiently mitigated.³¹

FERC also rejected claims that the EA was defective because (among other reasons) it allegedly did not: (i) examine induced natural gas production associated with the Project—specifically, the indirect effects of induced natural gas production in response to demand from Sabine Pass's customers; (ii) consider the cumulative environmental impacts from natural gas development and gathering, transportation, and distribution in areas outside of the proposed project area, and (iii) adequately analyze direct, cumulative, and indirect impacts on climate change from greenhouse gas (GHG) emissions.³² FERC disputed the claim that it should have based its analysis on CEQ's *Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts* (Revised Draft Guidance), stating that the Revised Draft Guidance was not issued until December 18, 2014, after the Sabine Pass EA was issued.³³ FERC also disagreed with Sierra Club's claim that FERC should use the "social cost of carbon tool" to estimate the comprehensive cost associated with the Liquefaction Expansion Project's GHG emissions.³⁴

³⁰ *Id.* at PP 105-06.

³¹ *Id.* at P 106.

³² FERC Order at 88-92, 95-96, 100, 105-07.

³³ *See id.* at P 100.

³⁴ *See id.* at P 101.

In sum, FERC stated that it had reviewed the information and analysis contained in the EA and concluded that, with the 65 environmental conditions required by its Order (of which 64 were recommended in the EA), the Liquefaction Expansion Project would not constitute a major federal action significantly affecting the quality of the human environment.³⁵

Sierra Club and other participants in the FERC proceeding timely filed requests for rehearing of the FERC Order, and FERC denied those requests in June 2015.³⁶

2. DOE's Environmental Documents and Order

In connection with this and other LNG export proceedings, on June 4, 2014, DOE/FE provided notice in the *Federal Register* of two separate documents that proposed to evaluate different environmental aspects of the LNG production and export chain. First, DOE/FE announced that it had conducted a review of existing literature on potential environmental aspects associated with unconventional gas production in the lower-48 states. DOE/FE published its draft report for public review and comment, entitled *Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States*.³⁷ DOE/FE received comments on the Draft Addendum and, on August 15, 2014, issued the final Addendum with its response to the public comments contained in Appendix B.³⁸

Second, DOE/FE commissioned the National Energy Technology Laboratory (NETL), a DOE applied research laboratory, to conduct an analysis estimating the life cycle greenhouse gas (GHG) emissions for LNG exported from the United States, regasified, and combusted for electric generation in Europe or Asia. The report compared the life-cycle GHG emissions of

³⁵ *Id.* at P 122.

³⁶ See FERC Rehearing Order, *supra* note 7.

³⁷ U.S. Dep't of Energy, Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States, 79 Fed. Reg. 32,258 (June 4, 2014) [hereinafter Draft Addendum]. DOE/FE announced the availability of the Draft Addendum on its website on May 29, 2014.

³⁸ U.S. Dep't of Energy, Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States, 79 Fed. Reg. 48,132 (Aug. 15, 2014) [hereinafter Addendum].

U.S.-exported LNG to other sources of natural gas available in Europe and Asia, as well as those of regionally-sourced coal. On May 29, 2014, DOE/FE published NETL's report entitled, *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (referred to as the LCA GHG Report),³⁹ as well as a 200-page supporting document entitled, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*.⁴⁰ DOE/FE received public comments on the LCA GHG Report and the supporting document, and provided its response to those comments in the Final Order.

On June 26, 2015, three days after FERC denied rehearing of the FERC Order in the Sabine Pass proceeding, DOE/FE issued its Opinion and Order. In the Order, DOE/FE: (i) independently reviewed FERC's NEPA analysis and other outstanding environmental issues, including public comments received on the Addendum and LCA GHG Report; (ii) considered the environmental information that had been developed and the related arguments of the commenters and parties, and found that it had not been demonstrated that SPL's requested authorization was inconsistent with the public interest; and (iii) granted SPL's Applications subject to further conditions, including the 65 environmental conditions adopted in the FERC Order.⁴¹

³⁹ U.S. Dep't of Energy, *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas From the United States*, 79 Fed. Reg. 32,260 (June 4, 2014). DOE/FE announced the availability of the LCA GHG Report on its website on May 29, 2014.

⁴⁰ See U.S. Dep't of Energy, Nat'l Energy Tech. Lab., *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (May 29, 2014), available at: <http://energy.gov/fe/life-cycle-greenhouse-gas-perspective-exporting-liquefied-natural-gas-united-states>; see also U.S. Dep't of Energy, Nat'l Energy Tech. Lab., *Life Cycle Analysis of Natural Gas Extraction and Power Generation* (May 29, 2014), available at: <http://www.netl.doe.gov/research/energy-analysis/search-publications/vuedetails?id=779>. The LCA GHG Report and the supporting document are incorporated herein by reference.

⁴¹ See, e.g., SPL Order, *supra* n.1, at 14-15.

B. Sierra Club's Request for Rehearing of DOE's Order

Sierra Club filed its Rehearing Request on July 27, 2015, seeking rehearing of DOE/FE Order No. 3669. On August 11, 2015, SPL filed a Motion for Leave to Answer and Answer to Sierra Club's Requests for Rehearing and Stay.⁴² On August 24, 2015, DOE/FE issued an order granting both Sierra Club's Rehearing Request and SPL's Motion for Leave to Answer for the limited purpose of further consideration.⁴³ We address Sierra Club's and SPL's arguments below.

III. DISCUSSION

A. The Rebuttable Presumption Derives from the Natural Gas Act

1. Sierra Club's Position

Sierra Club asserts that DOE/FE erred in finding that 3(a) of the NGA establishes a rebuttable presumption that exports of natural gas are in the public interest. Likewise, Sierra Club challenges the proposition that *Panhandle Producers & Royalty Owners Ass'n v. Economic Regulatory Administration*, 822 F.2d 1105 (D.C. Cir. 1987) (hereinafter *Panhandle Producers*) recognized a statutory presumption applicable to LNG export proceedings. Instead, Sierra Club submits the presumption addressed in *Panhandle Producers* applies only to import proceedings and was derived from DOE Policy Guidelines adopted in 1984, rather than the language of the NGA.⁴⁴

⁴² Sabine Pass Liquefaction, LLC, Motion for Leave to File Answer and Answer to Sierra Club's Requests for Rehearing and Stay, FE Docket Nos. 13-30-LNG, *et al.* (Aug. 11, 2015) [hereinafter SPL Answer].

⁴³ *Sabine Pass Liquefaction, LLC*, Order Granting Request for Rehearing and Motion for Leave to Answer for the Purpose of Further Consideration, FE Docket Nos. 13-30-LNG, *et al.* (Aug. 24, 2015).

⁴⁴ According to Sierra Club, the U.S. Court of Appeals for the District of Columbia Circuit in *Panhandle Producers* reviewed certain presumptions regarding natural gas imports set forth in DOE's *New Policy Guidelines and Delegation Orders from Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Imported Natural Gas*, 49 Fed. Reg. 6684 (Feb. 22, 1984) [hereinafter 1984 Policy Guidelines]. Sierra Club asserts that the "two specific rebuttable presumptions" arising from the 1984 Policy Guidelines are: (i) if the terms of a natural gas import contract are flexible enough, the natural gas will be delivered only if it is competitive; and (ii) if the imported gas is competitive, it will fill a domestic need.

Sierra Club further asserts that DOE cannot presume that “a project with adverse environmental impacts” is consistent with the public interest.⁴⁵ Sierra Club contends that it provided record evidence that affirmatively demonstrates that the Liquefaction Project is inconsistent with the public interest but that—even if DOE/FE were to determine that Sierra Club had not made this showing—DOE/FE must take a “hard look” at the environmental impacts of the Project under NEPA and determine whether these impacts are consistent with the public interest under the NGA.⁴⁶

2. SPL’s Answer

SPL disputes Sierra Club’s assertion that, in authorizing SPL’s exports, no presumption applies under the Natural Gas Act. SPL first contends that the plain statutory text is sufficient to show that a presumption applies here. Next, SPL reiterates that “section 3 sets out a general presumption favoring such authorization, by language which requires approval of an application unless there is an express finding that the proposed activity would not be consistent with the public interest.”⁴⁷ According to SPL, the *Panhandle Producers* case discussed by Sierra Club also makes clear that “§3 [of the Natural Gas Act] requires an affirmative showing of inconsistency with the public interest to deny an application.”⁴⁸ Finally, SPL disputes that NEPA nullifies the NGA section 3 presumption. SPL states that, because NEPA’s mandate is “essentially procedural,” NEPA does not mandate substantive results, such as conditioning the public interest inquiry under NGA section 3 on any particular environmental finding.⁴⁹

Rehearing Request at 1-2 (citing *Panhandle Producers*, 822 F.2d at 1111). Sierra Club further contends *Panhandle Producers* did not reach the question of whether any presumptions regarding imports or exports were compelled by the NGA. *Id.* at 2.

⁴⁵ Rehearing Request at 1-2 (and section heading).

⁴⁶ *Id.* at 2.

⁴⁷ SPL Answer at 6 (quoting *W. Va. Pub. Servs. Comm’n v. U.S. Dep’t of Energy*, 681 F.2d 847, 856 (D.C. Cir. 1982)).

⁴⁸ *Id.* (quoting *Panhandle Producers*, 822 F.2d at 1111).

⁴⁹ *Id.* at 6 (quoting *Grunewald v. Jarvis*, 776 F.3d 893, 903 (D.C. Cir. 2015) (internal quotation omitted)).

3. DOE/FE Analysis

The rebuttable presumption comes from the language of NGA section 3(a), which requires the Department to issue both export and import authorizations “*unless*, after opportunity for a hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.”⁵⁰ DOE interprets these words to mean that, for the Department to deny an application, it must make an affirmative finding based on record evidence that the proposed import or export is inconsistent with the public interest. The Department refers to this as a rebuttable presumption because, absent evidence demonstrating that a proposed export or import is inconsistent with the public interest, the Department must grant the requested authorization. Sierra Club claims that the court in *Panhandle Producers* “did not reach the question of whether any presumptions regarding imports or exports were compelled by the Natural Gas Act.”⁵¹ But, as SPL points out, the court in fact stated that “§ 3 [of the NGA] requires an affirmative showing of inconsistency with the public interest to *deny* an application.”⁵²

The rebuttable presumption in section 3(a) may affect the Department’s ultimate judgment whether to grant or deny an application, but it does not affect the Department’s obligations under NEPA. NEPA places an independent obligation on the Department to present information relating to the environmental impacts that may result from its decisions and to take a “hard look” at those impacts.⁵³ The rebuttable presumption has no bearing on these independent NEPA obligations and did not affect the Department’s performance of those obligations in this proceeding.

⁵⁰ 15 U.S.C. § 717b(a) (emphasis added).

⁵¹ Rehearing Request at 2.

⁵² *Panhandle Producers*, 822 F.2d at 1111 (emphasis in original); *see also id.* at 1112 (describing the court’s earlier decision in *West Virginia Pub. Serv. Comm. v. DOE*, 681 F.2d 847, 856 (D.C. Cir. 1982), as having “explicitly found that the statute created a presumption in favor of authorization.”).

⁵³ 42 U.S.C. § 4332.

As the record demonstrates, the Department took the “hard look” at SPL’s export proposal required by NEPA. The Department participated as a cooperating agency in FERC’s environmental review, independently reviewed the EA prepared by FERC, and adopted the 65 environmental conditions imposed by FERC in the Final Order.⁵⁴ In fulfilling its responsibilities under NEPA, the Department applied no presumptions regarding the potential environmental impacts associated with SPL’s proposed exports, as the record shows. We therefore reject Sierra Club’s arguments concerning DOE/FE’s interpretation of the NGA as it relates to the rebuttable presumption.

B. DOE/FE’s Analysis of Direct, Indirect, and Cumulative Environmental Effects Satisfied the National Environmental Policy Act

1. Sierra Club’s Position

Sierra Club asserts that DOE/FE’s environmental review failed to comply with NEPA because FERC’s EA, which DOE/FE adopted, “fails to take a hard look at DOE/FE’s proposed authorization of exports.”⁵⁵ Specifically, Sierra Club alleges that DOE/FE failed to cure the deficiencies in the EA or to supplement the EA to address the effects of SPL’s proposed exports, and therefore DOE/FE’s approval of SPL’s Applications violates NEPA.⁵⁶

Sierra Club first asserts that the Environmental Addendum and the LCA GHG Report are not substitutes for NEPA review, because they contradict one another, do not specify impacts associated with SPL’s Expansion Project, and thereby fail to inform the public and provide a basis for public comment.⁵⁷ Sierra Club maintains that, whether or not FERC did so, DOE/FE still was obligated to take a hard look at the environmental impacts of natural gas production

⁵⁴ See SPL Order at 223 (Ordering Para. H).

⁵⁵ See Rehearing Request 2-3.

⁵⁶ *Id.* at 3.

⁵⁷ See Rehearing Request at 3-4.

activities that would be induced by LNG exports—and specifically the impacts caused by SPL’s Project, which (on the date that the Order was issued) brought the total volume of approved non-FTA LNG exports to 9.99 Bcf/d of natural gas.⁵⁸ According to Sierra Club, induced production is a reasonably foreseeable consequence of increased demand for natural gas due to LNG exports.⁵⁹

Sierra Club next offers the National Energy Modeling System (NEMS) developed by the U.S. Energy Information Administration (EIA) as a methodology DOE/FE could have used to determine where, in what quantity, and under what circumstances exports would induce additional gas production.⁶⁰ Sierra Club contends the NEMS model underlying the Department’s 2012 LNG Export Study predicted how production would respond to exports.⁶¹ Sierra Club asserts that because NEMS is built on “play-level” modeling, EIA must have already developed forecasts of where production would increase in response to exports. Sierra Club maintains that, if EIA has not already undertaken this type of modeling, or if EIA’s modeling to date is insufficient to identify the impacts of SPL’s proposed exports, NEPA requires DOE to undertake or commission such modeling.⁶² In Sierra Club’s view, the geographic information provided by NEMS and other models provides an adequate basis for discussing many of the impacts of induced natural gas production.⁶³

⁵⁸ See *id.* at 7-8.

⁵⁹ See *id.* at 5-6.

⁶⁰ See *id.* at 9-10.

⁶¹ In 2011, the Department engaged the U.S. Energy Information Administration (EIA) and NERA Economic Consulting to conduct a two-part study of the economic impacts of LNG exports, collectively called the 2012 LNG Export Study. In relevant part, EIA published its study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, in January 2012, available at http://www.energy.gov/sites/prod/files/2013/04/f0/fe_eia_lng.pdf [hereinafter 2012 EIA Study]. Using the NEMS model, EIA examined the impact of two DOE/FE-prescribed levels of assumed natural gas exports (at 6 Bcf/d and 12 Bcf/d) under numerous scenarios and cases based on EIA’s 2011 projections. Both the 2012 EIA and NERA studies are discussed in detail in the SPL Order (§§ V, IX).

⁶² See Rehearing Request at 10-11.

⁶³ See *id.* at 9.

Sierra Club further argues that the environmental impacts of these additional natural gas production activities include increased generation of ozone precursors (*e.g.*, volatile organic compounds (VOCs) and hazardous air pollutants) and methane releases, resulting in additional GHG emissions into the atmosphere. Sierra Club contends that, once DOE determined the amount of additional natural gas production that would occur in specific shale plays (*e.g.*, the nearby Eagle Ford shale play), DOE could estimate the amount of VOC and nitrogen oxide (NO_x) emissions that would be emitted by that regional production and thereby estimate impacts on regional ozone levels.⁶⁴

Sierra Club further contends that the NEPA analysis should have examined environmental impacts that do not depend on geographic location, particularly climate impacts such as greenhouse gas (GHG) emissions from induced production.⁶⁵ Sierra Club maintains that the analysis of GHGs in the Addendum and other documents “falls far short” of the hard look required by NEPA, and that DOE erred when it found the impacts from the proposed exports and induced production in particular are beyond the scope of NEPA because it did not have direct regulatory authority over emissions and other effects of induced production.⁶⁶ Sierra Club contends that, at a minimum, DOE/FE should have estimated the amount of additional GHGs that would be emitted by the induced production and discussed their impact in the context of the U.S.’s ability to meet emission reduction targets, the social cost of GHG emissions, and any other appropriate metric.⁶⁷

⁶⁴ *Id.* at 10.

⁶⁵ *See id.* at 11.

⁶⁶ *See id.*

⁶⁷ Rehearing Request at 12.

Additionally, Sierra Club argues that DOE/FE's NEPA analysis was flawed because DOE did not examine the environmental impacts of switching from natural gas to coal in the generation of electricity, which Sierra Club contends could be induced by natural gas exports.⁶⁸ Sierra Club maintains that such fuel switching would be indirectly and cumulatively caused by the proposed LNG exports and asserts that these impacts should have been included in DOE/FE's NEPA analysis because they were reasonably foreseeable since they were discussed in the EIA 2012 Study. Sierra Club argues that, because "EIA modeled the effect this shift would have on nationwide greenhouse gas emissions," it is "plainly a reasonably foreseeable consequence of SPL's proposed exports, which required discussion in the EIS."⁶⁹

Sierra Club further argues that the reason given by DOE/FE in the SPL Order for not analyzing gas-to-coal fuel switching—that new and proposed federal rules would limit the use of coal for electric generation—violated NEPA because DOE/FE did not provide "any estimate of the *extent* to which these new or proposed rules would ... limit this switching."⁷⁰ Sierra Club contends that DOE/FE erred by not considering the potentially higher prices for domestic natural gas that would result if the new regulations do reduce coal-to-gas fuel switching. Sierra Club further contends that regulations that limit fuel switching would increase both natural gas prices and natural gas production in response to exports at a higher level than EIA predicted.⁷¹

Finally, Sierra Club argues that the Order does not distinguish between the indirect and cumulative impacts of the approved and pending LNG export applications, including SPL's exports at issue in this proceeding.⁷² Sierra Club maintains that DOE/FE should have assessed

⁶⁸ *See id.* at 16-17.

⁶⁹ Rehearing Request at 16-17.

⁷⁰ *Id.* at 17.

⁷¹ *See id.*

⁷² *See id.* at 18.

the “cumulative impacts of drilling induced by all other pending and foreseeable export proposals” as part of its cumulative impacts analysis.⁷³

2. SPL’s Answer

SPL disputes Sierra Club’s argument that DOE/FE should have issued its own NEPA analysis for the Liquefaction Expansion Project. SPL states that, consistent with the NEPA environmental review framework created by the Energy Policy Act of 2005, DOE properly served as a cooperating agency in FERC’s NEPA process, adopted the FERC EA, and issued a FONSI under NEPA.⁷⁴

Addressing Sierra Club’s arguments concerning “induced” upstream natural gas production, SPL contends that NEPA does not recognize “putative impacts” of emissions from increased domestic natural gas production and coal consumption allegedly induced by the Liquefaction Expansion Project.⁷⁵ SPL agrees with FERC that such putative impacts are not cognizable under NEPA and relevant caselaw, regardless of whether they are viewed as “indirect effects” or “cumulative impacts.”⁷⁶ In particular, SPL argues that “[b]road statistical data discussing general national trends’ are insufficient to create ‘reasonable foreseeability under NEPA.’”⁷⁷ SPL also contends that Sierra Club’s argument is based on a “lengthy chain of but-for causation”:

This lengthy and speculative chain of causation between an order under NGA Section 3 and a potential net increase in worldwide emissions depends on an activity—domestic natural gas production—whose ‘location and extent’ are ‘unknown’ and ‘too speculative,’ and over which the NGA gives DOE/FE and FERC ‘no jurisdiction’ by congressional design.⁷⁸

⁷³ *Id.*

⁷⁴ SPL Answer at 7 (citing, *e.g.*, 40 C.F.R. § 1506.3(c)).

⁷⁵ *See id.* at 8.

⁷⁶ *Id.*

⁷⁷ *Id.* at 9 (quoting *Coliseum Sq. Ass’n, Inc. v. Jackson*, 465 F.3d 215, 238 (5th Cir. 2006)).

⁷⁸ *Id.* at 16-17 (quoting FERC Rehearing Order at PP 12, 11).

Instead, SPL argues that natural gas exploration, production, and gathering, and the facilities used for these activities, are subject to extensive regulation by state and local agencies, as well as increasingly by EPA. SPL maintains that DOE/FE and FERC should not be deemed to have “caused”—and therefore to be responsible under NEPA for considering—effects that may occur regardless of their actions, and over which Congress did not intend them to have any control.⁷⁹

SPL next contends that NEPA did not require preparation of either the Addendum or the LCA GHG Report.⁸⁰ SPL maintains that neither document was intended to be an element of the NEPA review process for the Liquefaction Expansion Project. Pointing to language from the SPL Order, SPL states that the Environmental Addendum and LCA GHG Report provide useful generalized analyses, but do not attempt to provide specific, quantifiable information for a particular LNG project.⁸¹ SPL further argues that “the mere fact that DOE/FE commissions a projection of LNG exports’ hypothetical effects does not imbue those effects with reasonable foreseeability such that they are cognizable under NEPA.”⁸²

3. DOE/FE Analysis

a. Adequacy of the Environmental Assessment

Sierra Club does not challenge FERC’s choice of an EA in this proceeding instead of an environmental impact statement (EIS) or DOE/FE’s adoption of the EA in lieu of an EIS. Rather, Sierra Club argues that “FERC’s EA fails to take a hard look at DOE/FE’s authorization of exports,” and that “DOE/FE failed to cure the deficiencies in the EA or to supplement the EA to address the effects of this particular DOE/FE action [*e.g.*, SPL’s proposed exports].”⁸³

⁷⁹ SPL Answer at 17 (citations omitted).

⁸⁰ *See id.* at 20.

⁸¹ *See id.*

⁸² *Id.* at 21.

⁸³ Rehearing Request at 3.

We disagree. As noted above and in the SPL Order (at 64), FERC determined that an EA was appropriate for the Liquefaction Expansion Project because (among other reasons) the two additional liquefaction trains (Trains 5 and 6) will be located entirely within the footprint of the existing Sabine Pass LNG Terminal site.⁸⁴ On this basis, DOE/FE independently reviewed and adopted the EA, and properly issued a FONSI on the basis of both the EA and the 65 environmental conditions adopted by FERC in its Final Order (including the original 64 environmental conditions recommended by FERC staff in the EA). Insofar as Sierra Club is suggesting that the EA was required to assess the environmental impacts associated with the induced natural gas production attributable to the Liquefaction Expansion Project, we reject this argument for the reasons set forth below.

b. Induced Natural Gas Production

The CEQ regulations implementing NEPA require that agencies consider the “indirect effects” of proposed actions. “Indirect effects,” the regulations provide, “are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.”⁸⁵ Courts have articulated two principles useful in interpreting this provision. The first is that NEPA requires “a reasonably close causal relationship” between the environmental effect and the alleged cause.⁸⁶ The Supreme Court has stated that “a ‘but for’ causal relationship is insufficient to make an agency responsible for a particular effect under NEPA and the relevant regulations.”⁸⁷ Rather, in considering the strength of the causal relationship required by NEPA, the Supreme Court has “analogized . . . to the ‘familiar doctrine of proximate cause from tort

⁸⁴ FERC Order at P 30.

⁸⁵ 40 C.F.R. § 1508.8(b); *see also* 10 C.F.R. § 1021.200 (adopting CEQ’s regulations for the Department).

⁸⁶ *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983).

⁸⁷ *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 767 (2004) [hereinafter *Public Citizen*].

law,” instructing courts to “look to the underlying policies or legislative intent in order to draw a manageable line between those causal changes that may make an actor responsible for an effect and those that do not.”⁸⁸ The second principle is that “inherent in NEPA and its implementing regulations is a ‘rule of reason.’”⁸⁹ With respect to indirect effects, the rule of reason counsels that agencies are not required to address remote or speculative consequences, where insufficient information is available to permit meaningful consideration.⁹⁰

Sierra Club claims the Department violated NEPA by failing to consider the environmental impacts of increased natural gas production that may result indirectly from authorizing SPL to export LNG to non-FTA countries. The causal relationship Sierra Club posits is an economic one. Sierra Club argues that a decision to authorize exports of natural gas from the United States to non-FTA countries may increase the price of natural gas in the United States, and therefore concludes the Department must examine the consequences of that potential price increase, including increased domestic production of natural gas and increased consumption of coal, which competes with natural gas as a fuel for electric generation. We do not read Sierra Club’s Rehearing Request to argue that the Department must examine the environmental impacts of producing the very molecules of natural gas that will be exported by SPL. Rather, we understand Sierra Club to contend that the Department must examine the

⁸⁸ *Id.* (quoting *Metro. Edison Co.*, 460 U.S. at 774 n.7).

⁸⁹ *Id.* (citation omitted).

⁹⁰ *See, e.g., N. Plains Res. Council v. Surface Transp. Bd.*, 668 F.3d 1067, 1078 (9th Cir. 2011) (“Each project is different, and the agency is required to rationally explain its decision in the context of project-specific effects.”); *Hammond v Norton*, 370 F. Supp. 2d 226, 241 (D.D.C. 2005) (“The setting of the objectives and the range of alternatives to be considered by an agency are governed by a ‘rule of reason.’ All that NEPA requires is that the agency weigh all reasonable alternatives and come to a fully-informed decision.”); *Hoosier Envtl. Council v. U.S. Army Corps of Engineers*, 105 F. Supp. 2d 953, 974-975 (S.D. Ind. 2000) (upholding issuance of a permit to a casino riverboat, in part, because associated indirect effects were “tenuous and speculative” and therefore excluded from NEPA analysis under the “rule of reason”).

environmental impacts of the economically marginal natural gas production that may be induced as a result of granting an export authorization to SPL and other similarly situated applicants.

The Department does not dispute the economic logic that authorizing exports of natural gas to non-FTA countries could, all else equal, exert upward pressure on domestic natural gas prices as foreign purchasers compete with domestic purchasers. Nor does the Department dispute that higher natural gas prices could lead to increased natural gas production at the national level, among other potential economic consequences (including decreased domestic consumption of natural gas, increased pipeline imports of natural gas from Canada, and increased use of competing resources). Indeed, EIA's 2012 Study modeled the effects that exporting natural gas at levels of 6 and 12 Bcf/d at "rapid" and "slow" ramp-up scenarios could have on the energy sector.⁹¹ EIA projected that "[u]nder Reference case conditions, about 63 percent, on average, of the increase in exports in each of the four scenarios is accounted for by increased production [of natural gas], with most of the remainder from decreased consumption [of natural gas] from 2015 to 2035."⁹² EIA further projected that, of the increased production, over 90% would come from unconventional sources, such as shale gas, tight gas, and coalbed methane.⁹³

Although natural gas exports may increase domestic production *at the margin*, we reject the conclusion that the environmental impacts of such marginal production are "reasonably foreseeable" within the meaning of the CEQ's regulations and the applicable case law. To the contrary, it would be impossible to identify with any confidence the marginal production at the wellhead or local level that would be induced by SPL's exports from the Liquefaction Expansion

⁹¹ See 2012 EIA Study, *supra* note 61, at 1; SPL Order 25-27.

⁹² 2012 EIA Study, *supra* note 61, at 10.

⁹³ *Id.* at 11 (cited in SPL Order at 150 n.203).

Project over the period of its non-FTA authorization. Natural gas will be produced in substantial quantities across the United States regardless of how the Department rules on SPL's

Applications. As the Department observed in the Order:

There is ... fundamental uncertainty as to where any additional production would occur and in what quantity. As the Addendum illustrates, nearly all of the environmental issues presented by unconventional natural gas production are local in nature, affecting local water resources, local air quality, and local land use patterns, all under the auspices of state and local regulatory authority. As DOE explained in *Sabine Pass*, DOE/FE Order No. 2961-A, without knowing where, in what quantity, and under what circumstances additional gas production will arise, the environmental impacts resulting from production activity induced by LNG exports to non-FTA countries are not 'reasonably foreseeable' within the meaning of the CEQ's NEPA regulations.⁹⁴

Further, insofar as SPL's Applications in this proceeding are viewed cumulatively with other similar applications to export LNG to non-FTA countries, the Department has observed that there is considerable market uncertainty regarding the aggregate quantity of exports that will ultimately materialize:

[T]here is uncertainty as to the aggregate quantity of natural gas that ultimately may be exported to non-FTA countries. Receiving a non-FTA authorization from DOE/FE does not guarantee that a particular facility would be financed and built; nor does it guarantee that, if built, market conditions would continue to favor export once the facility is operational. To illustrate the point, of the more than 40 applications to build new LNG import facilities that were submitted to federal agencies between 2000 and 2010, only eight new facilities were built and those facilities have seen declining use in the past decade.⁹⁵

Sierra Club emphasizes the potential for economic modeling tools, such as EIA's NEMS model, to render the environmental impacts of export-induced production reasonably

⁹⁴ SPL Order at 199 (citations omitted).

⁹⁵ *Id.* at 198-99.

foreseeable. But where, as here, it is fundamentally uncertain how natural gas production at the local level will respond to price changes at the national level, an environmental analysis attempting to quantify local impacts would be more misleading than informative.⁹⁶ Economic modeling results are a product of the parameters that are entered into the model. In this context, the key parameter that would be used as a modeling input is the price elasticity of natural gas production, estimated at a sufficiently local level so as to analyze how the production would impact specific natural resources and human health. But, due to the limitations of estimating geology at the local level—as well as the uncertainties of predicting local regulation, land use patterns, and the development of supporting infrastructure—estimating the price elasticity of natural gas supply at the local level is much more speculative than doing so at the national level where local idiosyncrasies are averaged out.

Sierra Club’s argument concerning “play level” modeling also does not persuade us that the environmental impacts of induced production are reasonably foreseeable. The term “plays” refers to subsurface geologic formations containing substantial quantities of natural gas and may be used in reference to shale gas⁹⁷ or tight gas.⁹⁸ The shale plays, to which we believe Sierra Club is referring, overlap and stretch for thousands of square miles below diverse surface environments.⁹⁹ While the size of the shale plays makes them more reliable units for generating projections from economic models than smaller units such as counties, their size also makes

⁹⁶ See *Mayo Found. v. Surface Transp. Bd.*, 472 F.3d 545, 555-56 (8th Cir. 2006) (rejecting Sierra Club’s argument that the Surface Transportation Board must use the NEMS model as the basis for analyzing local-level environmental impacts).

⁹⁷ Addendum at 6, Fig. 2 (Approximate Locations of Current Producing Gas Shales and Prospective Shales).

⁹⁸ See *id.* at 7, Fig. 3 (Location of Currently Active Areas for Tight Sand Development and Production).

⁹⁹ See *id.* at 54, Table 13 (Attributes of Major Shale Gas Plays in the United States) (estimating the size of seven major shale plays ranging from 5,000 square miles for the Barnett Shale to 95,000 square miles for the Marcellus Shale). Each of the active shale basins is different and has a unique set of exploration criteria and operational challenges. See *id.* at 6.

them less useful units for analyzing impacts to environmental resources such as air,¹⁰⁰ water,¹⁰¹ or land.¹⁰² An economic model that estimated induced production across each shale play would provide no information about where any incremental production would arise within those shale plays and would not render the environmental impacts of such production reasonably foreseeable in a manner that would facilitate meaningful analysis.

Such an analysis would also be without limit. Because the price elasticity of natural gas production is likely to be positive in every producing region in the country and because there is a robust interstate pipeline system in the United States, it is likely that upward pressure on natural gas prices nationally could encourage at least some additional production in every producing region in the lower-48 states. The logic of Sierra Club's argument, therefore, would compel the Department, before acting on an application to export natural gas, to undertake an environmental impact statement or environmental assessment that examines separately the environmental impacts of natural gas production in every producing region in the country. Were such a requirement law, it would impose an unreasonable and unrealistic burden on the Department's ability to act on the LNG export applications before it. And the weight of this burden would be

¹⁰⁰ Air pollutants largely concentrate in the local area in which they are emitted. Without knowing where incremental natural gas production will occur within a particular shale play, the impacts to air quality of such production cannot be well understood. For example, with respect to ozone—the only air pollutant Sierra Club describes as amenable to regional discussion—the Addendum presents a map that overlays ozone non-attainment zones with the shale basins. *See* Addendum at 29, Fig. 8 (National Map Showing Ozone Nonattainment Areas Superimposed on Major Shale Gas Basins). The non-attainment zones appear near urban areas and bear little recognizable relationship to the subsurface geology. Without knowing where in relation to existing ozone concentrations the incremental production would occur, the play-level modeling Sierra Club urges would not enable DOE/FE to characterize the environmental and human health impacts posed by such production.

¹⁰¹ *See* Addendum at 10-19 (describing potential impacts to water quantity and quality, and concluding that “specific impacts to water resources cannot be predicted even on a regional level”).

¹⁰² Given the geographic expanse of the shale plays, characterizing the land use impacts of new, incremental wells would not be possible without knowing where those new wells would be located. On this point, Sierra Club suggests that DOE/FE simply could have estimated how many wells in each play would be necessary to meet projected export demand. Absent an understanding of what land would be affected, however, an attempt to estimate the total number of wells would not have meaningfully informed our decision.

misplaced: Unlike state and local regulators, or other federal agencies such as EPA and the U.S. Department of the Interior, the Department of Energy lacks any authority to regulate the environmental effects of natural gas production, much less to address issues identified at the local, regional, or play level.

In sum, there is no “reasonably close causal relationship” between any particular environmental impacts of induced natural gas production and the Department’s decision in this case.¹⁰³ The causal chain linking the Department’s decision to environmental impacts resulting from induced natural gas production is probabilistic and attenuated—not close and proximate as the Supreme Court has stated must be evident to bring the effects within the scope of NEPA review.

Nevertheless, even though the environmental impacts of induced natural gas production are not “reasonably foreseeable,” the Department has taken all reasonable steps to ensure that its public interest review was informed by a consideration of the general environmental impacts of natural gas production. On June 4, 2014, DOE/FE issued the draft Addendum, which, as noted above, presented a discussion of environmental issues associated with unconventional gas production in the lower-48 states based on DOE’s review of existing literature, regulations, and best management practices. The Addendum focused on the environmental impacts of unconventional natural gas production in the United States because of the projections by EIA in its 2012 Study that over 90% of incremental production resulting from exports would come from unconventional sources (i.e. shale gas, tight gas, and coalbed methane). The Addendum contained chapters separately considering water resources, air quality, greenhouse gases, induced seismicity, and land use impacts.¹⁰⁴ After a 45-day comment period, the Department received

¹⁰³ *Metro. Edison Co.*, 460 U.S. at 774.

¹⁰⁴ *See* SPL Order at 149-58 (summarizing the Addendum’s findings).

40,745 comments on the Addendum in 18 separate submissions, including comments from Sierra Club and its members. On August 15, 2014, the Department issued a final version of the Addendum, with textual changes resulting from the comments and a comment response chapter addressing each discrete issue raised in the comments. Although the Department has consistently maintained that an analysis of the environmental impacts of induced natural gas production falls outside the scope of what NEPA requires, the Department nonetheless observed NEPA's procedural requirements in publishing and taking comments on the Addendum.

In its Rehearing Request, Sierra Club argues that the Addendum fails to satisfy the NEPA obligation it believes the Department has with respect to induced natural gas production. First, Sierra Club claims that the Addendum cannot be used for NEPA compliance because “the Addendum and NETL reports . . . reach different conclusions regarding [1] the potency of methane as a greenhouse gas and [2] the amount of air pollution emitted by natural gas production.”¹⁰⁵ On the former point, the Department's reasoning for selecting the global warming potential (GWP) for methane used in the LCA GHG Report is explained below in Section III.D.2. The claim that the Addendum reached a “different conclusion[]” than the LCA GHG Report regarding the GWP for methane¹⁰⁶ mischaracterizes the Addendum's objective. The Addendum did not seek to resolve scientific uncertainty regarding the heat-trapping effects of methane. Rather, the Addendum sought to explain what was known on this subject in order to inform this proceeding. To that end, the Addendum explained that it had included the carbon dioxide equivalency factor for methane used in the 2007 Intergovernmental Panel on Climate Change's (IPCC) report in Table 7 “to maintain consistency with the EPA's Inventory reports and to allow usage of EPA's estimate for total greenhouse gas emissions from all sources,” but it

¹⁰⁵ Rehearing Request at 4.

¹⁰⁶ *Id.*

also described the values from the most recent IPCC reports (then in draft) as well as those of other scholars.¹⁰⁷ Finally, there was no inconsistency in the conclusions regarding air pollution emissions for the reasons explained herein.

Second, Sierra Club claims that the Addendum is inadequate because it does not “consider the effects of the particular proposal under consideration.”¹⁰⁸ But, to the extent that SPL’s proposal leads to additional unconventional natural gas production in the United States, then surely the Addendum does inform DOE/FE’s consideration of the effects of the proposal in its description of how unconventional gas production impacts various resource areas and, where relevant, how those impacts vary geographically. The Addendum did not attempt, however, to quantify the environmental impacts associated with SPL’s proposed exports or to apportion any potential environmental impacts across the many production areas currently active across the United States. For the reasons above, we believe that the speculative nature of such an effort would have made it of dubious value to our public interest review.

c. Increased Use of Coal

Sierra Club argues that the Department must examine the possible increased use of coal in electric power generation that may result from the Department’s decision in this case. Sierra Club’s argument centers on EIA’s 2012 Study, which (according to Sierra Club) projected that the increased price of natural gas resulting from exports of LNG leads to additional use of coal because coal competes with natural gas on price as a fuel for electric power generation.¹⁰⁹

The causal relationship between the Department’s decision in this proceeding and the level of coal generation in the United States is even more attenuated than its relationship to

¹⁰⁷ Addendum at 87 (DOE Response), 36.

¹⁰⁸ Rehearing Request at 8.

¹⁰⁹ *See id.* at 16-17.

induced natural gas production. In effect, Sierra Club is arguing that any time a federal agency takes an action that will affect the supply or demand of a commodity, it must examine the impacts of producing or consuming that commodity, as well as the impacts of producing or consuming the *substitute* commodities with which it competes. What Sierra Club is proposing goes far beyond what the Supreme Court described must be a “manageable line” defining the scope of review required by NEPA.¹¹⁰

We also believe that certain assumptions underlying EIA’s projections in its 2012 Study—specifically, the estimated increase in coal consumption arising from higher natural gas prices—are now out of date. As we observed in our Order, EIA’s projections assume continuation of the regulations in force at the time of its analysis. EIA prepared the 2012 Study before several EPA rulemakings had been finalized. Most significantly, in the fall of 2015, EPA finalized rules that impose limits on GHG emissions from both new and existing coal-fired power plants. Effective October 23, 2015, EPA implemented a final rule that limits carbon dioxide emissions from new coal-fired electric-generating units.¹¹¹ EPA also issued a final rule to take effect on December 22, 2015, that is designed to limit carbon dioxide emissions from existing coal-fired electric generating units.¹¹²

¹¹⁰ *Public Citizen.*, 541 U.S. at 767 (quotation and citation omitted).

¹¹¹ U.S. Env’tl. Protection Agency, Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,510 (Oct. 23, 2015).

¹¹² U.S. Env’tl. Protection Agency, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (effective Dec. 22, 2015). On February 9, 2016, the U.S. Supreme Court issued a stay of the effectiveness of this rule pending review. *See Chamber of Commerce, et al. v. EPA, et al.*, Order in Pending Case, 577 U.S. ____ (2016).

C. DOE/FE Complied with the Endangered Species Act and the National Historic Preservation Act

1. Sierra Club's Position

Sierra Club argues that, because the EA “covered only the site-specific impacts rather than the impacts from induced upstream natural gas production,” it fails to comply with both the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA).¹¹³

Addressing section 7 of the ESA, Sierra Club asserts that DOE must consider the “effects of increased gas production across the full region the [Liquefaction Expansion Project] affects” in determining whether its approval of SPL’s proposed exports may affect listed species or critical habitat.¹¹⁴

Sierra Club states that, similarly, DOE must fulfill its obligations under the NHPA to “take into account the effect of the undertaking [*i.e.*, SPL’s proposed exports] on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.”¹¹⁵ Specifically, Sierra Club argues that DOE must initiate the NHPA section 106 consultation and analysis process, and that “[t]he area of potential effects [under NHPA regulations] should sweep quite broadly ... because ... the reach of SPL’s proposal extends to the entire area in which it will increase [natural] gas production.”¹¹⁶

2. SPL's Answer

SPL contends that Sierra Club’s ESA and NHPA challenges miss the mark for two reason: (i) FERC is “the lead agency for purposes of coordinating all applicable Federal

¹¹³ Rehearing Request at 24.

¹¹⁴ *Id.* (citing, *inter alia*, 50 C.F.R. § 402.14(a)).

¹¹⁵ *Id.* (quoting 16 U.S.C. § 470f).

¹¹⁶ *Id.* at 25.

authorizations,”¹¹⁷ and (ii) neither the ESA nor the NHPA require the kind of nationwide assessment on which Sierra Club insists. SPL argues that an action’s “effects” under the ESA are more restrictively defined than under NEPA, in that they must be “reasonably certain to occur” under the ESA rather than “reasonably foreseeable” under NEPA.¹¹⁸ SPL therefore argues that, for the same reasons that induced additional natural gas production is not a cognizable effect under NEPA, it is also not a cognizable effect under the ESA. SPL also states that additional natural gas production may occur independent of the Liquefaction Expansion Project, and thus cannot be considered “interrelated” or “interdependent” with the Liquefaction Expansion Project for purposes of ESA analysis.¹¹⁹

Turning to the NHPA claims, SPL maintains that the NHPA does not require consideration of nationwide effects. According to SPL, the pertinent analysis area is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties,” and can vary depending on the nature of the action.¹²⁰ SPL argues that, as with NEPA, “indirect and cumulative effects must be both ‘reasonably foreseeable’ and ‘caused by’ the Federal action,” and thus the inducement of additional natural gas production falls outside of the scope of analysis required by the NHPA for the reasons stated by SPL above.¹²¹

3. DOE/FE Analysis

As the lead agency for the purposes of coordinating all applicable Federal authorizations and for the purposes of complying with NEPA, FERC established the scope of review for the

¹¹⁷ SPL Answer at 22 (quoting 15 U.S.C. § 717n(b)(1)).

¹¹⁸ *Id.* (quoting ESA definition of “effects of the action,” 50 C.F.R. § 402.02).

¹¹⁹ *See id.* at 22-23 (quoting 50 C.F.R. § 402.02).

¹²⁰ *Id.* at 23 (quoting 36 C.F.R. § 800.16(d)).

¹²¹ *Id.* (quoting 36 C.F.R. § 800.5(a)(1)).

Liquefaction Expansion Project in the EA, which DOE/FE adopted in its FONSI issued concurrently with the SPL Order on June 26, 2015. Sierra Club does not question the completeness of FERC’s analysis of the ESA and NHPA issues that fall within the scope of the EA. The Louisiana State Historic Preservation Office (SHPO) agreed with FERC’s determination that the Liquefaction Expansion Project would not affect historic properties.¹²² Under the ESA, SPL assisted FERC in meeting its Section 107 obligations by conducting informal consultations with the U.S. Fish and Wildlife Service and other agencies, and identifying two federally listed endangered bird species and one “candidate species” for federal listing that may occur in the Liquefaction Expansion Project area.¹²³ The U.S. Fish and Wildlife Service and the Louisiana Department of Wildlife and Fisheries determined that the Liquefaction Expansion Project would not impact any of these three species.¹²⁴

Nonetheless, Sierra Club argues that DOE/FE failed to comply with Section 7 of the ESA and Section 106 of the NHPA because “the EA covered only the site-specific impacts rather than the impacts from induced upstream natural gas production.”¹²⁵ Sierra Club contends that DOE must look “nationally” to comply with the ESA and the NHPA—a contention that SPL disputes. DOE need not repeat its arguments with respect to the appropriate scope of review over indirect effects except to observe that conducting a national consultation regarding species and historic property impacts would add greatly to the burden of acting on applications to export natural gas

¹²² EA at 23 (Table 1.9-1), 77-78; *see also id.* 78 n.14 (noting that “[t]he terminal property had been evaluated before by both federal and state agencies for multiple projects, including the Sabine Pass LNG Import Terminal ... and the Sabine Pass Liquefaction Project For these projects, the Louisiana SHPO indicated that no known historic properties would be affected by any of these previous projects within the terminal property).

¹²³ *See id.* at 53.

¹²⁴ *See id.* at 53-55. In the EA (at 187), FERC staff included one mitigation measure (#18) requiring the Pipeline Expansion Project to consult with the U.S. Fish and Wildlife Service to determine if surveys for one of the federally listed bird species were necessary and to file the results of that consultation with the Secretary of DOE. FERC adopted this environmental condition in its Order.

¹²⁵ Rehearing Request at 24.

to non-FTA countries. Moreover, the inability to predict at a local level the volumes of induced natural gas production would make the ESA and NHPA analyses more speculative than informative.

D. The Methodology Underlying the Life Cycle Greenhouse Gas (LCA GHG) Report Was Reasonable

1. Methane Leakage Rate

a. Sierra Club's Position

Sierra Club charges that DOE/FE has not adequately justified the methane leakage rate implied by the LCA GHG Study as compared to higher leakage rates estimated by other life cycle analyses.¹²⁶ Sierra Club states that the 1.2 percent leakage rate estimate attributed to NETL in the SPL Order is lower than the “expected” cradle-to-liquefaction leakage rates provided by NETL in the LCA GHG Report—1.3 percent for conventional onshore production and 1.4 percent for shale gas production.¹²⁷ Sierra Club points out that, in the Addendum, NETL refers to five major studies that account for the GHG emissions from upstream natural gas, including three (Howarth, Burnham, and Weber)¹²⁸ that either provide or imply an estimate of methane leakage rates. Sierra Club claims that all of these studies estimate much higher methane leakage than does NETL, and states that “[w]hile NETL provided a basis for disagreeing with the highest of these estimates, [the Howarth study], nothing in the record explains why NETL’s estimate is superior to Burnham and Weber.”¹²⁹

¹²⁶ *See id.* at 13.

¹²⁷ *Id.*

¹²⁸ *See, e.g.,* Burnham, Andrew, *et al.* Life-cycle greenhouse gas emissions of shale gas, natural gas, coal, and petroleum. *Environmental Science & Technology* 46.2 (2011): 619-627 [hereinafter Burnham study]; Weber, Christopher L., and Christopher Clavin. Life cycle carbon footprint of shale gas: Review of evidence and implications. *Environmental science & technology* 46.11 (2012): 5688-5695 [hereinafter Weber study].

¹²⁹ Rehearing Request at 13.

According to Sierra Club, DOE/FE correctly noted in the Order that the boundary conditions applied in the Burnham study differed from those in the LCA GHG Report, in that NETL reviewed “cradle-through-transmission” whereas Burnham included the additional step of distribution. Sierra Club maintains that the vast difference in methane emission estimates cannot be explained by the difference in boundary conditions or by other differences between NETL and the Burnham study. According to Sierra Club, Burnham estimated that 0.28 percent of methane produced was emitted during distribution, and that subtracting this 0.28 percent from Burnham’s total estimate leaves a cradle-through-transmission leak rate of 2.47 percent for conventional onshore gas and 1.73 percent for unconventional gas.¹³⁰

Sierra Club also addresses the statement in the Order that the Weber study made no mention of leakage rate. Sierra Club acknowledges that the Weber study does not discuss emissions in terms of leakage rate, but contends that the emissions estimates in the Weber study imply the same leakage rate that is set out in NETL’s Unconventional Production Report and asserts that this leakage rate is explained by Bradbury 2013,¹³¹ as discussed in the NETL reports. Sierra Club contends: “Because NETL already determined that the Weber team’s conclusions could be expressed as a leakage rate estimate, DOE cannot now argue that this work has no bearing on the appropriate estimate of leakage rates or, ultimately, methane emissions.”¹³²

Sierra Club also argues that the Department should have modeled methane emissions using “top-down” rather than “bottom-up” studies. Sierra Club cites five top-down studies that it claims estimate higher methane leakage rates of generally 3 percent or more on the basis of

¹³⁰ *See id.*

¹³¹ Bradbury, J., Obeiter, M., Draucker, L., Wang, W., & Stevens, A. (2013). Clearing the Air: Reducing Upstream Greenhouse Gas Emissions from U.S. Natural Gas Systems. Retrieved March 31, 2014, from <http://www.wri.org/publication/clearing-air>.

¹³² Rehearing Request at 13-14.

atmospheric measurements. According to Sierra Club, the Order acknowledges that top-down studies do not generally match bottom-up calculations due to different boundaries, but Sierra Club maintains that DOE/FE did not explain why the boundaries used in bottom-up studies are more appropriate.¹³³

Based on Brandt 2014 and other research,¹³⁴ Sierra Club maintains that bottom-up estimates are likely to be inaccurate. Sierra Club states that “nothing in Brandt indicates that the broader top-down estimates, such as Miller 2013, are *not* representative, and that the 3% leak rate indicated by Miller is more than double the rate used by DOE.”¹³⁵ Sierra Club recognizes that leakage rate is an output of, rather than an input to, NETL’s model. But Sierra Club’s maintains that NETL’s model produces an output that is so inconsistent with the outputs of other models that there is either a problem with the inputs to NETL’s model or with the model itself.¹³⁶ According to Sierra Club, DOE/FE did not provide a rational basis for using the NETL estimates instead of a higher methane leakage rate estimated by such top-down studies.

b. SPL’s Answer

SPL argues that Sierra Club’s criticisms of the methodologies underlying the LCA GHG Report lack specificity to the Liquefaction Expansion Project, and were already addressed in the Order.

¹³³ See *id.* at 14.

¹³⁴ See Brandt, A.R., *et al.* (2014) Methane Leaks from North American Natural Gas Systems. *Science* 343(6172), pp. 733-735 [hereinafter Brandt study]. Sierra Club also notes that, on June 19, 2014, after DOE/FE had released the draft Addendum and the LCA GHG Report, a new study by researchers at Carnegie Mellon and the National Oceanic and Atmospheric Administration was published that, Sierra Club claims, concludes that the most likely methane leakage rate is between 2 percent and 4 percent. See Rehearing Request at 15 & n.33 (citing Stefan Scheietzke *et al.*, “Natural Gas fugitive emissions rates constrained by global atmospheric methane and ethane,” *Environmental Science & Technology* (June 19, 2014), DOI: 10.1021/es50104c)). Although Sierra Club does not explain whether this study used a top-down or bottom-up modeling approach, its assertions regarding the study nevertheless are untimely. Sierra Club did not mention the study in its comments on the LCA GHG Report submitted to DOE/FE on July 21, 2014, and DOE/FE will not consider new evidence on rehearing.

¹³⁵ Rehearing Request at 14.

¹³⁶ *Id.* at 15.

c. DOE/FE Analysis

The average methane leakage rate estimated in the LCA GHG Report is reasonable. Sierra Club is correct that NETL determined 1.3 percent and 1.4 percent to be the methane leakage rates for natural gas extracted using conventional extraction methods and extracted from the Marcellus Shale, respectively, as shown in Table 5-1 of the LCA GHG Report. But, as DOE/FE has explained, NETL determined that 1.2 percent is the expected “cradle-through-transmission” leakage rate for the *average* mix of domestic natural gas, which includes seven extraction sources. The contribution of the other five sources of domestic natural gas (offshore, associated, tight gas, Barnett Shale, and coal bed methane) lower the average methane leakage to 1.2 percent, below the 1.3 percent and 1.4 percent reported for actual gas extracted using conventional on-shore extraction and from the Marcellus Shale. This means that the extraction, processing, and transmission of 1 kg of natural gas¹³⁷ in the United States releases 0.012 kg of methane to the atmosphere from the average mix of natural gas produced in the United States (excluding Alaskan production). Thus, NETL’s expected value and range on methane emission rates are calculated results that capture the underlying uncertainty and variability of the natural gas system average performance. This approach results in a reasonable estimate, and we reject Sierra Club’s arguments to the contrary.

We also reject Sierra Club’s assertion that NETL’s methane leakage rate is significantly lower than those used or calculated by other bottom-up studies. The Weber study reconciled the boundaries from six studies (including work by NETL and Burnham), and demonstrated that the

¹³⁷ As a convention to improve comparability to other studies, NETL expresses leakage rate using delivered natural gas as a denominator; that is, methane emissions per unit of delivered natural gas, not methane emissions per unit of delivered methane.

expected values and uncertainty ranges of NETL's upstream natural gas GHG emissions closely match the results for most other studies.

We likewise reject Sierra Club's argument that DOE/FE should have used a "top-down" approach to derive a methane leakage rate.¹³⁸ In the Order, DOE/FE responded by noting that researchers are currently working to discern why top-down studies do not match bottom-up studies. DOE/FE also noted that, as research continues, scientists expect to learn more about the differences between these two types of methodologies.¹³⁹

With that caveat in mind, our judgment is that, based on the scientific studies available at the time the analysis in this proceeding was performed, bottom-up studies are a more appropriate basis for analysis of methane emissions from U.S. natural gas systems than available top-down studies. The broad boundaries of top-down measurements may capture all emissions from natural gas production facilities within a study region; however, these emissions are not always distinguishable from emissions from nearby oil production activities, or emissions from other sectors that operate in the same region such as agriculture. Further, top-down measurements capture methane emissions only at a particular place and time. Thus, in the Order, we discussed the role of temporal and geographical representativeness as potential reasons for the differences between top-down and bottom-up results, while at the same time noting that research into that question is continuing. The top-down studies cited by Sierra Club represent valuable research

¹³⁸ Rehearing Request at 14-16. For purposes of this discussion, bottom-up *data* account for emissions at the device level (*e.g.*, liquid unloading equipment, compressors, etc.), and bottom-up *models* aggregate multiple processes to compose a system. In contrast, top-down *data* account for emissions from an entire system (*e.g.*, a sector or geographical region), and top-down *models* apportion system emissions to the products of the system. Currently, the bottom-up models for natural gas systems are based mostly on engineering relationships and represent long-term operating regimes, while top-down models for natural gas systems represent measurements collected for specific regions during narrow time frames. *See* SPL Order at 183.

¹³⁹ *See* SPL Order at 183.

that advance our understanding of methane emissions, but do not form a robust basis for estimating the leakage rate from U.S. natural gas systems in the aggregate.

2. Global Warming Potential of Methane

a. Sierra Club's Position

Sierra Club claims that the LCA GHG Report erroneously “understates the impact of each ton of methane pollution”¹⁴⁰ and that DOE/FE should have used Global Warming Potential (GWP)¹⁴¹ estimates drawn from the IPCC that include climate carbon feedbacks.¹⁴² Sierra Club contends these estimates would have yielded a 20 percent higher GWP. According to Sierra Club, the IPCC has stated that including the climate-carbon feedback for methane and other non-carbon dioxide greenhouse gases—in which an increase in the atmospheric temperature causes a further increase in atmospheric concentration of carbon dioxide—provides a better estimate of the metric value. Sierra Club therefore argues that DOE should have used the IPCC’s 20-year and 100-year fossil methane global warming potentials of 87 and 36, respectively.¹⁴³ Without providing a calculation or citation, Sierra Club asserts that using a GWP value of 36 for methane increases the life cycle GHG emissions from the scenarios by 20 percent relative to those calculated by NETL using a GWP value of 30.¹⁴⁴

¹⁴⁰ Rehearing Request at 15.

¹⁴¹ GWP is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide. The larger the GWP, the more that a given gas warms the Earth compared to carbon dioxide over that time period. The time period usually used for GWPs is 100 years. GWPs provide a common unit of measure, which allows analysts to add up emissions estimates of different gases (*e.g.*, to compile a national greenhouse gas inventory), and allows policy-makers to compare emissions-reductions opportunities across sectors and gases. See U.S. Env'tl. Protection Agency, *Understanding Global Warming Potentials*, <http://www.epa.gov/climatechange/ghgemissions/gwps.html> (last updated Feb. 23, 2016).

¹⁴² Rehearing Request at 15.

¹⁴³ See *id.* (citing Sierra Club’s Climate Comment at 12).

¹⁴⁴ See *id.* at 15-16.

b. DOE/FE Analysis

The LCA GHG Report addresses an area of scientific study—the study of life cycle GHG emissions—that is constantly evolving. In the Report, NETL acknowledges the wide range of scenario variability, the uncertainty in the underlying modeled data, and other study limitations arising from this subject matter.¹⁴⁵ As explained below, NETL and DOE/FE made a reasoned evaluation of the scientific facts then-available concerning the potential impacts of U.S. LNG exports on global GHG emissions.

NETL selected the GWP values and other parameters for its LCA GHG Report in the fall of 2013. At that time, working group papers for the IPCC's Fifth Assessment Report¹⁴⁶ were available in draft form. For the first time, those analyses produced two sets of GWP values for methane: GWP values based solely on the radiative forcing of methane and GWP values that also included an adder for climate-carbon feedbacks. Based on a perception of uncertainty underlying the climate carbon feedback adders, as well as their novelty and a lack of clear guidance from the IPCC at that time, NETL elected to use the GWP values without the climate carbon feedback adders as it had done in the past. Specifically, the LCA GHG Report uses 20- and 100-year methane GWPs of 85 and 30, respectively—as compared to the GWPs of 87 and 36 when climate carbon effects are included.¹⁴⁷

We agree with Sierra Club that using 20- and 100-year methane GWPs of 87 and 36 is most appropriate for use today and that climate carbon feedbacks should be captured in the GWP values for methane. Using these values, however, would not have materially affected the

¹⁴⁵ LCA GHG Report at 18 (Summary and Study Limitations).

¹⁴⁶ IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.

¹⁴⁷ See SPL Order at 163 (referencing LCA GHG Report at 2-3).

conclusions of the LCA GHG Report. Contrary to Sierra Club’s suggestion, there is no one-for-one relationship between the GWP of methane and the total life-cycle GHG impact of U.S.-exported LNG because methane is not the only type of GHG emission. Natural gas energy systems release both methane and carbon dioxide. On a life cycle basis for delivered electricity, combustion at the power plant—which produces carbon dioxide emissions—accounts for the majority of GHG emissions. The following table depicts how the life cycle GHG emissions for three key scenarios in the LCA GHG Report would change depending on whether the 100-GWP for methane was 30 or 36. These changes were calculated by scaling the methane emissions in Figures 6-3 through 6-5 of the LCA GHG Report by a ratio of 36/30.

Table 1: Increase in GHG Emissions by Changing 100-year CH₄ GWP

Scenario	GHG Emissions (kg CO ₂ e/MWh)		% change
	GWP _{CH₄} = 30	GWP _{CH₄} = 36	
Natural gas power using U.S. LNG transported to Rotterdam	629	646	2.8%
Natural gas power using Russian NG transported by pipeline to Rotterdam	612	642	4.9%
Coal power using regional coal	1,089	1,090	0.1%

As this table demonstrates, using the 100-year methane GWP of 36 does not increase the 100-year GWP by 20 percent compared to NETL’s estimates based on a GWP value of 30. Rather, the estimate of GHG emissions resulting from U.S.-exported LNG increases by 2.8 percent, the estimate for Russian gas increases by 4.9 percent, and the estimate for use of regional coal increases by 0.1 percent. This change in the GWP estimate would not have made a material difference to the conclusions of the LCA GHG Report and does not warrant re-opening this proceeding to update the LCA GHG Report.

E. Consideration of Climate Impacts

1. Sierra Club's Position

Sierra Club claims that DOE/FE's consideration of climate impacts in its public interest analysis was based on unsupported assumptions and failed to place these impacts in the proper context.¹⁴⁸ In the Order, DOE considered whether emissions from U.S.-exported LNG would be offset by displacement of combustion of other fossil fuels and avoidance of associated emissions. Sierra Club maintains that this approach is not the proper way to assess climate impacts and that the United States' international commitments require consideration of domestic GHG emissions without consideration of displaced foreign emissions.¹⁴⁹ In addition, Sierra Club claims that DOE/FE's analysis of climate impacts focuses on the LCA GHG analysis but does not focus on "the simpler problem" represented by SPL's specific proposal for a definite amount of natural gas.¹⁵⁰ Sierra Club asserts that this modeling effort for SPL's Liquefaction Expansion Project would not be unreasonably burdensome or speculative.

Sierra Club also maintains the available evidence does not support DOE/FE's decision to compare the lifecycle of U.S. LNG solely to coal and other sources of gas. First, Sierra Club asserts DOE provides no basis for comparing U.S. LNG against coal and natural gas used in China rather than the aggregate GHG intensity of China's generation fleet or, even more appropriately, the average GHG intensity of additional generation capacity that China is expected to add (based on EIA data). According to Sierra Club, DOE cited China's 2012 generation capacity, which was composed of 66 percent coal and 3 percent natural gas. Sierra Club maintains that it would have been reasonable to assume that U.S. LNG would be more

¹⁴⁸ Rehearing Request at 22.

¹⁴⁹ *Id.* at 22-23.

¹⁵⁰ *Id.* at 23.

likely to compete against sources of new capacity rather than existing sources, and states that the new capacity will be more than 50 percent renewables and, therefore, will have a significantly lower GHG intensity than DOE's estimate even under a 100-year GWP.¹⁵¹

Second, in the case of Japan, Sierra Club states DOE did not forecast future Japanese generation even though this information is available. Sierra Club contends DOE/FE has an obligation to seek out the environmental effects of the proposed project. However, Sierra Club states that the data of the International Energy Agency on which EIA relied indicates that the GHG intensity of Japan's aggregate mix is very near NETL's estimate of the intensity of U.S. LNG. Therefore, Sierra Club maintains that correcting any of the errors in NETL's assessment would likely lead to the conclusion that U.S. LNG has higher life-cycle emissions than the energy that U.S. LNG would likely displace in Japan.¹⁵²

2. DOE/FE Analysis

The Department has thoroughly reviewed the GHG impacts of its decision. At the project level, the EA describes direct GHG emissions resulting from the construction and operation of the Liquefaction Expansion Project (including the liquefaction process), and includes a section addressing potential climate change impacts from the Project.¹⁵³ The Addendum contains a chapter devoted to GHG emissions and includes a range of estimates from the scientific literature of the GHGs emitted by producing and transporting natural gas from unconventional resources.¹⁵⁴ Finally, the LCA GHG Report analyzes the life-cycle GHGs emitted from U.S.-exported LNG that is re-gasified and combusted for electric power generation

¹⁵¹ *See id.*

¹⁵² *See id.* at 23-24.

¹⁵³ *See, e.g.*, EA at 80-87, 92-93, 95-101, 168-71.

¹⁵⁴ Addendum at 33-44.

in Europe or Asia. The LCA GHG Report compares the life-cycle GHGs of U.S.-exported LNG to those of LNG exported from other producing countries, pipeline gas delivered from Russia, and domestic coal burned in both Europe and Asia.¹⁵⁵

It is useful to compare the life-cycle GHG emissions of U.S.-exported LNG to other forms of generation because U.S.-exported LNG has the potential to displace other fuels and thus to avoid the emissions associated with burning those fuels. The comparison cases used in the LCA GHG Report were well-chosen. When U.S.-exported LNG enters the marketplace, it will compete with LNG sourced from other countries. Therefore, the comparison of U.S.-sourced LNG to foreign-sourced LNG is clearly instructive. U.S.-exported LNG also will compete directly with pipeline deliveries from Russia in some markets, another form of “gas-on-gas” competition. Recognizing that the availability of U.S.-exported LNG may affect the electric power generation fuel mix in importing countries, the LCA GHG Report also compared U.S.-exported LNG to coal produced domestically in both Europe and Asia. This comparison is likewise instructive because, as the Department explained in the Order, coal remains a prevalent choice for electric power generation in LNG-importing countries and competes with natural gas as a source of baseload power.¹⁵⁶

It is important, however, to recognize the Department’s limited aims in making these comparisons. In the Order, the Department made clear that the comparisons to coal and foreign-sourced gas in the LCA GHG Report did not themselves answer the ultimate question of how U.S. LNG exports would affect the global GHG balance because U.S. LNG could compete with other resources as well. The Department explained that, given the prevalence of coal and natural gas as sources of electric generation in LNG-importing countries, the comparison nonetheless

¹⁵⁵ See Order at 208.

¹⁵⁶ See *id.* at 168-71.

provided useful information. Looking at the record before it, the Department concluded only that it did “not see a reason to conclude that U.S. LNG exports will significantly exacerbate global GHG emissions.”¹⁵⁷

The Department also explained why it was not attempting a more precise prediction regarding global GHG impacts. The Department explained that the compounded uncertainties in estimating how the availability of U.S. LNG exports would affect the market for every potential energy source in every importing country, along with the interventions of foreign governments in those markets, would render such an analysis too speculative to inform its public interest determination.¹⁵⁸ In its rehearing petition, Sierra Club suggests alternative comparisons the Department could have used to approach the difficult question of how U.S. LNG exports would affect the global GHG balance. For example, Sierra Club states that the Department could have analyzed how SPL’s LNG exports will affect global GHG emissions. Reasoning that “SPL is a specific proposal, for a definite amount of gas,” Sierra Club suggests that modeling the effects of SPL’s exports “presents a simpler problem than the abstract problem of modeling the effects of U.S. LNG exports in general.”¹⁵⁹ We disagree. There is a global market for LNG, such that SPL’s exports will affect the global price of LNG, which in turn will affect energy systems in numerous countries.

Sierra Club also suggests the Department should have compared the lifecycle GHG emissions of U.S.-exported LNG to those of the average new facility in China. But Sierra Club does not explain why this would be an appropriate comparison. To the extent U.S.-exported LNG lowers the price of natural gas in a given country, that price change could affect dispatch

¹⁵⁷ *Id.* at 209.

¹⁵⁸ *See id.* at 207-08.

¹⁵⁹ Rehearing Request at 23.

and retirement decisions facing existing units as well as decisions of what new units to build. Moreover, even with respect to new capacity, it may not be valid to assume that natural gas would compete directly with renewables in all nations given the potential intervention of public policy and the different role these resources play in an integrated electric system.

F. DOE/FE Correctly Evaluated Economic Impacts in Determining That SPL's Proposed Exports Are in the Public Interest

1. Sierra Club's Position

Sierra Club's economic argument is based upon the broad contention that, in granting SPL's Applications, DOE considered the "upstream" economic benefits of induced natural gas production attributable to the proposed LNG exports, but refused to consider the environmental harms that allegedly would occur as a result of induced natural gas production.¹⁶⁰ Sierra Club asserts that DOE/FE is "casting widely" for economic benefits yet fails to weigh economic impacts properly, in violation of the Natural Gas Act.¹⁶¹ Sierra Club provides the following criticisms of DOE/FE's economic conclusions: (i) SPL claims responsibility for the benefits of upstream natural gas production, but accepts no responsibility for upstream environmental harms; (ii) the 2012 LNG Export Study, upon which DOE relies, disregards the economic impacts felt by people outside of the natural gas industry and relies too heavily on a possible slight increase in U.S. gross domestic product (GDP) to conclude that authorizing LNG exports is within the public interest; and (iii) approving LNG exports could cause an increase in domestic natural gas prices costing the consumer billions of dollars per year.¹⁶²

Sierra Club asserts that DOE's reliance on the 2012 LNG Export Study (specifically, the NERA study developed as the second part of the 2012 LNG Export Study, *see supra* note 61)

¹⁶⁰ Rehearing Request at 18.

¹⁶¹ *Id.*

¹⁶² *See id.* at 19.

disregards the impacts felt by people outside the natural gas industry. According to Sierra Club, the “primary effect” of exporting LNG will be to transfer wealth from the majority of Americans to the small minority of corporations that will own natural gas resources or LNG export infrastructure.¹⁶³ Sierra Club argues that the associated “slight increase in GDP” calculated by NERA is outweighed by other factors, such that the likely net effect of exporting LNG will be a decrease in U.S. GDP that is contrary to the public interest.¹⁶⁴ Indeed, Sierra Club argues that the conclusion of the 2012 LNG Export Study—that LNG exports will provide public benefits—“is contradicted by the only other available comprehensive model of LNG exports’ impacts,” an unpublished working paper allegedly conducted in 2013 by Purdue University economists Kemal Sarica and Wallace E. Tyner (referred to by Sierra Club as the “Purdue Study”).¹⁶⁵ According to Sierra Club, the Purdue Study concludes that the likely net effect of LNG exports will be a decrease in U.S. GDP.¹⁶⁶

Sierra Club also discusses the various LNG export proposals then-pending before DOE/FE, concluding that the combined volumes of all pending non-FTA export proposals are higher than the non-FTA export volumes then-approved by DOE (9.99 Bcf/d of natural gas), and impacts to natural gas prices can be expected to be commensurately greater.¹⁶⁷ According to Sierra Club, SPL’s proposed exports would benefit a small subset of citizens (mostly in the oil and gas sector) while penalizing millions of citizens through increases in natural gas prices and resulting increases in prices of consumer goods and services. For this reason, Sierra Club states that DOE/FE must deny SPL’s Applications as inconsistent with the public interest.

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *See id.* at n.41 (citing “Purdue Study” conducted by Sarica and Tyner).

¹⁶⁶ Rehearing Request at 19-20.

¹⁶⁷ *Id.* at 20.

2. DOE/FE Analysis

Upon review of Sierra Club's Request for Rehearing, we find that Sierra Club is raising substantially the same (if not identical) economic arguments that were already presented and addressed in the SPL Order.

As to price impacts attributable to LNG exports, we observed in the Order in response to arguments from Sierra Club and others:

NERA's analysis in its 2012 Study indicates that, after five years of increasing LNG exports, wellhead natural gas price increases could range from \$0.22 to \$1.11 ... depending on the market-determined level of exports. However, *even with these estimated prices increases*, NERA found that the United States would experience net economic benefits from increased LNG exports in all cases studied.¹⁶⁸

To the extent Sierra Club is claiming that price impacts will be higher now based on higher cumulative LNG export levels than originally considered, we note that the Order assesses the cumulative impacts of the eight final authorizations issued at that time (then totaling 9.99 Bcf/d of natural gas) and states that this total volume is within the range of scenarios analyzed in the 2012 LNG Export Study in which NERA found that the United States would experience net economic benefits.¹⁶⁹ In each succeeding non-FTA export authorization issued since the SPL Order, we have continued to make the same assessment of cumulative impacts to ensure that each authorization is in the public interest.¹⁷⁰

Sierra Club again criticizes the 2012 LNG Export Study and the conclusions that DOE/FE draws from that Study, asserting that projected U.S. GDP benefits are slight and will

¹⁶⁸ SPL Order at 193-94 (emphasis added).

¹⁶⁹ *See id.* at 211.

¹⁷⁰ *See, e.g., Flint Hills Resources, LP*, DOE/FE Order No. 3829, FE Docket No. 15-168-LNG, Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas in ISO Containers and in Bulk Loaded At the Stabilis LNG Eagle Ford Facility in George West, Texas, and Exported by Vessel to Non-Free Trade Agreement Nations, 23-26 (Mar. 18, 2016). Additionally, as described herein and set forth in the SPL Order, "it is far from certain that all or even most of the proposed LNG export projects will ever be realized because of the time, difficulty, and expense of commercializing, financing, and constructing LNG export terminals, as well as the uncertainties inherent in the global market demand for LNG." SPL Order at 210.

not accrue to the general public. DOE/FE previously recognized these aspects of the NERA findings, but ultimately determined that the net benefits to the U.S. economy from exporting LNG were in the public interest:

DOE believes that the public interest generally favors authorizing proposals to export natural gas that have been shown to lead to net benefits to the U.S. economy. While there may be circumstances in which the distributional consequences of an authorizing decision could be shown to be so negative as to outweigh net positive benefits to the U.S. economy as a whole, we do not see sufficiently compelling evidence that those circumstances are present here.¹⁷¹

To counter the 2012 LNG Export Study, Sierra Club refers to one new study from 2013, which it calls the “Purdue Study” but is actually titled a “Working Paper.”¹⁷² Sierra Club, however, did not introduce or discuss the Purdue Study in its earlier filings in this proceeding, thereby foreclosing DOE/FE from having considered it in the Order. Nor has Sierra Club provided the Purdue Study as an exhibit to its Rehearing Request.¹⁷³ By Sierra Club’s own admission, this working paper is unpublished and available only from the authors.¹⁷⁴

In sum, Sierra Club’s economic arguments do not alter our conclusions in the Final Order. Although “[b]oth the [2102] LNG Export Study and many public comments identify significant uncertainties and even potential negative impacts from LNG exports,” we affirm, on

¹⁷¹ See *id.* at 115-16.

¹⁷² Rehearing Request at 19 n.41.

¹⁷³ DOE/FE has the discretion to reject evidence that was available but not proffered for our consideration at the time we issued the Order. Further, we are reluctant to chase a moving target by considering new evidence discussed for the first time at the rehearing stage of this proceeding.

¹⁷⁴ Sierra Club addresses one other study to support its position concerning economic harms attributable to LNG export—a study entitled, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, commissioned by DOE in May 2014 and published by the U.S. Energy Information Administration (EIA) on October 29, 2014. See Rehearing Request at 21 n.45 (citing 2014 EIA Study); 2014 EIA Study *available at*: <https://www.eia.gov/analysis/requests/fe/>. In requesting the study, DOE asked EIA to update its earlier study conducted as part of the 2012 LNG Export Study by examining the effects of exports of domestically produced LNG at levels from 12 to 20 Bcf/d of natural gas. Overall, the 2014 EIA Study found that exports of LNG at those levels will have a positive impact on U.S. GDP. The 2014 EIA Study is not a part of the administrative record in this proceeding, but even if it were, we would not conclude that the 2014 Study supports Sierra Club’s arguments concerning price impacts.

balance, “that the potential negative implications of SPL’s proposed exports are outweighed by the likely net economic benefits and by other non-economic or indirect benefits.”¹⁷⁵ We therefore reject Sierra Club’s economic arguments.

IV. CONCLUSION

We find that it has not been shown that a grant of the requested authorization is inconsistent with the public interest. We affirm our previous finding that the Applications should be granted subject to the terms and conditions set forth in DOE/FE Order No. 3669.

V. ORDER

Pursuant to sections 3 and 19 of the Natural Gas Act, and for the reasons set forth above and in DOE/FE Order No. 3669, it is ordered that:

- A. Sabine Point Liquefaction, LLC’s Motion for Leave to Answer Sierra Club’s Requests for Rehearing and Stay is granted; and
- B. Sierra Club’s Request for Rehearing is denied.¹⁷⁶

Issued in Washington, D.C., on May 26, 2016.



Christopher A. Smith
Assistant Secretary
Office of Fossil Energy

¹⁷⁵ SPL Order at 209-10.

¹⁷⁶ Sierra Club’s request for a stay of DOE/FE Order No. 3669 pending resolution of this rehearing proceeding, made as part of its Rehearing Request, was denied previously by operation of law. 10 C.F.R. § 590.302(c).