

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

CHENIERE MARKETING, LLC AND)
CORPUS CHRISTI LIQUEFACTION, LLC) FE DOCKET NO. 12-97-LNG
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OPINION AND ORDER DENYING REQUEST FOR REHEARING
OF ORDER GRANTING LONG-TERM, MULTI CONTRACT AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS BY VESSEL
FROM THE PROPOSED CORPUS CHRISTI LIQUEFACTION PROJECT
TO BE LOCATED IN CORPUS CHRISTI, TEXAS,
TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO. 3638-A

MAY 26, 2016

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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
CMI	collectively, Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC
CO ₂	Carbon Dioxide
DOE	U.S. Department of Energy
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
VOC	Volatile Organic Compound

I. INTRODUCTION

On May 12, 2015, the Department of Energy's (DOE or the Department) Office of Fossil Energy (DOE/FE) issued DOE/FE Order No. 3638¹ (Order) to Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC (collectively, CMI or Cheniere Corpus Christi, unless otherwise stated)² under section 3 of the Natural Gas Act (NGA).³ In that final Opinion and Order, DOE/FE granted CMI's export application filed on August 31, 2012 (Application).⁴

In the Application, CMI requested long-term, multi-contract authorization 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 Order authorizes CMI to export LNG in a volume equivalent to 767 billion cubic feet per year (Bcf/yr) of natural gas (2.1 Bcf per day (Bcf/d)), for a term of 20 years.

CMI's exports will originate from the proposed Corpus Christi Liquefaction Project (Liquefaction Project or CMI Project), to be located near Corpus Christi, in San Patricio and Nueces Counties, Texas.⁶ The Liquefaction Project and other facility modifications are being

¹ *Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC*, DOE/FE Order No. 3638, FE Docket No. 12-97-LNG, Final Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel From the Proposed Corpus Christi Liquefaction Project to be Located in Corpus Christi, Texas to Non-Free Trade Agreement Nations (May 12, 2015) [hereinafter CMI Order].

² Both entities are within the corporate family of Cheniere Energy, Inc., a developer of LNG terminals and natural gas pipelines on the Gulf Coast of the United States. *See* CMI Order at 14-15 (describing corporate ownership).

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. 00-006.02 issued on November 17, 2014.

⁴ Cheniere Marketing, LLC, Application of Cheniere Marketing, LLC for Long-Term Authorization To Export Liquefied Natural Gas To Non-Free Trade Countries, FE Docket No. 12-97-LNG (Aug. 31, 2012) [hereinafter CMI App.]. Cheniere Marketing, LLC filed the Application in its sole capacity, but on October 29, 2014, DOE/FE issued an order amending the Application to add Corpus Christi Liquefaction, LLC as a joint applicant at Cheniere Marketing's request.

⁵ 15 U.S.C. § 717b(a).

⁶ DOE/FE authorized CMI to export the LNG on its own behalf and as an agent for other entities that hold title to the LNG, after registering each such entity with DOE/FE. The Order contains numerous other terms and conditions. *See* CMI Order at 207-20.

developed by Corpus Christi Liquefaction and by Cheniere Corpus Christi Pipeline, L.P. (Cheniere Corpus Christi Pipeline), at the same general locations proposed for the previously authorized Corpus Christi LNG, L.P. import terminal and associated pipeline (Corpus Christi Terminal). Cheniere Corpus Christi Pipeline is developing plans to construct, own, and operate an approximately 23-mile long natural gas transmission pipeline in Nueces and San Patricio Counties, Texas. Once constructed, the Corpus Christi Pipeline (Pipeline) will connect the Corpus Christi Terminal facilities to interstate and intrastate natural gas supplies and markets.

On June 11, 2015, Sierra Club timely filed a Request for Rehearing of the Order.⁷ For the reasons set forth below, DOE/FE 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 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.⁸ FERC's lead agency role was codified by

⁷ Sierra Club, Request for Rehearing, FE Docket No. 12-97-LNG (June 11, 2015) [hereinafter Rehearing Request].

⁸ 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.

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).⁹

The present case follows that framework. In December 2011, Corpus Christi Liquefaction commenced FERC's mandatory pre-filing process under NEPA for the Liquefaction Project in FERC Docket No. PF12-3-000.¹⁰ In June 2012, FERC issued a Notice of Intent to Prepare an Environmental Assessment (NOI) for the proposed Liquefaction and Pipeline Projects.¹¹ The NOI stated that DOE/FE had agreed to participate as a cooperating agency in FERC's proceeding to satisfy its NEPA responsibilities.¹² In August 2012, Corpus Christi Liquefaction filed its application in FERC Docket No. CP12-507-000 to site, construct, and operate the Liquefaction Project.¹³ Likewise, in FERC Docket No. CP12-508-000, Cheniere Corpus Christi Pipeline requested a certificate of public convenience and necessity to construct and operate the related Pipeline under NGA section 7(c), 15 U.S.C. § 717f(c).¹⁴

In October 2012, FERC announced its decision to prepare an environmental impact statement (EIS) for the Liquefaction and Pipeline Projects, instead of an environmental assessment. In accordance with NEPA, FERC issued a draft EIS for the proposed Liquefaction Project and other facilities modifications on June 13, 2014,¹⁵ and a final EIS on October 8,

⁹ See 15 U.S.C. § 717n (b)(1).

¹⁰ CMI App. at 4 n.11 (stating that Cheniere Corpus Christi Pipeline was later added in the FERC pre-filing proceeding).

¹¹ Corpus Christi Liquefaction, LLC; Cheniere Corpus Christi Pipeline, L.P.; Notice of Intent to Prepare an Environmental Assessment for the Planned Corpus Christi LNG Terminal and Pipeline Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting, 77 Fed. Reg. 34,034 (June 8, 2012) [hereinafter FERC NOI].

¹² See *id.*, 77 Fed. Reg. at 34,036.

¹³ Corpus Christi Liquefaction, LLC, *et al.*, Application for Authorization Under Section 3 of the Natural Gas Act, FERC Docket Nos. CP12-507-000, *et al.* (Aug. 31, 2012) [hereinafter Corpus Christi Liquefaction FERC App.], see 77 Fed. Reg. 58,368 (Sept. 20, 2012) (notice of application).

¹⁴ See 77 Fed. Reg. at 58,368.

¹⁵ See Corpus Christi Liquefaction, LLC, *et al.*; Notice of Availability of the Draft Environmental Impact Statement for the Proposed Corpus Christi LNG Project, 79 Fed. Reg. 35,344 (June 20, 2014).

2014.¹⁶ The final EIS recommended that FERC subject any approval of CMI's proposed Liquefaction Project to 104 environmental mitigation measures.¹⁷ FERC staff determined that implementation of these mitigation measures "would ensure that impacts in the Project area would be avoided or minimized and would not be significant."¹⁸

Subsequently, on December 30, 2014, FERC issued an Order Granting Section 3 and Section 7 Authorizations. In that order, FERC authorized Corpus Christi Liquefaction to cite, construct, and operate the proposed Liquefaction Project; issued a certificate of public convenience and necessity to Cheniere Corpus Christi Pipeline to construct and operate the proposed pipeline project; and imposed the 104 environmental mitigation measures as conditions of the authorizations.¹⁹

Sierra Club filed a timely request for rehearing of the FERC Order, and FERC denied that request on May 6, 2015.²⁰

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

¹⁶ See *Corpus Christi Liquefaction, LLC, et al.*; Notice of Availability of the Final Environmental Impact Statement for the Proposed Corpus Christi LNG Project, 79 Fed. Reg. 62,130 (Oct. 16, 2014). See also *Corpus Christi Liquefaction, LLC, et al.*, Corpus Christi LNG Project, Final Environmental Impact Statement, FERC/EIS-0252F (Oct. 2014) [hereinafter Final EIS].

¹⁷ See Final EIS at 5-10 to 5-25.

¹⁸ *Id.* at 5-1.

¹⁹ *Corpus Christi Liquefaction, LLC, et al.*, Order Granting Authorization Under Section 3 of the Natural Gas Act and Issuing Certificates, 149 FERC ¶ 61,283, at P 125(A) (Dec. 30, 2014) [hereinafter FERC Order].

²⁰ *Corpus Christi Liquefaction, LLC, et al.*, 151 FERC ¶ 61,098 (May 6, 2015) (Order Denying Rehearing).

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*.²¹ 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.²²

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 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),²³ as well as a 200-page supporting document entitled, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*.²⁴ DOE/FE received public comments on the LCA GHG Report and the supporting document, and provided its response to those comments in the Order.

DOE/FE issued the CMI Order on May 12, 2015. In the Order, DOE/FE: (i)

²¹ 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.

²² 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].

²³ 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.

²⁴ 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.

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 CMI's requested authorization was inconsistent with the public interest; and (iii) granted CMI's Application subject to further conditions, including the 104 environmental conditions adopted in the FERC Order.²⁵

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

Sierra Club filed its Rehearing Request on June 11, 2015, seeking rehearing of DOE/FE Order No. 3638. On June 26, 2015, CMI filed a Motion for Leave to Answer and Answer to Sierra Club's Requests for Rehearing and Stay.²⁶ On July 10 and July 14, 2015, respectively, DOE/FE issued orders granting both Sierra Club's Rehearing Request and CMI's Motion for Leave to Answer for the limited purpose of further consideration.²⁷ We address Sierra Club's and CMI's arguments below.

²⁵ See, e.g., CMI Order at 1-12.

²⁶ *Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC*, Motion for Leave to Answer and Answer to Sierra Club's Requests for Rehearing and Stay, FE Docket No. 12-97-LNG (June 26, 2015) [hereinafter CMI Answer].

²⁷ *Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC*, Order Granting Rehearing for Further Consideration, FE Docket No. 12-97-LNG (July 10, 2015); *Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC*, Order Granting Motion for Leave to Answer for the Purpose of Further Consideration, FE Docket No. 12-97-LNG (July 14, 2015).

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) (*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.²⁸

Sierra Club further asserts that DOE cannot presume that “a project with adverse environmental impacts” is consistent with the public interest.²⁹ Sierra Club contends that it provided record evidence that affirmatively demonstrates that CMI's Application is inconsistent with the public interest and, further—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.³⁰

²⁸ 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. 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. Rehearing Request at 2.

²⁹ *Id.* at 1-2 (and section heading).

³⁰ *Id.* at 2.

2. CMI's Answer

CMI disputes Sierra Club's assertion that, in authorizing CMI's exports, no presumption applies under the Natural Gas Act. CMI first contends that the plain statutory text is sufficient to show that a presumption applies here. Next, quoting a decision by the U.S. Court of Appeals for the District of Columbia Circuit, CMI 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.'"³¹ According to CMI, 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."³² Finally, CMI disputes that NEPA nullifies the NGA section 3 presumption. CMI 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.³³ Nor, CMI maintains, is NEPA a suitable vehicle for airing grievances about substantive agency policies because NEPA was not intended to resolve fundamental policy disputes.³⁴

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."³⁵ DOE interprets these words to mean that, for the Department to deny an

³¹ CMI 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)).

³² *Panhandle Producers*, 822 F.2d at 1111, cited in Rehearing Request at 6.

³³ CMI Answer at 6 (quoting *Grunewald v. Jarvis*, 776 F.3d 893, 903 (D.C. Cir. 2015) (internal quotation omitted)).

³⁴ See *id.* (citation omitted).

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

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.”³⁶ But in fact the court stated that “§ 3 [of the NGA] requires an affirmative showing of inconsistency with the public interest to *deny* an application.”³⁷

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.³⁸ 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.

As the record demonstrates, the Department took the “hard look” at CMI’s export proposal required by NEPA. The Department participated as a cooperating agency in FERC’s environmental review, independently reviewed the EIS prepared by FERC, and adopted the 104 environmental conditions imposed by FERC in the Order.³⁹ In fulfilling its responsibilities under NEPA, the Department applied no presumptions regarding the potential environmental

³⁶ Rehearing Request at 2.

³⁷ *Panhandle Producers*, 822 F.2d at 1111 (emphasis in original); *see also id.* at 1112 (describing the court’s earlier decision in *W. Va. Pub. Servs. Comm’n. 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.”).

³⁸ 42 U.S.C. § 4332.

³⁹ *See* CMI Order at 216 (Ordering Para. H).

impacts associated with CMI'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 Impacts 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 EIS, which DOE/FE adopted, did not take a "hard look" at the impacts of CMI's exports.⁴⁰ Sierra Club asserts that, whether or not FERC did so, DOE/FE should have analyzed the environmental impacts of natural gas production activities that would be induced by LNG exports.

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 CMI's Project, and thereby fail to inform the public and provide a basis for public comment.⁴¹ Sierra Club maintains that, whether or not FERC did so, DOE/FE was obligated to take a hard look at the environmental impacts of natural gas production activities that would be induced by LNG exports—and specifically the impacts caused by CMI's exports (equivalent to 2.1 Bcf/d of natural gas), which (on the date that the Order was issued) brought the total volume of then-approved non-FTA LNG exports to 8.61 Bcf/d of natural gas.⁴² According to Sierra Club, induced production is a reasonably foreseeable consequence of increased demand for natural gas due to LNG exports.⁴³

⁴⁰ See Rehearing Request 2-4.

⁴¹ See *id.* at 4-5.

⁴² See *id.* at 8.

⁴³ See *id.* at 5-8.

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.⁴⁴ Sierra Club contends the NEMS model underlying the Department's 2012 LNG Export Study predicted how production would respond to exports.⁴⁵ 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 CMI's proposed exports, NEPA requires DOE to undertake or commission such modeling.⁴⁶ 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.⁴⁷

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

⁴⁴ *See id.* at 9-10.

⁴⁵ 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 Order (§§ I, VIII, IX).

⁴⁶ *See* Rehearing Request at 9.

⁴⁷ *See id.*

(NO_x) emissions that would be emitted by that regional production and thereby estimate impacts on regional ozone levels.⁴⁸

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.⁴⁹ 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.⁵⁰ 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.⁵¹

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.⁵² 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

⁴⁸ *Id.* at 10.

⁴⁹ *See id.* at 11.

⁵⁰ *See id.*

⁵¹ Rehearing Request at 12.

⁵² *See id.* at 16-17.

would have on nationwide greenhouse gas emissions,” it is “plainly a reasonably foreseeable consequence of CMI’s proposed exports, which required discussion in the EIS.”⁵³

Sierra Club further maintains that the reason given by DOE/FE in the 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.”⁵⁴ Sierra Club argues 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 maintains 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.⁵⁵

Finally, Sierra Club argues that DOE/FE’s Order does not distinguish between the indirect and cumulative impacts of the approved and pending LNG export applications, including CMI’s exports at issue in this proceeding.⁵⁶ Sierra Club maintains that DOE/FE should have assessed the “cumulative impacts of drilling induced by all other approved and pending [non-FTA] export projects” as part of its cumulative impacts analysis.⁵⁷

2. CMI’s Answer

CMI disputes Sierra Club’s argument that DOE/FE should have issued its own NEPA analysis for the Liquefaction Project. CMI states that, consistent with the NEPA environmental review framework created by the Energy Policy Act of 2005, DOE properly served as a

⁵³ *Id.*

⁵⁴ *Id.* at 17.

⁵⁵ *See id.*

⁵⁶ *See* Rehearing Request at 18.

⁵⁷ *Id.*

cooperating agency in FERC's NEPA process, adopted the FERC EA, and issued a FONSI under NEPA.⁵⁸

Addressing Sierra Club's arguments concerning "induced" upstream natural gas production, CMI contends that NEPA does not recognize "putative impacts" of emissions from increased domestic natural gas production and coal consumption allegedly induced by the Liquefaction Project.⁵⁹ CMI 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."⁶⁰ In particular, CMI argues that "[b]road statistical data discussing general national trends' are insufficient to create 'reasonable foreseeability under NEPA.'"⁶¹ CMI 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—that 'may occur for reasons unrelated to the Project' and over which the NGA gives DOE/FE and FERC 'no [control]' by congressional design.⁶²

Instead, CMI 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. CMI 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.⁶³

⁵⁸ CMI Answer at 7-8 (citing, *e.g.*, 40 C.F.R. § 1506.3(c)).

⁵⁹ *See id.* at 8.

⁶⁰ *Id.*

⁶¹ *Id.* at 8-9 (quoting *Coliseum Sq. Ass'n, Inc. v. Jackson*, 465 F.3d 215, 238 (5th Cir. 2006)).

⁶² *Id.* at 16-17 (quoting CMI Order at 42, quoting Final EIS at 4-213).

⁶³ CMI Answer at 17 (citations omitted).

CMI next contends that NEPA did not require preparation of either the Addendum or the LCA GHG Report.⁶⁴ CMI maintains that neither document was intended to be an element of the NEPA review process for the Liquefaction Project. Pointing to language from the CMI Order, CMI 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.⁶⁵ CMI 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.”⁶⁶

3. DOE/FE Analysis

a. 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.”⁶⁷ 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.⁶⁸ 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.”⁶⁹ 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

⁶⁴ *Id.* at 20.

⁶⁵ *Id.*

⁶⁶ *Id.* at 21.

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

⁶⁸ *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983).

⁶⁹ *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.”⁷⁰ The second principle is that “inherent in NEPA and its implementing regulations is a ‘rule of reason.’”⁷¹ 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.⁷²

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 CMI 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 petition to argue that the Department must examine the environmental impacts of producing the very molecules of natural gas that will be exported by CMI. Rather, we understand Sierra Club to contend that the Department must examine the environmental impacts

⁷⁰ *Id.* (quoting *Metro. Edison Co.*, 460 U.S. at 774 n.7).

⁷¹ *Id.* (citation omitted).

⁷² *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”).

of the economically marginal natural gas production that may be induced as a result of granting an export authorization to CMI 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.⁷³ 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."⁷⁴ EIA further projected that, of the increased production, over 90% would come from unconventional sources, such as shale gas, tight gas, and coalbed methane.⁷⁵

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 CMI's exports over the period of its non-FTA

⁷³ See 2012 EIA Study, *supra* note 45, at 1.

⁷⁴ *Id.* at 10.

⁷⁵ *Id.* at 11; *see also* CMI Order at 148.

authorization. Natural gas will be produced in substantial quantities across the United States regardless of how the Department rules on CMI's Application. 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.⁷⁶

Further, insofar as CMI's Application is 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.⁷⁷

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 foreseeable. But where, as here, it is fundamentally uncertain how natural gas production at the

⁷⁶ CMI Order at 194 (citations omitted).

⁷⁷ *Id.*

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.⁷⁸ 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 gas⁷⁹ or tight gas.⁸⁰ The shale plays, to which we believe Sierra Club is referring, overlap and stretch for thousands of square miles below diverse surface environments.⁸¹ 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

⁷⁸ 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).

⁷⁹ Addendum at 6, Fig. 2 (Approximate Locations of Current Producing Gas Shales and Prospective Shales).

⁸⁰ See *id.* at 7, Fig. 3 (Location of Currently Active Areas for Tight Sand Development and Production).

⁸¹ 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,⁸² water,⁸³ or land.⁸⁴ 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

⁸² 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.

⁸³ *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”).

⁸⁴ 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 the U.S. Environmental Protection Agency (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.⁸⁵ 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.⁸⁶ After a 45-day comment period, the Department received

⁸⁵ *Metro. Edison Co.*, 460 U.S. at 774.

⁸⁶ See CMI Order at 147-56 (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.”⁸⁷ 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 methane⁸⁸ 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

⁸⁷ Rehearing Request at 4.

⁸⁸ *Id.*

also described the values from the most recent IPCC reports (then in draft) as well as those of other scholars.⁸⁹ 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.”⁹⁰ But, to the extent that CMI’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 CMI’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.

b. 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.⁹¹

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

⁸⁹ Addendum at 87 (DOE Response), 36.

⁹⁰ Rehearing Request at 9.

⁹¹ *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.⁹²

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 CMI’s 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.⁹³ EPA also issued a final rule to take effect on December 22, 2015, designed to limit carbon dioxide emissions from existing coal-fired electric generating units.⁹⁴

⁹² *Public Citizen*, 541 U.S. at 767 (quotation and citation omitted).

⁹³ 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).

⁹⁴ 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 FERC's EIS adopted by DOE "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).⁹⁵ 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 Project] affects" in determining whether its approval of CMI's proposed exports may affect listed species or critical habitat.⁹⁶

Sierra Club states that, similarly, DOE must fulfill its obligations under the NHPA to "take into account the effect of the undertaking [*i.e.*, CMI's proposed exports] on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register."⁹⁷ 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 CMI's proposal extends to the entire area in which it will increase [natural] gas production."⁹⁸

2. CMI's Answer

CMI contends that Sierra Club's ESA and NHPA challenges miss the mark for two reasons: (i) FERC is "the lead agency for purposes of coordinating all applicable Federal

⁹⁵ Rehearing Request at 26.

⁹⁶ *See id.* (citing, *inter alia*, 50 C.F.R. § 402.14(a)).

⁹⁷ *Id.* (quoting 16 U.S.C. § 470f).

⁹⁸ *Id.* at 27.

authorizations,”⁹⁹ and (ii) neither the ESA nor the NHPA require the kind of nationwide assessment on which Sierra Club insists. CMI 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.¹⁰⁰ CMI 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. CMI also states that additional natural gas production may occur independent of the Liquefaction Project, and thus cannot be considered “interrelated” or “interdependent” with the Liquefaction Project for purposes of ESA analysis.¹⁰¹

Turning to the NHPA claims, CMI maintains that the NHPA does not require consideration of nationwide effects. According to CMI, 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,” which can vary depending on the nature of the action.¹⁰² CMI 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 CMI above.¹⁰³

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

⁹⁹ CMI Answer at 22 (quoting 15 U.S.C. § 717n(b)(1)).

¹⁰⁰ *Id.* (quoting ESA definition of “effects of the action,” 50 C.F.R. § 402.02).

¹⁰¹ *See id.* at 22-23 (quoting 50 C.F.R. § 402.02).

¹⁰² *Id.* at 23 (quoting 36 C.F.R. § 800.16(d)).

¹⁰³ *Id.* (quoting 36 C.F.R. § 800.5(a)(1)).

Liquefaction Project in the EIS, which DOE/FE adopted. Sierra Club does not question the completeness of FERC’s analysis of the ESA and NHPA issues that fall within the scope of the EIS. Regarding federally listed threatened and endangered species, the National Oceanic and Atmospheric Administration National Marine Fisheries Service notified CMI that initiation of Section 7 consultation under the Endangered Species Act would not be required, and the U.S. Fish and Wildlife Service concurred with determinations that the Project is not likely to adversely affect species under its jurisdiction.¹⁰⁴ Texas Parks and Wildlife provided comment on the draft EIS’s analysis of impacts on listed species, which were addressed in the final EIS.¹⁰⁵ Likewise, in consultation under the NHPA, FERC consulted with Indian tribes that may have an interest in the Project area, and with the Texas State Historic Preservation Office, and “found that no traditional cultural properties or sites of religious significance to Indian tribes were identified in the area of potential effect, and no historic properties would be affected by the Project.”¹⁰⁶

Instead, Sierra Club argues that DOE/FE failed to comply with Section 7 of the ESA and Section 106 of the NHPA because “the EIS covered only the site-specific impacts rather than the impacts from induced upstream natural gas production.”¹⁰⁷ Sierra Club contends that DOE must look “nationally” to comply with the ESA and the NHPA—a contention that CMI 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 to non-FTA countries. Moreover, the inability to predict at a local level the volumes of induced

¹⁰⁴ Final EIS, *supra* note 16, at ES-3; *see also id.* at 1-16 to 1-17, 1-21, 4-49 to 4-60.

¹⁰⁵ *See id.* at I-125 to I-137.

¹⁰⁶ *Id.* at ES-3 to ES-4; *see also id.* at ES 1-19, 1-22, 4-90 to 4-94.

¹⁰⁷ Rehearing Request at 26.

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.¹⁰⁸ Sierra Club states that the 1.2 percent leakage rate estimate attributed to NETL in the 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.¹⁰⁹ 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)¹¹⁰ 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.”¹¹¹

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

¹⁰⁸ *See id.* at 13.

¹⁰⁹ *Id.*

¹¹⁰ *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].

¹¹¹ Rehearing Request at 13.

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.¹¹²

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 2013,¹¹³ 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.”¹¹⁴

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 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

¹¹² *See id.*

¹¹³ 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>.

¹¹⁴ Rehearing Request at 13-14.

Club maintains that DOE/FE did not explain why the boundaries used in bottom-up studies are more appropriate.¹¹⁵

Based on Brandt 2014 and other research,¹¹⁶ 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% leakage rate indicated by Miller is more than double the rate used by DOE.”¹¹⁷ 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.¹¹⁸ 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. CMI’s Answer

CMI argues that Sierra Club’s criticisms of the methodologies underlying the LCA GHG Report lack specificity to the Liquefaction Project, and were already addressed in the Order.¹¹⁹

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

¹¹⁵ *See id.* at 14.

¹¹⁶ *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.

¹¹⁷ Rehearing Request at 14.

¹¹⁸ *See id.* at 15.

¹¹⁹ CMI Answer at 21.

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 gas¹²⁰ 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 expected values and uncertainty ranges of NETL’s upstream natural gas GHG emissions closely match the results for most other studies.

¹²⁰ 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.

We likewise reject Sierra Club’s argument that DOE/FE should have used a “top-down” approach to derive a methane leakage rate.¹²¹ 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.¹²²

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 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.

¹²¹ 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* CMI Order at 180-81.

¹²² *See* CMI Order at 181.

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”¹²³ and that DOE/FE should have used Global Warming Potential (GWP)¹²⁴ estimates drawn from the IPCC that include climate carbon feedbacks.¹²⁵ 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.¹²⁶ 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 30.¹²⁷

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

¹²³ Rehearing Request at 15.

¹²⁴ 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. Evtl. Protection Agency, *Understanding Global Warming Potentials*, <http://www.epa.gov/climatechange/ghgemissions/gwps.html> (last updated Feb. 23, 2016).

¹²⁵ Rehearing Request at 15-16.

¹²⁶ See *id.* at 15 (quoting Sierra Club’s Climate Comment at 12).

¹²⁷ See *id.* at 15-16.

scenario variability, the uncertainty in the underlying modeled data, and other study limitations arising from this subject matter.¹²⁸ 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 Report¹²⁹ 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.¹³⁰

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 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

¹²⁸ LCA GHG Report at 18 (Summary and Study Limitations).

¹²⁹ 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.

¹³⁰ See CMI Order at 161 (referencing LCA GHG Report at 2-3).

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%, the estimate for Russian gas increases by 4.9%, and the estimate for use of regional coal increases by 0.1%. 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. 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.¹³¹ 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 CMI's specific proposal with the majority of output contracted to Japanese and Indian buyers.¹³² Sierra Club asserts that this modeling effort for CMI's Liquefaction 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 likely to compete against sources of new capacity rather than existing sources, and states that the

¹³¹ Rehearing Request at 25.

¹³² *Id.*

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.¹³³

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.¹³⁴

2. DOE/FE Analysis

The Department has thoroughly reviewed the GHG impacts of its decision. At the project level, the EIS describes direct GHG emissions resulting from the construction and operation of the CMI Project, including the liquefaction process.¹³⁵ 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.¹³⁶ 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 in Europe or Asia. The LCA GHG Report compares the life-cycle GHGs of U.S.-exported LNG to those of LNG

¹³³ *See id.*

¹³⁴ *See id.* at 26.

¹³⁵ *See, e.g.*, EIS at 4-96 to 4-97.

¹³⁶ Addendum at 33-44.

exported from other producing countries, pipeline gas delivered from Russia, and domestic coal burned in both Europe and Asia.¹³⁷

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.¹³⁸

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 provided useful information. Looking at the record before it, the Department concluded only

¹³⁷ See CMI Order at 156-66.

¹³⁸ See *id.* at 168-69.

that it did “not see a reason to conclude that U.S. LNG exports will significantly exacerbate global GHG emissions.”¹³⁹

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.¹⁴⁰ In its Rehearing Request, 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 CMI’s specific LNG export proposal. Stating that the majority of CMI’s proposed output of LNG is contracted to Japanese and Indian buyers, Sierra Club suggests DOE should have focused solely on Japan and India, which Sierra Club characterizes as a “simpler problem.”¹⁴¹ We disagree. Focusing solely on Japan and India is a “simpler problem” only because it ignores that there is a global market for LNG. Even if *all* U.S.-exported LNG went to Japan and India, those exports would affect the global price of LNG, which in turn would affect energy systems in numerous countries, not only Japan and India.

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

¹³⁹ *Id.* at 204.

¹⁴⁰ *See id.* at 202-03.

¹⁴¹ Rehearing Request at 25.

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 Benefits and Impacts in Determining That CMI'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 CMI's Application, 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.¹⁴² 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.¹⁴³ Sierra Club provides the following three criticisms of DOE/FE's economic conclusions: (i) the economic model used by CMI to calculate the economic benefits and upon which DOE allegedly rests its case has serious flaws—namely, overestimating jobs figures and failing to consider "counterfactuals or foregone opportunities" had investors and regulators made different choices; (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.¹⁴⁴

¹⁴² *Id.* at 18.

¹⁴³ *Id.*

¹⁴⁴ *Id.* at 19.

Sierra Club first disputes CMI’s estimates concerning the number of jobs and economic benefits associated with its LNG export proposal. According to Sierra Club, the bulk of CMI’s claimed “overstated” economic benefits will result from increased domestic production of natural gas, and are derived from the flawed “input-output” model used by CMI’s consultant.¹⁴⁵ Sierra Club argues that CMI’s projected economic benefits based on this model—presented in the Perryman Report provided with the Application—are flawed because “CMI appears to claim credit for jobs ‘supported’ by its activities rather than jobs ‘created.’”¹⁴⁶ Additionally, Sierra Club asserts that CMI’s input-output model—as well as DOE’s 2012 LNG Export Study—do not consider counterfactuals and foregone opportunities—*i.e.*, they fail to ask how the U.S. economy might have grown based on different economic or regulatory choices, and fail to consider how LNG exports may displace other economic activity.

In sum, Sierra Club maintains that “a simple economic model cannot reliably capture the consequences of transforming an entire region of the country ... into an industrial gas extraction zone.”¹⁴⁷ Sierra Club therefore argues that DOE cannot approve CMI’s Application based upon the economic modeling results, and instead must undertake an independent inquiry into the costs and benefits of CMI’s proposal to fully account for “the difficult changes inherent in the shale gas boom.”¹⁴⁸ Sierra Club concludes by offering that “the better course” is “the strengthening [of] regional sectors which are not driven by boom-bust cycles.”¹⁴⁹

Next, 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*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.* at 20.

¹⁴⁷ Rehearing Request at 20.

¹⁴⁸ *Id.* at 21.

¹⁴⁹ *Id.*

supra note 45) 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.¹⁵⁰ 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.¹⁵¹ 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”).¹⁵² According to Sierra Club, the Purdue Study concludes that the likely net effect of LNG exports will be a decrease in U.S. GDP.¹⁵³

Finally, Sierra Club asserts that economic harms associated with CMI’s proposed exports will be significant, due to increases in natural gas prices.¹⁵⁴ Sierra Club discusses the various LNG export proposals then-pending before DOE/FE, concluding that the combined volumes of all pending non-FTA export proposals are far higher than the maximum export figure presented in CMI’s Application, and thus impacts to natural gas prices can be expected to be commensurately greater.¹⁵⁵ According to Sierra Club, CMI’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

¹⁵⁰ *Id.*

¹⁵¹ *Id.* at 22

¹⁵² *Id.* at 21-22 & n.46 (citing “Purdue Study” conducted by Sarica and Tyner).

¹⁵³ Rehearing Request at 23.

¹⁵⁴ *See id.*

¹⁵⁵ *Id.* at 22-23.

services. For this reason, Sierra Club states that DOE/FE must deny CMI's Application as inconsistent with the public interest.

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 in CMI's Order.

Specifically, in its Protest to the CMI Application, Sierra Club presented its arguments concerning the alleged deficiencies of CMI's input-output model used in the Perryman Report and the increases in natural gas prices that it claims will occur due to CMI's proposed exports.¹⁵⁶ Contrary to Sierra Club's assertion, DOE/FE did address Sierra Club's arguments concerning the economic benefits projected from CMI's input-output model. There, we found that the record contains substantial evidence of regional economic benefits from a grant of the Application.¹⁵⁷ Additionally, we note that the Perryman Report submitted by CMI is not inherently flawed simply because it is based on "a series of static snapshots" of the effects of certain predicted inputs or because all of the potential counterfactuals raised by Sierra Club were not factored into the analysis.¹⁵⁸ These characteristics of an input-output study do not mean that the results are unreasonable. The results of the Perryman Report, and CMI's conclusions regarding economic benefits associated with its exports of LNG, are also confirmed on a national scale by the NERA study (discussed *supra* note 45).

Further, DOE/FE examined both the study that Sierra Club presented to critique the claims related to employment benefits supported by Marcellus Shale production activities (the

¹⁵⁶ See CMI Order at 52-54.

¹⁵⁷ See *id.* at 185-89.

¹⁵⁸ Rehearing Request at 20; compare CMI Order at 187.

Weinstein study) and Sierra Club’s concerns regarding the economic impacts of the shale gas “boom” in regional gas production areas.¹⁵⁹ As noted above, DOE/FE has determined that CMI provided evidence in the Perryman Report that significant economic benefits at the local, regional, national, and international levels are likely to occur if the Application is granted.¹⁶⁰ This evidence, together with the 2012 LNG Export Study (discussed below), provide ample evidence of both the economic benefits and impacts associated with CMI’s exports on which to base a public interest determination.

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 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.¹⁶¹

To the extent Sierra Club is claiming that price impacts will be higher now based on higher cumulative LNG export levels than originally considered in CMI’s Application, we note that the Order assesses the cumulative impacts of the seven final authorizations issued at that time (then totaling 8.61 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.¹⁶² In each succeeding non-FTA export authorization issued since the CMI Order, we have continued to make the same assessment of cumulative impacts to ensure that each authorization is in the public interest.¹⁶³

¹⁵⁹ See CMI Order at 135-38.

¹⁶⁰ See *id.* at 186-88.

¹⁶¹ *Id.* at 189.

¹⁶² See *id.* at 206-07.

¹⁶³ 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

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 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.¹⁶⁴

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.”¹⁶⁵ 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 CMI’s Order. Nor has Sierra Club provided the Purdue Study as an exhibit to its Rehearing Request.¹⁶⁶ By Sierra Club’s own admission, this working paper is unpublished and available only from the authors.¹⁶⁷

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 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.” CMI Order at 205.

¹⁶⁴ *Id.* at 114-15.

¹⁶⁵ Rehearing Request at 22 n.46.

¹⁶⁶ 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.

¹⁶⁷ 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 25 & n.57 (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

In sum, Sierra Club's economic arguments do not alter our conclusions in the 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 balance, "that the potential negative implications of CMI's proposed exports are outweighed by the likely net economic benefits and by other non-economic or indirect benefits."¹⁶⁸ 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 Application should be granted subject to the terms and conditions set forth in DOE/FE Order No. 3638.

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. 3638, it is ordered that:

- A. Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC's Motion for Leave to Answer Sierra Club's Request for Rehearing is granted; and
- B. Sierra Club's Request for Rehearing is denied.¹⁶⁹

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



Christopher A. Smith
Assistant Secretary
Office of Fossil Energy

proceeding, but even if it were, we would not conclude that the 2014 Study supports Sierra Club's arguments concerning price impacts.

¹⁶⁸ CMI Order at 204-205.

¹⁶⁹ Sierra Club's request for a stay of DOE/FE Order No. 3638 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).