UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

DOMINION COVE POINT LNG, LP	)	FE DOCKET NO. 11-128-LNG

FINAL OPINION AND ORDER GRANTING LONG-TERM, MULTI-CONTRACT AUTHORIZATION TO EXPORT LIQUEFIED NATURAL GAS BY VESSEL FROM THE COVE POINT LNG TERMINAL IN CALVERT COUNTY, MARYLAND, TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO. 3331-A

MAY 7, 2015

TABLE OF CONTENTS

FREQUENTLY USED ACRONYMS

AEO	Annual Energy Outlook
APGA	American Public Gas Association
API	American Petroleum Institute
Bcf/d	Billion Cubic Feet per Day
Bcf/yr	Billion Cubic Feet per Year
CEQ	The Council on Environmental Quality
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
DCP	Dominion Cove Point LNG, LP
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EUR	Estimated Ultimate Recovery
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
HAP	Hazardous Air Pollutant
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt-Hour
LCA	Life Cycle Analysis
LNG	Liquefied Natural Gas
LTA	Liquefaction Tolling Agreement
Mcf	Thousand Cubic Feet
MMBtu	Million British Thermal Units
mtpa	Million Metric Tons per Annum
MWh	Megawatt-Hour
NEPA	National Environmental Policy Act
NERA	NERA Economic Consulting
NETL	National Energy Technology Laboratory
NGA	Natural Gas Act
PM	Particulate Matter
Tcf/yr	Trillion Cubic Feet per Year
VOC	Volatile Organic Compound

I. INTRODUCTION

On September 11, 2013, the Office of Fossil Energy of the Department of Energy (DOE/FE) issued Order No. 3331 to Dominion Cove Point LNG, LP (DCP) pursuant to section 3(a) of the Natural Gas Act (NGA)[1] (Conditional Order or DCP Conditional Order).[2] In that Order, DOE/FE conditionally granted DCP's Application[3] for long-term, multi-contract authority 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 (FTA) providing for national treatment for trade in natural gas (non-FTA nations). The proposed exports are authorized to originate from the existing Cove Point LNG Terminal (Terminal), located near Lusby, Maryland, in Calvert County. DCP owns the Cove Point LNG Terminal, as well as an 88-mile long gas pipeline (Cove Point Pipeline) that connects the Terminal to connections with interstate pipelines in Loudoun and Fairfax Counties, Virginia. DCP states that it is developing plans to install facilities at the Terminal to liquefy domestically produced natural gas delivered through the Cove Point Pipeline and to load the LNG onto tankers for export from the Terminal (Liquefaction Project).

In the Application, DCP requested authorization to export LNG in a volume equivalent to 365 billion cubic feet per year (Bcf/yr) of natural gas, or 1 Bcf per day (Bcf/d), which was the maximum volume that DCP contemplated exporting at that time. Subsequently, in an update to

[1] 15 U.S.C. § 717b(a). 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.
[2] *Dominion Cove Point LNG, LP*, DOE/FE Order No. 3331, FE Docket No. 11-128-LNG, Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Cove Point LNG Terminal to Non-Free Trade Agreement Nations (Sept. 11, 2013) [hereinafter DCP Conditional Order].
[3] Application of Dominion Cove Point LNG, LP, for Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries, FE Docket No. 11-128-LNG (Oct. 3, 2011) [hereinafter DCP App.].

the Application filed on May 2, 2013,[4] DCP informed DOE/FE that the planned liquefaction capacity of the Liquefaction Project was, in fact, lower than the requested export volume. *See infra* at § IV.B. Therefore, DOE/FE conditionally authorized DCP to export LNG in a volume equivalent to 281 Bcf/yr of natural gas (0.77 Bcf/d), or approximately 5.75 million metric tons per annum (mtpa) of LNG, which represents the planned liquefaction capacity of the Project.[5] The authorization term was to commence on the earlier of the date of first commercial export or seven years from the date the order was issued (September 11, 2020). DOE/FE authorized DCP to export this LNG solely as an agent for other entities that hold title to the LNG, after registering each such entity with DOE/FE.

In addition to the Conditional Order, DOE/FE has issued one other long-term LNG export authorization to DCP. In DOE/FE Order No. 3019, issued on October 7, 2011, DOE/FE authorized DCP to export domestically produced LNG by vessel from the Cove Point LNG Terminal to countries with which the United States has, or in the future enters into, a FTA requiring the national treatment for trade in natural gas (FTA countries), in a volume equivalent to 365 Bcf/yr of natural gas (1 Bcf/d)—the planned liquefaction capacity of the Project at that time.[6] The volumes of LNG authorized for export in DOE/FE Order No. 3019 and this Order are not additive to one another. *See infra* at § XI.I.

In September 2012, in connection with its pre-filing process under the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*, the Federal Energy Regulatory

[4] Dominion Cove Point LNG, LP, Update of Dominion Cove Point LNG, LP Concerning Signed LNG Export Contracts, FE Docket No. 11-128-LNG (May 2, 2013) [hereinafter DCP Update].
[5] DOE/FE's rationale for the lower export volume is set forth in the DCP Conditional Order and is summarized below. *See* DCP Conditional Order at 1-2, 11-12, 149; *see also infra* § IV.B.
[6] *Dominion Cove Point LNG, LP*, DOE/FE Order No. 3019, FE Docket No. 11-115-LNG, Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Cove Point Terminal to Free Trade Agreement Nations (Oct. 7, 2001) [hereinafter FTA Order].

Commission (FERC) issued a Notice of Intent (NOI) to prepare an Environmental Assessment (EA) for the planned Liquefaction Project.[7] Under FERC's NEPA regulations, "[i]f [FERC] believes that a proposed action … may not be a major Federal action significantly affecting the quality of the human environment, an environmental assessment, rather than an environmental impact statement [EIS], will be prepared first. Depending on the outcome of the environmental assessment, an environmental impact statement may or may not be prepared."[8] In its NOI, FERC observed that all of the proposed liquefaction facilities would be located within the fenced, operating industrial area of the existing Cove Point LNG Terminal.[9] Subsequently, in April 2013, DCP filed its application with FERC to site, construct, and operate the Liquefaction Project under NGA section 3.[10] DCP also sought authority from FERC under NGA section 7(c), 15 U.S.C. § 717f(c), to construct, own, and operate facilities on its Cove Point Pipeline at its existing compressor station and metering and regulating site in Fairfax County, Virginia, and at its metering and regulating site located in Loudon County, Virginia.[11]

At the time that DOE/FE issued DCP's Conditional Order in September 2013, DCP's application to FERC was still pending in FERC Docket CP13-113-000. Accordingly, the Conditional Order addressed the record evidence and entered findings on all non-environmental issues considered under NGA section 3(a), including the economic impacts, international impacts, and security of gas supply associated with DCP's proposed exports. *See infra* § III (public interest standard). Because DOE/FE must also consider environmental issues, DOE/FE

[7] Dominion Cove Point LNG, LP; Notice of Intent to Prepare an Environmental Assessment for the Planned Cove Point Liquefaction Project, Request for Comments on Environmental Issues, Notice of On-Site Environmental Review, and Notice of Public Scoping Meetings, 77 Fed. Reg. 59,601 (Sept. 28, 2012) [hereinafter FERC NOI]
[8] 18 C.F.R. § 380.6(b).
[9] *See* 77 Fed. Reg. at 59,602.
[10] Dominion Cove Point LNG, LP, Application for Authorization Under Section 3 of the Natural Gas Act, FERC Docket No. CP13-113-000 (Apr. 1, 2013) [hereinafter DCP FERC App.].
[11] *See id.*

conditioned its authorization on the satisfactory completion of the environmental review process under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 *et seq.*, and on DOE/FE's issuance of a Finding of No Significant Impact (FONSI) or a Record of Decision.[12] DOE/FE stated that it "intends to complete its NEPA review as a cooperating agency in FERC's review of the Liquefaction Project," and explained that the Conditional Order "indicates … DOE/FE's determination at this time on all but the environmental issues in this proceeding."[13]

On May 15, 2014, in accordance with NEPA, FERC placed the EA for the proposed Liquefaction Project into the public record.[14] The EA recommended that FERC subject any approval of the Liquefaction Project to 82 environmental conditions. FERC received hundreds of comments on the EA, with some commenters—including Sierra Club and Earthjustice—raising concerns about the Liquefaction Project and challenging the adequacy of the EA.[15] Commenters including Earthjustice asserted, in part, that the EA: (i) failed to consider the indirect effects of induced natural gas production associated with the Liquefaction Project; (ii) failed to consider the cumulative impacts from all projects related to natural gas development and gathering, including Marcellus shale development, natural gas transportation, and natural gas distribution in areas outside of the Cove Point project area; and (iii) failed to adequately analyze

[12] *See* DCP Conditional Order at 150 (Term and Condition Para. H).
[13] *See id.* (stating that "DOE/FE's participation as a cooperating agency … is intended to avoid duplication of effort by agencies with overlapping environmental review responsibilities, to achieve early coordination among agencies, and to concentrate public participation in a single forum.").
[14] Dominion Cove Point LNG, LP; Notice of Availability of the Environmental Assessment and Draft General Conformity Determination for the Proposed Cove Point Liquefaction Project, 79 Fed. Reg. 29,435 (May 22, 2014) [hereinafter Notice of EA].
[15] *See Dominion Cove Point LNG, LP*, Order Granting Section 3 and Section 7 Authorizations, 148 FERC ¶ 61,244, at PP 102-04 (Sept. 29, 2014) [hereinafter FERC Order].

direct, cumulative, and indirect impacts on climate change from emissions of greenhouse gases (GHG) associated with the construction and operation of the Liquefaction Project.[16]

On September 29, 2014, FERC issued an Order Granting Section 3 and Section 7 Authorizations (FERC Order), which authorized DCP to site, construct, and operate the Liquefaction and Pipeline Project subject to 79 environmental conditions contained in Appendix B of that Order.[17] FERC determined that these 79 environmental conditions, not the 82 conditions recommended in the EA, were sufficient due to supplemental information provided by DCP.[18] In its Order, FERC rejected the environmental arguments raised by commenters opposing the Liquefaction Project, reasoning that the primary environmental concerns would be mitigated by the 79 environmental conditions that it adopted from the 82 conditions recommended in the EA.[19]

First, FERC found that potential environmental effects associated with natural gas production in the Marcellus shale region are not sufficiently causally related to the Liquefaction Project to warrant detailed analysis as indirect impacts, and that Earthjustice failed to provide evidence to support such an analysis.[20] FERC stated that such production is not "reasonably foreseeable" within the meaning of NEPA.[21] Second, FERC rejected the argument that it was required to analyze the cumulative impacts of projects related to upstream natural gas production and transportation in areas outside of the project area, where any such projects and impacts would

[16] *See id*. at PP 225-48. Sierra Club is an intervenor in this DOE/FE proceeding and raised similar arguments in opposing DOE/FE's grant of DCP's Application. *See infra* §§ VII.E, X.A.
[17] *See id*. at PP 2, 285.
[18] *See id*. P 107 & App. B.
[19] *See id*. at P 281.
[20] FERC Order at PP 227-33.
[21] *See id*. at PP 227-30 (citing 40 C.F.R. § 1508.8).

be speculative.[22] Third, FERC explained that the EA identified and quantified GHG emissions associated with the construction and operation of the Liquefaction Project. FERC stated, however, that it did not attempt to assess air emissions, or climate change impacts of such emissions, from the ultimate consumption of natural gas exported from the Liquefaction Project because the end use was not part of the project before it.[23] On this record, FERC concluded that the Liquefaction and Pipeline Projects, if built and operated consonant with the specified environmental conditions, "would not constitute a major federal action significantly affecting the quality of the human environment."[24] Several intervenors, including Sierra Club, filed timely requests for rehearing of the FERC Order, and FERC denied those requests on May 4, 2015.[25]

On November 5, 2014, after an independent review, DOE/FE adopted FERC's EA and issued a FONSI for DCP's proposed Liquefaction Project (DOE/EA-1942).[26] The condition imposed by DOE/FE in the Conditional Order having been met, DOE/FE will now issue this Final Opinion and Order. As discussed below, this Order is conditioned on DCP's compliance with the 79 environmental conditions adopted by FERC in Appendix B of its Order.

In connection with this and other LNG export proceedings, on June 4, 2014, DOE/FE issued two notices in the *Federal Register* proposing 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 issues associated with unconventional gas production in the lower-48 states. The purpose of this review was to provide additional

[22] *See id*. at 238-42.
[23] *See id* at PP 243-46.
[24] *Id*. at P 281.
[25] *Dominion Cove Point LNG, LP*, 151 FERC ¶ 61,095 (May 4, 2015) (Order Denying Rehearing and Stay).
[26] U.S. Dep't of Energy, Finding of No Significant Impact for Cove Point Liquefaction Project Regarding Dominion Cove Point LNG, LP, Application Seeking Department of Energy Authorization to Export Liquefied Natural Gas from Dominion Cove Point LNG Terminal to Non-Free Trade Agreement Nations, DOE/EA-1942 (Nov. 5, 2014), *available at* http://energy.gov/sites/prod/files/2014/11/f19/EA-1942-FONSI-2014.pdf [hereinafter FONSI].

information to the public concerning the potential environmental impacts of unconventional natural gas exploration and production activities, including hydraulic fracturing. DOE/FE published its draft report for public review and comment, entitled *Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States* (Draft Addendum).[27] As detailed below, DOE/FE received comments on the Draft Addendum and, on August 15, 2014, issued the final Addendum (hereafter Addendum) with its response to the public comments contained in Appendix B.[28]

Second, DOE/FE commissioned the National Energy Technology Laboratory (NETL), a DOE applied research laboratory, to conduct an analysis calculating the life cycle greenhouse gas (GHG) emissions for LNG exported from the United States. The purpose of this analysis was to determine: (i) how domestically-produced LNG exported from the United States compares with regional coal (or other LNG sources) for electric power generation in Europe and Asia from a life cycle GHG perspective, and (ii) how those results compare with natural gas sourced from Russia and delivered to the same markets via pipeline. DOE/FE published NETL's report entitled, *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (LCA GHG Report).[29] DOE/FE also received public comment on the LCA GHG Report, and provides its response to those comments in this Order. *See infra* § IX.B.

With respect to both the Addendum and the LCA GHG Report, DOE/FE has taken all public comments into consideration in this decision and has made those comments, as well as the

[27] 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). DOE/FE announced the availability of the Draft Addendum on its website on May 29, 2014.
[28] 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).
[29] 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) [hereinafter LCA GHG Report]. DOE/FE announced the availability of the LCA GHG Report on its website on May 29, 2014.

underlying studies, part of the record in this proceeding.[30] As explained below, neither the Addendum nor the LCA GHG Report are required by NEPA, but DOE/FE believes that these documents will inform its review of the public interest under NGA section 3(a), and are responsive to concerns previously raised in this proceeding. Below, we discuss these documents, as well as other environmental issues evaluated as part of our public interest review.

II. SUMMARY OF FINDINGS AND CONCLUSIONS

As noted above, the DCP Conditional Order (DOE/FE Order No. 3331) presented DOE/FE's findings and conclusions on the non-environmental issues associated with DCP's proposed exports. DOE/FE compiled an administrative record based on submissions by persons who intervened in, protested, and/or commented on DCP's Application. DOE/FE also considered the LNG Export Study described below.[31] Based on that record, DOE/FE reviewed a number of public interest considerations and determined that intervenors and commenters had not demonstrated that the requested authorization would be inconsistent with the public interest, as would be required to deny DCP's Application under NGA section 3(a).[32]

This Order adopts the key findings, terms, and conditions of the Conditional Order, and focuses on the remaining issue: the potential environmental impacts of DCP's proposed exports. Based on a review of the record in this proceeding—including FERC's EA on the proposed Liquefaction Project, the FERC Order granting authorization for DCP to site, construct, and

[30] By electronic mail, DOE/FE notified all parties to this proceeding of the issuance of both the draft Addendum and the LCA GHG Report, as well as the opportunity to submit comments on those documents.
[31] *See* 2012 LNG Export Study, 77 Fed. Reg. 73,627 (Dec. 11, 2012), *available at* http://energy.gov/sites/prod/files/2013/04/f0/fr_notice_two_part_study.pdf (Federal Register Notice of Availability of the LNG Export Study); LNG Export Study – Related Documents, *available at* http://energy.gov/fe/downloads/lng-export-study-related-documents (EIA Analysis (Study - Part 1) & (NERA Economic Consulting Analysis (Study - Part 2)).
[32] *See* DCP Conditional Order at 6.

operate the Liquefaction Project, as well as the Addendum and LCA GHG Report—DOE/FE finds that the proposed exports have not been shown to be inconsistent with the public interest.

On this basis, DOE/FE grants final authorization for DCP's exports of domestically produced LNG from the Cove Point LNG Terminal to non-FTA countries in a volume equivalent to 281 Bcf/yr of natural gas. *See infra* §§ XI.H, XIII. This authorization is subject to the Terms and Conditions and Ordering Paragraphs discussed below, which incorporate by reference the 79 environmental conditions imposed by FERC. *See infra* §§ XI-XIII.

III. PUBLIC INTEREST STANDARD

Section 3(a) of the NGA sets forth the standard for review of DCP's Application:

> [N]o person shall export any natural gas from the United States to a foreign country or import any natural gas from a foreign country without first having secured an order of the [Secretary of Energy[33]] authorizing it to do so. The [Secretary] shall issue such order upon application, unless after opportunity for hearing, [he] finds that the proposed exportation or importation will not be consistent with the public interest. The [Secretary] may by [the Secretary's] order grant such application, in whole or part, with such modification and upon such terms and conditions as the [Secretary] may find necessary or appropriate.

15 U.S.C. § 717b(a). This provision creates a rebuttable presumption that a proposed export of natural gas is in the public interest. DOE/FE must grant such an application unless opponents of the application overcome that presumption by making an affirmative showing of inconsistency with the public interest.[34]

[33] The Secretary's authority was established by the Department of Energy Organization Act, 42 U.S.C. § 7172, which transferred jurisdiction over imports and export authorizations from the Federal Power Commission to the Secretary of Energy.

[34] *See, e.g.*, *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 2961, FE Docket No. 10-111-LNG, Opinion and Order Conditionally Granting Long-Term Authorization to Export Liquefied Natural Gas From Sabine Pass LNG Terminal to Non-Free Trade Agreement Nations, at 28 (May 20, 2011) [hereinafter *Sabine Pass*]; *see also Phillips Alaska Natural Gas Corp. & Marathon Oil Co.*, DOE/FE Order No. 1473, FE Docket No. 96-99-LNG, Order Extending Authorization to Export Liquefied Natural Gas from Alaska, at 13 (April 2, 1999) [hereinafter *Phillips Alaska Natural Gas*], citing *Panhandle Producers & Royalty Owners Ass'n v. ERA*, 822 F.2d 1105, 1111 (D.C. Cir. 1987).

While section 3(a) establishes a broad public interest standard and a presumption favoring export authorizations, the statute does not define "public interest" or identify criteria that must be considered. In prior decisions, however, DOE/FE has identified a range of factors that it evaluates when reviewing an application for export authorization. These factors include economic impacts, international impacts, security of natural gas supply, and environmental impacts, among others. To conduct this review, DOE/FE looks to record evidence developed in the application proceeding.[35]

DOE/FE's prior decisions have also looked to certain principles established in its 1984 Policy Guidelines.[36] The goals of the Policy Guidelines are to minimize federal control and involvement in energy markets and to promote a balanced and mixed energy resource system. The Guidelines provide that:

> The market, not government, should determine the price and other contract terms of imported [or exported] natural gas …. The federal government's primary responsibility in authorizing imports [or exports] will be to evaluate the need for the gas and whether the import [or export] arrangement will provide the gas on a competitively priced basis for the duration of the contract while minimizing regulatory impediments to a freely operating market.[37]

While nominally applicable to natural gas import cases, DOE/FE subsequently held in Order No. 1473 that the same policies should be applied to natural gas export applications.[38]

In Order No. 1473, DOE/FE stated that it was guided by DOE Delegation Order No. 0204-111. That delegation order, which authorized the Administrator of the Economic Regulatory Administration to exercise the agency's review authority under NGA section 3,

---

[35] *See, e.g.*, *Sabine Pass*, DOE/FE Order No. 2961, at 28-42 (reviewing record evidence in issuing conditional authorization).
[36] New Policy Guidelines and Delegations Order Relating to Regulation of Imported Natural Gas, 49 Fed. Reg. 6684 (Feb. 22, 1984) [hereinafter 1984 Policy Guidelines].
[37] *Id*. at 6685.
[38] *Phillips Alaska Natural Gas*, DOE/FE Order No. 1473, at 14 (citing *Yukon Pacific Corp.*, DOE/FE Order No. 350, Order Granting Authorization to Export Liquefied Natural Gas from Alaska, 1 FE ¶ 70,259, at 71,128 (1989)).

directed the Administrator to regulate exports "based on a consideration of the domestic need for the gas to be exported and such other matters as the Administrator finds in the circumstances of a particular case to be appropriate."[39] In February 1989, the Assistant Secretary for Fossil Energy assumed the delegated responsibilities of the Administrator of ERA.[40]

Although DOE Delegation Order No. 0204-111 is no longer in effect, DOE/FE's review of export applications has continued to focus on: (i) the domestic need for the natural gas proposed to be exported, (ii) whether the proposed exports pose a threat to the security of domestic natural gas supplies, (iii) whether the arrangement is consistent with DOE/FE's policy of promoting market competition, and (iv) any other factors bearing on the public interest described herein.

IV. DESCRIPTION OF REQUEST

In its Application, DCP requests long-term, multi-contract authorization to export domestically produced LNG in a volume equivalent to 365 Bcf/yr of natural gas (1 Bcf/d) by vessel from the Cove Point LNG Terminal to non-FTA countries for a 25-year term. DCP seeks to export this LNG solely on behalf of others holding title to the LNG, not on its own behalf. Taking into account the planned liquefaction capacity of the Liquefaction Project presented in DCP's Update to its Application, DOE/ FE conditionally granted the Application in the reduced volume of 281 Bcf/yr of natural gas (0.77 Bcf/d) to non-FTA countries. DOE/FE granted this request for a 20-year term commencing on the earlier of the date of first export or six years from the date of issuance of the requested authorization.

[39] DOE Delegation Order No. 0204-111, at 1; *see also* 1984 Policy Guidelines, 49 Fed. Reg. at 6690.
[40] *See* Applications for Authorization to Construct, Operate, or Modify Facilities Used for the Export or Import of Natural Gas, 62 Fed. Reg. 30,435, 30,437 n.15 (June 4, 1997) (citing DOE Delegation Order No. 0204-127, 54 Fed. Reg. 11,436 (Mar. 20, 1989)).

A. Description of Applicant and Facility

DCP is a Delaware limited partnership with its principal place of business in Lusby, Maryland, and with offices in Richmond, Virginia. DCP is a subsidiary of Dominion Resources, Inc., which DCP states is one of the largest producers and transporters of energy in the United States. Dominion Resources, Inc. is a Virginia corporation with its principal place of business in Richmond, Virginia.

DCP owns the existing Cove Point LNG Terminal, as well as the 88-mile long Cove Point Pipeline that connects the Cove Point LNG Terminal to the interstate gas pipeline grid. According to DCP, the construction and operation of the Cove Point LNG Terminal was initially authorized in 1972 as part of a project to import LNG from Algeria and to transport natural gas to U.S. markets. Shipments of LNG to the Terminal occurred between March 1978 and December 1980.

In 2001, FERC authorized the reactivation of the Terminal and the construction of new facilities to receive imports of LNG.[41] In 2006, FERC authorized the Cove Point Expansion project, which nearly doubled the size of the Terminal, expanded the import capacity of the Cove Point Pipeline, and provided for new downstream pipeline and storage facilities.[42] In 2009, FERC authorized DCP to upgrade, modify, and expand its existing off-shore pier at the Terminal to accommodate the docking of larger LNG vessels.[43]

According to DCP, the Cove Point LNG Terminal currently has peak daily send-out capacity of 1.8 Bcf of natural gas and on-site LNG storage capacity of the equivalent of 14.6 Bcf

[41] *Cove Point LNG LP*, 97 FERC ¶ 61,043, *reh'g*, 97 FERC ¶ 61,276 (2001), *reh'g*, 98 FERC ¶ 61,270 (2002).
[42] *Dominion Cove Point LNG, LP*, 115 FERC ¶ 61,337 (2006), *reh'g*, 118 FERC ¶ 61,007 (2007), *remanded sub nom. Washington Gas Light Co. v. FERC*, 532 F.3d 928 (D.C. Cir. 2008), *order on remand*, 125 FERC ¶ 61,018 (2008), *reh'g*, 126 FERC ¶ 61,036 (2009).
[43] *Dominion Cove Point LNG, LP*, 128 FERC ¶ 61,037, *reh'g*, 129 FERC ¶ 61,137 (2009).

of natural gas (678,900 cubic meters of LNG). The Cove Point Pipeline, which has firm transportation capacity of 1.8 Bcf/d, connects the Terminal to the major Mid-Atlantic gas transmission systems of Transcontinental Gas Pipe Line Company, LLC; Columbia Gas Transmission, LLC; and Dominion Transmission, Inc., an interstate gas transmission business unit of Dominion Resources, Inc.

B. Liquefaction Project

Application. DCP states that it will liquefy domestically produced natural gas at its Cove Point LNG Terminal and load the LNG onto tankers for export to foreign markets. DCP intends that the Terminal will be a bi-directional facility with capability to both import and export LNG. Additionally, DCP states that domestic gas can be delivered to the Terminal through DCP's existing pipeline, which is also bi-directional.

The proposed Liquefaction Project will be located on approximately 59.5 acres within the existing, fenced 131-acre operating industrial area which, in turn, is located within the more than 1,000 acres of existing Cove Point LNG Terminal property.[44] Such facilities may include an off-shore pier (with two berths), insulated LNG and gas piping from the pier to the on-shore Terminal and within the Terminal facility, seven LNG storage tanks, on-site power generation, and control systems. DCP states that it will construct new facilities to liquefy natural gas delivered to the Terminal through the Cove Point Pipeline, although (at the time of filing) it had not yet determined the particular facilities to be constructed for the Liquefaction Project, or the amount of liquefaction capacity.[45]

Update to Application. In the Update to the Application filed in May 2013, *see supra* at 1-2, DCP informed DOE/FE that it had submitted its front end engineering and design (FEED)

[44] *See* FERC Order at P 276.
[45] DCP App. at 10.

study to FERC for review. DCP states that the proposed Liquefaction Project will consist of one LNG production train expected to have a name plate capacity of up to 5.75 mtpa. Specifically, the FEED study was for facilities having a base LNG production capacity of 5.25 mtpa. Once the Liquefaction Project is in operation, however, DCP expects that the actual liquefaction capacity will exceed the base level of 5.25 mtpa by as much as 10 percent. DCP therefore "requested from ... FERC authorization to construct and operate liquefaction facilities with LNG production capacity of up to 5.75 mtpa."[46] DOE/FE estimates that 5.75 mtpa is equivalent to 0.77 Bcf/d, or 281 Bcf/yr, of natural gas.[47]

DCP also informed DOE/FE that, in its filing with FERC, DCP proposed to commence construction of the Liquefaction Project in the first quarter of 2014, to meet a target in-service date of June 2017.

C. Procedural History

DCP's procedural history with DOE/FE is summarized as follows:

FTA Order in FE Docket No. 11-115-LNG (DOE/FE Order No. 3019). On October 7, 2011, in Order No. 3019, DOE/FE granted DCP's request to export domestically produced LNG from the Cove Point LNG Terminal to FTA nations. Pursuant to that order, DCP is authorized to export LNG, on behalf of other entities for whom it acts as agent, in a volume equivalent to 365 Bcf/yr of natural gas (1 Bcf/d) for a 25-year term commencing on the earlier of the date of first export or six years from the date the authorization was issued (October 7, 2017).[48]

[46] DCP Update at 4.
[47] DOE/FE used conversion factors of 1.022 MM Btu per thousand cubic feet (Mcf) of dry natural gas and 51.75 Bcf per million metric tons of dry natural gas. This estimate is based on a mixture of methane and ethane with an energy content of 1,022 Btu per cubic foot of natural gas.
[48] *See* DCP FTA Order, *supra* at 2 n.6.

DCP's Update to Application. In the Update, DCP provided additional details about the Liquefaction Project, as summarized above. DCP also stated that it had executed terminal service agreements (TSAs) with two customers, each of which will contract for 50 percent of the available capacity. The two customers are Pacific Summit Energy LLC, a U.S. subsidiary of Sumitomo Corporation, a Japanese corporation; and GAIL Global (USA) LNG, LLC, a U.S. subsidiary of GAIL (India), an Indian company. Combined, these customers have contracted for firm capacity to liquefy natural gas and load LNG onto ships in the average annual amount of 240,900,000 decatherms, which DOE/FE estimates is equivalent to 0.65 Bcf/d of natural gas. In addition, DCP stated that the contracts[49] provide each of the customers with access as "overrun" service to any LNG production capability that may exist in excess of this contracted firm capacity. According to DCP, both customers contracted for a primary term of 20 years, with potential extension rights at the end of that term.

DCP anticipates that Pacific Summit Energy will export LNG from the Terminal primarily to Japan, and that GAIL Global (USA) LNG will export the LNG primarily, if not exclusively, to India. DCP states that the contracts provide these customers with options for either liquefying natural gas and loading it onto LNG tankers at the Terminal for export, or for importing LNG at the Terminal for vaporization and send-out as regasified LNG into the domestic market. The customers may make a joint election once per year to switch to an import and regasification service, or back from that service to export operations, based on economics and demand for natural gas.

[49] References to DCP's terminal service agreements and contracts with its customers are synonymous for purposes of this Order.

Non-FTA Conditional Order (DOE/FE Order No. 3331). On September 11, 2013, DOE/FE issued the non-FTA Conditional Order to DCP, in which it conditionally authorized DCP to export LNG in a volume equivalent to 281 Bcf/yr of natural gas (0.77 Bcf/d) to non-FTA nations, consistent with DCP's planned liquefaction capacity.[50] The export volume authorized in both the FTA order and this Order reflect the planned liquefaction capacity of the Liquefaction Project estimated at the time each application was submitted, and thus are not additive. *See infra* § XI.I.

LNG Import Order (DOE/FE Order No. 3572). On December 31, 2014, in Order No. 3572, DOE/FE issued a blanket authorization for DCP to import LNG from various international sources by vessel.[51] Pursuant to that order, DCP is authorized to import LNG in a volume equivalent to 36 Bcf/yr of natural gas for a two-year term that began on March 1, 2015, and extends through February 28, 2017. DCP may import the LNG at any LNG receiving facility in the United States and its territories.

D. Business Model

In the Update to its Application, DCP states that its contracts with its two customers are structured as tolling agreements, under which Pacific Summit Energy and GAIL Global (USA) LNG contract for services from DCP but are responsible for obtaining their own gas supplies and transporting them to the Terminal. DCP further states that both customers have entered into a firm transportation service agreement on the Cove Point Pipeline.

According to DCP, these customers may enter into long-term gas supply contracts or procure spot supplies in the U.S. natural gas market. DCP states that it does not intend to hold

[50] *See* DCP Conditional Order, *supra* at 1 n.2.
[51] *See Dominion Cove Point LNG, LP*, DOE/FE Order No. 3572, FE Docket No. 14-192-LNG, Order Granting Blanket Authorization to Import Liquefied Natural Gas from Various International Sources by Vessel (Dec. 31, 2014).

title to either the natural gas delivered to it for liquefaction or the LNG to be exported. DCP is therefore requesting authorization to act as agent for these two customers (and any other entities) that hold title to the natural gas and LNG. DCP states that it will register each such LNG title holder with DOE/FE, consistent with DOE/FE precedent.

E. Source of Natural Gas

According to DCP, natural gas will be delivered to the Cove Point Pipeline from the interstate pipeline grid, thereby allowing natural gas to be sourced broadly from both conventional and unconventional domestic sources. DCP notes that the location of the Cove Point LNG Terminal provides close access to the Marcellus and Utica shale plays, two of the most prolific gas basins in North America.

DCP states that the pipeline system of Dominion Transmission, Inc. provides access to Appalachian gas supply (including the Marcellus shale play), as well as connections to major pipelines transporting natural gas from the Gulf of Mexico area, the mid-continent, the Rockies, and Canada. DCP further states that Dominion Transmission, Inc. operates the largest underground natural gas storage system in the country, as well as the Dominion South Point trading hub. Finally, DCP states that the interstate pipeline systems of Transcontinental Gas Pipe Line Company, LLC and Columbia Gas Transmission, LLC—both connected to the Cove Point Pipeline—provide DCP's customers with additional access to abundant, diverse supplies of domestic natural gas.

V. 2012 LNG EXPORT STUDY

DOE/FE's public interest analysis in the Conditional Order relied in significant part on the two-part LNG Export Study, commenced in 2011 and published in 2012.

On May 20, 2011, several months before DCP filed its Application, DOE/FE issued *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 2961 (*Sabine Pass*), the Department's first order conditionally granting a long-term authorization to export LNG produced in the lower-48 states to non-FTA countries.[52] In August 2011, with other non-FTA applications pending before it, DOE/FE determined that study of the cumulative economic impact of LNG exports was warranted to better inform its public interest review under section 3 of the NGA.[53] Accordingly, DOE/FE engaged the U.S. Energy Information Administration (EIA) and NERA Economic Consulting (NERA) to conduct a two-part study of the economic impacts of LNG exports.[54]

First, DOE/FE requested that EIA assess how prescribed levels of natural gas exports above baseline cases could affect domestic energy markets. EIA examined the impact of two DOE/FE-prescribed levels of assumed natural gas exports (6 Bcf/d and 12 Bcf/d) under numerous scenarios and cases based on projections from EIA's 2011 *Annual Energy Outlook* (AEO 2011), the most recent EIA projections available at that time.[55] EIA published its study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, in January 2012 (2012 EIA Study).[56] As detailed in the Conditional Order, EIA generally found that LNG exports will

---

[52] *Sabine Pass*, DOE/FE Order No. 2961. In August 2012, DOE/FE granted Sabine Pass's final authorization. *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 2961-A, FE Docket No. 10-111-LNG, Final Opinion and Order Granting Long-Term Authorization to Export Liquefied Natural Gas From Sabine Pass LNG Terminal to Non-Free Trade Agreement Nations (Aug. 7, 2012). *See also* Sabine Pass Liquefaction, LLC, DOE/FE Order No. 2961-B, FE Docket No. 10-111-LNG, Opinion and Order Denying Request for Rehearing of Order Denying Motion for Late Intervention, Dismissing Request for Rehearing of Order No. 2961-A, and Dismissing Motion for a Stay Pendente Lite (Jan. 25, 2013).

[53] *See Sabine Pass*, DOE/FE Order No. 2961, at 33 (DOE/FE "will evaluate the cumulative impact of the [Sabine Pass] authorization and any future authorizations for export authority when considering any subsequent application for such authority.").

[54] *See* 2012 LNG Export Study, 77 Fed. Reg. 73,627 (Dec. 11, 2012), *available at* http://energy.gov/sites/prod/files/2013/04/f0/fr_notice_two_part_study.pdf (Federal Register Notice of Availability of the LNG Export Study).

[55] The Annual Energy Outlook (AEO) presents long-term projections of energy supply, demand, and prices. It is based on results from EIA's National Energy Modeling System (NEMS) model.

[56] *See* LNG Export Study – Related Documents, *available at* http://energy.gov/fe/downloads/lng-export-study-related-documents (EIA Analysis (Study - Part 1)).

lead to higher domestic natural gas prices, increased domestic natural gas production, reduced domestic natural gas consumption, and increased natural gas imports from Canada via pipeline.[57]

Second, DOE contracted with NERA to assess the potential macroeconomic impact of LNG exports. Building on the EIA Study, NERA analyzed the potential macroeconomic impacts of LNG exports under a range of global natural gas supply and demand scenarios, including scenarios with unlimited LNG exports. DOE published the NERA study, *Macroeconomic Impacts of LNG Exports from the United States*, in December 2012.[58] Among its key findings, NERA projected that the United States would gain net economic benefits from allowing LNG exports. For every market scenario examined, net economic benefits increased as the level of LNG exports increased.[59]

On December 11, 2012, DOE/FE published a Notice of Availability of the EIA and NERA studies (collectively, the LNG Export Study).[60] DOE/FE invited public comment on the LNG Export Study, and stated that its disposition of DCP's Application and 14 other LNG export applications then pending would be informed by the Study and the comments received in response thereto.[61]

As discussed in the Conditional Order, DOE/FE received more than 188,000 initial comments and over 2,700 reply comments, of which approximately 800 were unique.[62] DOE/FE

[57] *See* DCP Conditional Order at 57-65 (2012 EIA Study).
[58] *See* LNG Export Study – Related Documents, *available at* http://energy.gov/fe/downloads/lng-export-study-related-documents (NERA Economic Consulting Analysis (Study - Part 2)).
[59] *See* DCP Conditional Order at 65-81 (NERA Study).
[60] 77 Fed. Reg. at 73,627.
[61] *Id*. at 73,628. DOE/FE specifically invited comment on "the impact of LNG exports on: domestic energy consumption, production, and prices, and particularly the macroeconomic factors identified in the NERA analysis, including Gross Domestic Product (GDP), welfare analysis, consumption, U.S. economic sector analysis, and … any other factors included in the analyses." *Id*. at 73,629.
[62] *See* DCP Conditional Order at 5-6.

extensively reviewed and responded to these public comments in the Conditional Order.[63] Some of the comments submitted by Sierra Club, *et al*.[64] and others in response to the Notice of Availability addressed environmental issues, which DOE/FE determined were outside the scope of the LNG Export Study proceeding. In the Conditional Order, DOE/FE stated:

> [P]ersons wishing to raise questions regarding the environmental review of the present Application are responsible for doing so within the FERC proceedings. Insofar as a participant in the FERC proceeding actively raises concerns over the scope or substance of environmental review but is unsuccessful in securing that agency's consideration of its stated interests, DOE/FE reserves the right to address the stated interests within this proceeding.[65]

Accordingly, DOE/FE has considered the environmental comments submitted in the LNG Export Study proceeding as part of the record in this proceeding. Where not already addressed in FERC's or DOE/FE's review of the intervenors' protests and comments, these issues are discussed below.

On the basis of the two-part Study and its review of the comments, DOE/FE explained that, "[t]he conclusion of the LNG Export Study is that the United States will experience net economic benefits from issuance of authorizations to export domestically produced LNG."[66] DOE/FE further found that the LNG Export Study is "fundamentally sound and supports the proposition that [DCP's] proposed authorization will not be inconsistent with the public interest."[67]

In the Conditional Order, DOE/FE also considered more recent EIA projections in response to criticisms by commenters that the AEO 2011 projections were based on outdated

[63] *See id*. at 82-134 (§ VIII).
[64] In the LNG Export Study proceeding, Sierra Club filed comments on behalf of itself and a coalition of non-profit organizations, including Catskill Citizens for Safe Energy, Center for Biological Diversity, Clean Air Council, Columbia Riverkeeper, Delaware Riverkeeper, Lower Susquehanna Riverkeeper, Shenandoah Riverkeeper, and Upper Green River Alliance (collectively, Sierra Club).
[65] DCP Conditional Order at 122.
[66] *Id*. at 140.
[67] *Id.*

data and significantly underestimated actual and future demand for natural gas. DOE/FE explained its basis for relying on the AEO 2011 projections, yet also concluded that post-AEO 2011 EIA projections (specifically, the AEO 2012 final projections and the final AEO 2013 Reference Case) would not have materially affected the findings of the LNG Export Study.[68] However, on April 14, 2015, EIA issued its most recent update, the Annual Energy Outlook 2015 (AEO 2015), with projections to 2040.[69] Below, we consider the AEO 2015 projections and conclude that they do not undermine our conclusions regarding the consistency of DCP's proposed exports with the public interest. *See infra* § X.D. With this background, we turn to the present stage of this proceeding.

VI. FERC PROCEEDING AND GRANT OF AUTHORIZATION

A. FERC's Pre-Filing Procedures

Authorizations issued by FERC permitting the siting, construction, and operation of LNG export terminals are reviewed under NGA section 3(a) and (e), 15 U.S.C. § 717b(a), (e). FERC's approval process for such an application consists of a mandatory pre-filing process during which the environmental review required by NEPA commences,[70] and a formal application process that starts no sooner than 180 days after issuance of a notice that the pre-filing process has commenced.[71]

DCP filed a request with FERC for use of the pre-filing procedures on June 6, 2012. On June 26, 2012, in Docket No. PF12-16-000, the Director of the Office of Energy Projects at FERC granted DCP's request to commence the pre-filing review process. On September 24,

[68] *See id*. at 82-90. At the time DOE/FE issued the DCP Conditional Order, EIA's final AOE 2013 Reference Case was the most recent information then available. *See id*. at 83 n.95.
[69] U.S. Energy Information Administration, Annual Energy Outlook 2015 (April 14, 2015), *available at* http://www.eia.gov/forecasts/aeo/ [hereinafter AEO 2015].
[70] 18 C.F.R. § 157.21.
[71] 18 C.F.R. § 157.21(a)(2)(ii).

2012, FERC issued a Notice of Intent to Prepare an Environmental Assessment (NOI) of the proposed Liquefaction Project.[72]

DOE agreed to participate as a cooperating agency in FERC's preparation of DCP's environmental analysis,[73] as set forth in the NOI.[74] Consistent with its practice, FERC published the NOI in the Federal Register and mailed it to federal, state, and local government representatives and agencies, elected officials, environmental and public interest groups, Native American Tribes, property owners in the vicinity of the proposed facilities, other interested parties, and local libraries and newspapers.[75] As part of FERC's public scoping process under NEPA, FERC held open houses and received comments from a variety of stakeholders on the NOI, which served to identify issues for FERC staff to address in the EA.[76]

B. FERC's Environmental Review

On April 1, 2013, DCP began the second part of FERC's approval process by filing its formal application in FERC Docket No. CP13-113-000 for authorization to site, construct, and operate the Liquefaction Project under NGA section 3.[77] As noted above, FERC issued the EA for the Project on May 15, 2014, and placed the EA into the public record.[78] FERC provided a 30-day public comment period on the EA. During this time, FERC held a public comment

[72] *See supra* at 3 n.7.
[73] 40 C.F.R. § 1501.6 ("In addition, any other Federal agency which has special expertise with respect to any environmental issue, which should be addressed in the statement may be a cooperating agency upon request of the lead agency."); *see also id.* § 1501.6(b) (responsibilities of a cooperating agency).
[74] *See* FERC NOI, 77 Fed. Reg. at 59,601.
[75] FERC Order at P 98.
[76] *See id.* at PP 99-100.
[77] In addition to its request for authorization to site, construct, and operate the Liquefaction Project, DCP requested authorization under section 7(c) of the NGA to add compression at an existing compression station and to modify two of its metering and regulating sites in Virginia. *See* § I; FERC Order at P 12.
[78] Notice of EA, *supra* at 4 n.14.

meeting and accepted written comments on the EA from DCP, Sierra Club, various federal and state agencies, and other interested individuals and organizations.[79]

The EA addresses numerous environmental issues, including potential impacts on water resources, vegetation, fisheries, wildlife, federally listed species, land use, air quality, and cumulative impacts.[80] Based on its environmental analysis, FERC staff concluded that "the impacts associated with this Project can be sufficiently mitigated to support a finding of no significant impact and, thus, an EA is warranted."[81] FERC staff therefore recommended 82 mitigation measures for the Project. FERC staff further explained that, "if DCP constructs and operates the proposed facilities in accordance with its application, supplements, and our mitigation measures …, approval of this Project would not constitute a major federal action significantly affecting the quality of the human environment."[82] On this basis, FERC staff recommended that FERC issue an order to DCP that contains a Finding of No Significant Impact and includes the mitigation measures as conditions of DCP's authorizations.[83]

Subsequently, DCP filed supplemental information and clarifications in response to several comments filed on the EA. This supplemental information included documentation of DCP's compliance with some of the 82 mitigation measures recommended in the EA.[84]

C. FERC's Order Granting DCP's Authorization

On September 29, 2014, FERC issued its Order authorizing DCP to: (1) site, construct, and operate facilities for the liquefaction and export of domestically produced natural gas from

[79] FERC Order at PP 102-04.
[80] *Id.* at P 102.
[81] Federal Energy Regulatory Comm'n, Environmental Assessment for the Cove Point Liquefaction Project (Dominion Cove Point LNG, LP), Docket No. CP13-113-000, at 24 (May 2014), *available at* http://www.ferc.gov/industries/gas/enviro/eis/2014/05-15-14-ea/ea.pdf.
[82] *Id*. at 186.
[83] *See id*.
[84] FERC Order at PP 105-07.

the proposed Liquefaction Project at the existing Cove Point LNG Terminal, pursuant to NGA section 3(a); and (ii) construct and operate the related facilities in Virginia, pursuant to NGA section 7(c).[85]

In granting this authorization, FERC observed that the proposed Liquefaction Project is located on, and adjacent to, the footprint of the previously-approved Cove Point LNG Terminal. FERC reasoned that, because "[m]uch of the land in the area was previously disturbed during construction of the LNG terminal … the proposed project's environmental impacts are expected to be relatively small in number and well-defined."[86] Based on its consideration of the analysis in the EA and its discussion in the Order, FERC determined that, "if constructed and operated in accordance with [DCP's] application and supplements, and in compliance with the environmental conditions in Appendix [B] to this order, our approval of this proposal would not constitute a major federal action significantly affecting the quality of the human environment."[87] FERC further concluded that, "with the conditions required herein, the Cove Point Liquefaction Project results in minimal environmental impacts and can be constructed and operated safely," and thus DCP's proposed exports are not inconsistent with the public interest.[88] On this basis, FERC adopted 79 of the 82 mitigation measures recommended in the EA as environmental conditions of its Order, set forth in Appendix B.[89]

In relevant part, FERC addressed the commenters' assertion that the EA failed to consider the "potentially significant" indirect environmental impacts of the Liquefaction Project—specifically, the indirect effects of induced natural gas production in the Marcellus

[85] *Id*. at PP 1-2.
[86] *Id*. at P 32; *see also id*. at P 276 ("The small amount of land involved in the project makes an EA adequate and appropriate to fully consider all environmental issues.").
[87] *Id*. at P 281.
[88] *Id*. at P 33.
[89] *See* FERC Order at P 107.

shale region in response to demand from DCP's customers.[90] Citing the CEQ NEPA regulations, FERC observed that "[i]ndirect impacts are 'caused by the proposed action' and occur later in time or farther removed in distance than direct project impacts, but are still 'reasonably foreseeable.'"[91] FERC found that "[p]otential environmental effects associated with Marcellus shale region production are not sufficiently causally related to the Cove Point Liquefaction Project to warrant detailed analysis as indirect impacts," where Marcellus shale production is "not an essential predicate for the Cove Point Liquefaction Project, which can receive natural gas through interconnects with three interstate natural gas pipeline systems."[92] FERC also noted that "[n]atural gas development, including development of the Marcellus shale region, will continue and indeed is continuing, with or without the Cove Point Liquefaction Project, because multiple existing and proposed transportation alternatives for production from the region are available."[93]

FERC further reasoned that, even if such a causal relationship were shown, the scope of the impacts from any such induced production is not reasonably foreseeable as contemplated by CEQ regulations and case law:

> While it is axiomatic that natural gas exports require natural gas supplies, the source of gas to be exported via any individual project is speculative and would likely change throughout the operation of the project. … Thus, assessing where the gas processed by the [DCP] project will originate, much less where the wells, gathering line locations and the potential environmental impacts will occur, would require significant speculation.[94]

FERC concluded that such speculative analysis would not provide meaningful information to inform its decision whether to approve the Cove Point Liquefaction Project. It likewise rejected

[90] *See id*. at P 225.
[91] *See id*. P 227 (quoting 40 C.F.R. § 1508.8(b)).
[92] *Id*. at P 228.
[93] *Id*. at P 229.
[94] FERC Order at P 231.

a variety of related arguments presented by Earthjustice concerning induced production at the Project.[95]

Next, FERC addressed claims by Earthjustice and other commenters that the EA failed to consider the cumulative environmental impacts from natural gas development and gathering, natural gas transportation, and natural gas distribution in areas outside of the proposed project area. FERC found no merit in this argument, stating that under CEQ regulations and guidance implementing NEPA, cumulative impacts must occur in the project area being analyzed and be reasonably foreseeable.[96] FERC emphasized that, after analyzing reasonably foreseeable cumulative impacts in the same vicinity as the proposed Cove Point Liquefaction Project—namely projects that "affect the same resources in the same approximate time frame"—the EA concluded that cumulative impacts occurring in conjunction with the Liquefaction Project would be "temporary and minor" and that, overall, the Project would not result in significant cumulative impacts.[97]

FERC similarly rejected commenters' suggestion to analyze cumulative upstream impacts from development of the Marcellus shale. FERC found that such an evaluation "is outside the scope of this analysis because the exact location, scale, and timing of future facilities are unknown."[98] FERC explained that "[t]he EA notes that the specific details, including the timing, location, and number of additional production wells that may or may not be drilled, are speculative," and therefore are not reasonably foreseeable.[99]

[95] *See id.*; *see also id*. at PP 232-37.
[96] *See id*. at PP 238-42.
[97] *Id*. at PP 241.
[98] *Id*. at P 242.
[99] *Id.*

FERC also rejected commenters' arguments that the EA failed to adequately analyze direct, cumulative, and indirect impacts on climate change from GHG emissions. First, FERC observed that potential GHG emissions associated with the construction and operation of the Liquefaction Project were, in fact, identified and quantified in the EA. Second, FERC reaffirmed the EA's conclusion that it is not possible to determine whether the Liquefaction Project's contribution to cumulative impacts on climate change will be significant, citing the lack of a "standard methodology to determine how a project's incremental contribution to GHG emissions would result in physical effects on the environment, either locally or globally."[100] FERC concurred with the EA's determination that "because [FERC] cannot determine the project's incremental physical impacts on climate change, it is not possible to determine whether or not the project's contribution to cumulative impacts on climate change will be significant."[101] Third, FERC rejected claims that it should consider DOE/FE's LCA GHG Report, discussed herein, as part of its decision-making under NGA section 3. FERC reasoned that it has "no cause to attempt to assess air emissions, or the climate change impacts of such emissions, from the ultimate consumption of gas exported from the Cove Point LNG Project because the end use is not part of the project before us."[102]

Next, FERC found that the EA properly reviewed available alternatives to the proposed Liquefaction Project, including the "no action" alternative and "alternative energy sources." Specifically, commenters argued that building the Cove Point Project would take away the focus from developing renewable sources of energy and transitioning away from fossil fuels.[103] FERC disagreed, finding that predicting the effect that renewable energy sources might have in the

[100] FERC Order at P 243.
[101] *Id.* at P 246.
[102] *Id.* at P 246.
[103] *See id.* at P 264.

future on the use of natural gas for the Cove Point Project is speculative and beyond the scope of the EA.[104] Further, FERC found that the EA had reviewed the no action alternative and alternative energy sources, and concluded that they would not meet the Project's purpose, which is to export natural gas for DCP's customers.[105]

Finally, FERC addressed Earthjustice and other commenters' challenges to the sufficiency of the EA. These commenters asserted that FERC was required to prepare an EIS, not merely an EA, because the proposed Liquefaction Project is a major federal action "significantly" affecting the quality of the environment.[106] FERC again disagreed. FERC noted that, although there is no explicit definition for the term "significant impacts" in CEQ's regulations, significance depends on "both 'context' and 'intensity.'"[107] FERC stated that the Project's context (including the affected region, the affected interest, and the locality) and the Project's intensity (including any unique characteristics of the Project's geographic area and other factors) supported the FERC staff's determination that an EA was appropriate: namely, "the proposed facilities would be within the footprint of the existing LNG terminal and … the relevant [environmental] issues … were relatively small in number and well-defined."[108]

In sum, FERC stated that it had reviewed the information and analysis contained in the EA regarding the potential environmental effects of DCP's Liquefaction Project and concluded that, with the 79 environmental conditions required by its Order, the Project would not constitute a major federal action significantly affecting the quality of the human environment.[109] FERC

---

[104] *Id*.
[105] FERC Order at P 264.
[106] *Id.* at P 273.
[107] *Id.* at P 274.
[108] *Id.* at PP 274-75.
[109] FERC Order at PP 273, 275, 281.

therefore determined that the record is "sufficient to make a 'finding of no significant impact' of the project as conditioned"[110]—a conclusion that DOE/FE adopted, as discussed herein.

VII. CURRENT PROCEEDING BEFORE DOE/FE

A. Overview

The Conditional Order granted DCP's Application, but reserved the environmental issues raised in the proceeding for future review and decision. In its Application, DCP argues that natural gas, as the cleanest-burning fossil fuel, significantly reduces total GHG emissions when used as a substitute for coal or fuel oil. DCP asserts that, to the extent that the proposed exports are used as substitute for coal and fuel oil in other countries, its exports will reduce GHGs significantly over the export term.[111] DCP also states that the Liquefaction Project will be designed to minimize or mitigate any environmental or other adverse impacts.

As described in the Conditional Order, the Notice of Application called on interested persons to submit protests, motions to intervene, and comments by February 6, 2012.[112] Even before DOE/FE published the Notice of Application, however, the Coalition for Responsible Siting of LNG (CRS) and Shell NA LNG, LLC (Shell LNG) separately moved to intervene in the proceeding, with Shell also providing non-environmental comments.[113]

In response to the Notice of Application, DOE/FE received timely comments opposing the Application from: (1) the West Virginia State Building and Construction Trades Council, AFL-CIO, and its division, the Affiliated Construction Trades Foundation (collectively, the Trades

[110] *Id.* at P 272.
[111] DCP App. at 19.
[112] Dominion Cove Point LNG, LP, Application to Export Domestic Liquefied Natural Gas to Non-Free Trade Agreement Nations, 76 Fed. Reg. 76,698 (Dec. 8, 2011) [hereinafter Notice of Application].
[113] CRS filed a motion to intervene on October 19, 2011. Shell LNG filed a motion to intervene and comments on November 15, 2011. *See* DCP Conditional Order at 2-3, 30.

Council);[114] and (2) the Delaware Riverkeeper and eight other Riverkeeper organizations (collectively, Riverkeeper).[115] No comments were filed in support of the Application. DOE/FE also received two additional timely motions to intervene and protests from the American Public Gas Association (APGA) and Sierra Club.[116] Of these four motions to intervene, APGA and Sierra Club opposed the Application and asserted environmental concerns, and CRS and Shell LNG took no position.[117] DOE/FE granted each of these timely filed motions to intervene in the Conditional Order.[118]

On September 10, 2013, the day before DOE/FE issued the Conditional Order, DOE/FE received a filing by the Industrial Energy Consumers of America (IECA) entitled, "Consolidated Motions to Comment and Intervene Out of Time" (Consolidated Motion).[119] IECA's Consolidated Motion was filed approximately 19 months after the February 6, 2012, deadline established in the *Federal Register* for motions to intervene and comments on DCP's Application. In the Consolidated Motion, IECA did not address the merits of the Application, but instead commented that DOE should establish different standards for reviewing natural gas export applications, and requested intervenor status to "preserve its ability to represent its members in the context of any future DOE rulings or decisions."[120] DOE/FE did not rule on

[114] Comments of the West Virginia State Building & Construction Trades Council, *et al*., FE Docket No. 11-128-LNG (Feb. 6, 2012) [hereinafter Trades Council Comments].
[115] Comments on Application Export LNG filed by Delaware Riverkeeper, *et al.*, FE Docket No. 11-128-LNG (Feb. 6, 2012) [hereinafter Riverkeeper Comments]. Riverkeeper filed comments on behalf of the Delaware Riverkeeper, the Lower Susquehanna Riverkeeper, the Patuxent Riverkeeper, the Shenandoah Riverkeeper, the Potomac Riverkeeper, the Gunpowder Riverkeeper, the Choptank Riverkeeper, the South Riverkeeper, and the Sassafras Riverkeeper.
[116] On February 6, 2012, APGA filed a motion for leave to intervene and protest, and Sierra Club filed a motion to intervene, protest, and comments.
[117] *See* DCP Conditional Order at 30.
[118] *See id*. at 156 (Ordering Para. Q).
[119] Industrial Energy Consumers of America's Consolidated Motions to Comment and Intervene Out of Time, FE Docket No. 11-128-LNG (Sept. 10, 2013) [hereinafter Consolidated Motion].
[120] *Id*. at 9.

IECA's Consolidated Motion in the Conditional Order, but hereby denies it because it was filed significantly out of time without good cause shown.[121] *See infra* at § XIII (Ordering Para. S).

B. Non-Intervenor Comment by the Trades Council in Opposition to the Application

The Trades Council states that it is a labor organization that represents approximately 20,000 construction workers throughout West Virginia and the surrounding states. Although the Trades Council's comments are directed at the potential economic impacts of granting DCP's Application, it also argues that the Federal Government should be playing a "very proactive role" in incentivizing industries to use natural gas as a primary fuel source.[122] The Trades Council contends that allowing companies like DCP to export LNG to foreign markets would "send the wrong signal," leading to increased production of GHGs.[123] The Trades Council asserts, for example, that if natural gas were used as the primary fuel source in the transportation sector, the United States could achieve 90 percent fewer emissions than from traditional gasoline or diesel vehicles and reduce the risk to the public if a spill were to occur, as the LNG would evaporate and disperse without leaving a residue.

C. Non-Intervenor Comment by Riverkeeper in Opposition to the Application

Riverkeeper opposes DCP's Application and argues that DCP's proposal to export LNG does not satisfy the public interest. Riverkeeper's non-environmental comments were summarized and addressed in the Conditional Order.[124] For purposes of this Order, Riverkeeper states that increased natural gas production harms communities and the environment, and entails significant unevaluated impacts to the environment. Therefore, Riverkeeper asserts, DCP's

[121] *See* 10 C.F.R. § 590.303(f) ("[I]f [a] motion to intervene is not timely filed, then the movant becomes a party only after the motion to intervene is expressly granted.").
[122] Trades Council Comments at 3.
[123] *Id*.
[124] *See* DCP Conditional Order at 32-35.

proposal requires an EIS under NEPA.[125]

First, Riverkeeper argues that DCP's proposal ignores the environmental, health, and community ramifications of drilling using high-volume hydraulic fracturing practices—the mechanism that (according to Riverkeeper) will be used to produce natural gas for DCP's exports. Riverkeeper asserts that shale gas development is an extraordinarily land and water-intensive process that converts agricultural, forest, and range lands to industrial uses; consumes millions of gallons of water per well; and generates huge quantities of hazardous wastes.[126]

Addressing water quality impacts, Riverkeeper contends that failures in the integrity of well casing and cementing occur regularly in natural gas drilling operations. These failures, in turn, create potential pathways for contaminants to reach shallow water aquifers. According to Riverkeeper, shale gas extraction uses and produces numerous toxic substances, many of which allegedly are exempt from federal regulation as hazardous substances. Riverkeeper further states that wastewater pollutants associated with high-volume hydraulic fracturing practices include lead, arsenic, and benzene, among other pollutants. Riverkeeper argues that ground and water contamination may result from spills, leaks, or improper disposal, with most commercial and municipal wastewater treatment facilities ill-equipped to handle waste from hydraulic fracturing. In addition to potential water contamination, Riverkeeper states that the proliferation of shale gas development has the potential to degrade water systems due to the massive volumes of water consumed.

Turning to the impacts allegedly associated with the construction and maintenance of shale gas infrastructure, Riverkeeper argues that shale gas development consumes acres of land

[125] Riverkeeper Comments at 3.
[126] *See id*. at 18-19.

for well pads, pipelines, and access roads. Riverkeeper contends that, in the forested and agricultural lands overlaying the Marcellus Shale, this massive industrialization will cause widespread impacts to surface water quality from deforestation, stormwater runoff, and erosion and sedimentation. Riverkeeper argues that granting DCP's Application will exacerbate these and other environmental impacts, particularly when viewed in the context of the "boom" for shale gas in the mid-Atlantic region.

Next, Riverkeeper argues that DCP's construction and use of the Liquefaction Project facilities will increase GHG emissions for Maryland and the Chesapeake region. Riverkeeper argues that, because the construction and use of DCP's liquefaction facilities will facilitate and encourage natural gas production at inland reserves, DOE must account for emissions and air pollution from wells, compressors, pipelines, natural gas processing plants, trucks, construction equipment, and other related equipment. According to Riverkeeper, these operations produce major air pollutants of concern—including (but not limited to) methane (CH_4), volatile organic compounds (VOCs), nitrogen oxides (NO_x), and hazardous air pollutants (HAPs)—with carbon dioxide equivalents (CO2-e) presenting particular concern in terms of GHG emissions.

Focusing on the lifecycle of LNG production, Riverkeeper states that the energy and emissions lifecycle of LNG releases substantially more GHG pollution than that of natural gas due to the various stages required (*i.e.*, liquefying the natural gas, transporting it, then regasifying it). Riverkeeper urges DOE/FE to "consider the potential for increased emissions from the LNG lifecycle and shale gas production lifecycle in determining whether DCP's application fulfills the public interest."[127]

[127] *Id*. at 27.

Finally, Riverkeeper asserts that authorizing DCP's proposal to construct and operate LNG export facilities and to export LNG is a "'major federal action significantly affecting the quality of the human environment'" for purposes of NEPA, and therefore DOE/FE is required to prepare an EIS.[128] According to Riverkeeper, the construction and operation of DCP's export facilities will have significant effects on the human environment, as well as induce additional shale gas production in upstream regions, incite infrastructure development to transport upstream gas to downstream facilities, increase coal consumption, and increase GHG emissions and global warming. For this reason, Riverkeeper asserts that DOE/FE must prepare an EIS (or, at a minimum, a supplemental EIS) that considers the direct and indirect environmental impacts of the proposed action on the environment, including any cumulative effects.

D. APGA's Protest

APGA is an association of municipal gas distribution systems, public utility districts, and other public agencies. In arguing that DCP's proposed exports are inconsistent with the public interest, APGA focuses on potential economic impacts, as discussed in the Conditional Order.[129] Insofar as APGA raises environmental concerns, APGA notes that the production of natural gas from shale formations requires hydraulic fracturing which, according to APGA, is a controversial practice that is under increasing environmental scrutiny.

APGA asserts that hydraulic fracturing raises environmental issues in three areas: water, air emissions, and other pollution such as localized disruptions caused by work-site activity. Of these areas, APGA speculates that water issues "may prove the most serious," citing concerns

[128] *Id*. at 30; *see generally id*. at 28-32.
[129] Motion for Leave to Intervene and Protest of the American Public Gas Association, FE Docket No. 11-128-LNG, (Feb. 6, 2012) [hereinafter APGA Mot.]. *See* DCP Conditional Order at 35-38.

related to the volume of water used and the possible contamination of drinking water.[130] APGA notes that the U.S. Environmental Protection Agency (EPA) is studying water quality, water use, and waste fluid disposal issues associated with hydraulic fracturing, and has announced proposed rulemakings in related areas.

Turning to air emissions, APGA notes that, in 2011, EPA proposed a rule for regulating air pollutants, particularly VOCs, from hydraulically fractured oil and gas wells.[131] APGA states that unintentional leaks of natural gas and intentional flaring also have come under increased scrutiny.

Finally, APGA observes that state governments in the Marcellus Shale region—including Pennsylvania, Maryland, and New York—have taken, or are considering taking, actions to increase environmental and other regulatory oversight of aspects of hydraulic fracturing.

E. Sierra Club's Protest

Sierra Club states that it represents tens of thousands of members throughout Maryland, Delaware, Pennsylvania, Washington, DC, and New York—areas that it claims will be directly affected by the operation of DCP's proposed Liquefaction Project.[132] Sierra Club's non-environmental comments were summarized and addressed in the Conditional Order.[133] In addition to asserting that DCP's Application is not supported by adequate economic analysis (as discussed in the Conditional Order), Sierra Club contends that the Application is not supported by adequate environmental analysis and that DCP's proposed exports, if authorized, will cause

[130] *Id*. at 13.
[131] *See id*. at 14 (citing U.S. Envtl. Prot. Agency, Oil & Natural Gas Sector; New Source Performance Standards & National Emission Standards for Hazardous Air Pollutants Reviews; Proposed Rule, 76 Fed. Reg. 52,738 (Aug. 23, 2011)).
[132] Sierra Club's Motion to Intervene, Protest, and Comments, FE Docket No. 11-128-LNG, at 1-2 (Feb. 6, 2012) [hereinafter Sierra Club Mot.].
[133] DCP Conditional Order at 39-44.

significant environmental harm. On this basis, Sierra Club asserts that DOE/FE should deny DCP's Application as inconsistent with the public interest.

Sierra Club makes the following principal environmental arguments: (i) natural gas production is a major source of air pollution; (ii) natural gas production causes land use impacts; (iii) natural gas production causes water impacts; and (iv) DOE/FE must not approve DCP's Application without both (a) considering the cumulative impact of all reasonably foreseeable LNG export projects, including DCP's proposed Project, and (b) ensuring the completion of a EIS and a Record of Decision under NEPA which supports DOE/FE's decision.

First, Sierra Club asserts that DCP's proposed exports will lead to increased natural gas production, particularly from unconventional resources such as shale gas. According to Sierra Club, this increased production will lead to increased domestic natural gas prices which will, in turn, increase domestic coal use and related air and water pollution. According to Sierra Club, DOE/FE must consider these environmental impacts *and* monetize them to weigh them against other economic harms in the public interest analysis.[134]

Sierra Club asserts that natural gas production from both conventional and unconventional sources is a significant cause of environmental harm, disrupting ecosystems and watersheds. Sierra Club contends that a 2011 report of the Shale Gas Production Subcommittee of the Secretary of Energy's Advisory Board identifies "'a real risk of serious environmental consequences'" resulting from continued expansion of shale gas production.[135] Sierra Club states that natural gas production is a major source of air pollution, causing both direct emissions from production equipment and indirect emissions when natural gas replaces cleaner energy

[134] Sierra Club Mot. at 22.
[135] *Id*. at 22-23 (quoting Secretary of Energy's Advisory Board, *Shale Gas Production Subcommittee Second 90-Day Report*, at 10 (Nov. 18, 2011)).

sources. Specifically, Sierra Club claims that natural gas production operations emit methane, VOCs, nitrogen oxides, sulfur dioxide (SO_2), hydrogen sulfide (H_2S), particulate matter (PM), and significant quantities of hazardous air pollutants that contribute to cancer risks and other acute public health problems. Sierra Club asserts that methane is the dominant pollutant from the oil and gas sector, with emissions occurring as a result of intentional venting or unintentional leaks during drilling, production, processing, transmission, storage, and distribution. According to Sierra Club, EPA has identified natural gas systems as the largest contributor to anthropogenic methane emissions in the United States.[136]

Sierra Club states that methane is a potent greenhouse gas that substantially contributes to global climate change while causing environmental harm as an ozone precursor. Sierra Club asserts that, due to methane's effects on climate, EPA has found that methane endangers the public health and welfare within the meaning of the Clean Air Act. Sierra Club states that methane reacts in the atmosphere to form ozone, which damages vegetation, agricultural productivity, and cultural resources. Sierra Club observes that natural gas, when burned, produces less GHG emissions than other fuels (such as coal and oil), but states that these benefits are offset by the production sector's status as the largest domestic source of methane. Sierra Club therefore asserts that, whether DCP's proposed exports would stimulate unconventional or conventional production, they will accelerate GHG emissions for the industry.

Sierra Club also disputes DCP's claim that natural gas significantly reduces total GHG emissions by pointing to the "energy and emissions lifecycle" for LNG.[137] Sierra Club states that, because LNG requires additional energy to be liquefied, transported, and regasified, its

[136] *Id*. at 26 (citing 76 Fed. Reg. at 52,792).
[137] *See id*. at 28.

emissions lifecycle releases substantially more GHG pollution than that of natural gas generally, whether conventionally or unconventionally sourced:

> [A]ccording to the only published lifecycle study of LNG used for electricity generation of which we are aware, these upstream emissions are sufficient to push LNG lifecycle emissions well above those of natural gas generally, and into the range of coal emissions.[138]

Sierra Club further states that natural gas use, and LNG exports in particular, can increase GHG emissions by displacing other fuels and renewable energy. Citing EIA's data discussed in the Conditional Order, Sierra Club maintains that LNG exports will benefit renewable power somewhat (by raising natural gas prices), but will benefit coal power more (because coal is less expensive than renewables in some markets)—hence leading to increased GHG pollution. Pointing to this chain of events allegedly caused by exporting domestically produced LNG, Sierra Club asserts that "LNG export is disastrously bad climate policy."[139]

Sierra Club claims the natural gas industry is also a major source of VOCs and NOx. Sierra Club asserts that, as a result of significant VOC and NOx emissions associated with oil and gas development, numerous areas of the country with heavy concentrations of drilling are now suffering from serious ground-level ozone problems (*i.e.*, smog). As one example, Sierra Club states that, in 2008, the Colorado Department of Public Health and Environment concluded that the smog-forming emissions from oil and gas operations exceeded vehicle emissions for the entire state.[140] According to Sierra Club, smog pollution harms respiratory systems and has been linked to premature death, heart failure, chronic respiratory damage, and premature aging of the lungs. Sierra Club states that significant ozone pollution also damages plants and ecosystems.

---

[138] *Id*.
[139] Sierra Club Mot at 30.
[140] *See id*. at 33 (citing Colo. Dept. of Public Health & Env't, Air Pollution Control Division, Oil and Gas Emission Sources, *Presentation for the Air Quality Control Commission Retreat*, at 3-4 (May 15, 2008)).

Sierra Club next argues that oil and gas production emits sulfur dioxide, primarily from natural gas processing plants, and that some natural gas in the United States contains hydrogen sulfide. Sierra Club asserts that hydrogen sulfide emissions from the oil and gas industry are especially concerning because the pollutant may be harmful even at low concentrations and can lead to neurological impairment or even death. Sierra Club states that long-term exposure to hydrogen sulfide is linked to respiratory infections and eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches. Sierra Club reports that EPA has concluded that the potential for hydrogen sulfide emissions from the oil and gas industry is "'significant.'"[141]

Sierra Club states that the oil and gas industry is also a major source of PM pollution, which it states is generated by heavy equipment used to move and level earth during well pad and road construction. According to Sierra Club, PM consists of tiny particles of a range of sizes suspended in air. Sierra Club states that PM causes a wide variety of health problems and has been linked to respiratory and cardiovascular problems, including coughing, painful breathing, aggravated asthma attacks, chronic bronchitis, decreased lung function, heart attacks, and premature death.

According to Sierra Club, EPA's new source performance standards and standards for hazardous air pollutants will reduce some of the pollution problems from natural gas production, but they will not solve them. Sierra Club contends that EPA's new rules do not address some pollutants, such as NOx, methane, and hydrogen sulfide. Sierra Club also argues that EPA's rules do not control existing sources of air pollution, meaning that the increased use of existing

[141] *Id.* at 35 (quoting EPA, Office of Air Quality Planning and Standards, *Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas* (EPA-453/R-93-045), at III-35 (Oct. 1993)).

infrastructure will produce emissions uncontrolled by EPA's rules. Sierra Club further asserts that, without full enforcement, the rules will not reduce emissions completely, and that the rules do not address the tendency of LNG exports to increase the use of coal power. For these reasons, Sierra Club argues that DOE/FE may not rely on EPA's rules to avoid the obligation to weigh and disclose the air pollution impacts associated with DCP's proposed exports.[142]

Second, Sierra Club argues that increased natural gas production will transform the landscape of regions overlying shale gas plays, bringing industrialization to previously rural landscapes and significantly affecting ecosystems, plants, and animals. According to Sierra Club, land use disturbance associated with natural gas development has negative impacts on plants and animals through direct habitat loss (in which land is cleared for natural gas uses) and indirect habitat loss (in which land adjacent to direct habitat losses loses some of its important characteristics). As an example, Sierra Club cites a study of the Nature Conservancy, which (according to Sierra Club) found that one third of the species tracked by the Pennsylvania Natural Heritage Program are found in areas of the Marcellus Shale play projected to have a high probability of well development, with 132 species considered to be globally rare or critically endangered or imperiled.[143] Sierra Club maintains that these effects will harm rural economies and decrease property values.

Third, Sierra Club argues that natural gas production poses risks to ground and surface water. Sierra Club notes that hydraulic fracturing involves a process of injecting various fracturing chemicals into gas-bearing formations at high pressures to fracture rock and release natural gas. According to Sierra Club, each step of this process presents a risk to water

[142] *See id*. at 37.
[143] Sierra Club Mot. at 38-39 (citing The Nature Conservancy, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* (2010) at 29).

resources. Sierra Club states that hydraulic fracturing requires large quantities of water and that the large water withdrawals could drastically impact aquatic ecosystems and human communities. Sierra Club also contends that hydraulic fracturing poses a serious risk of groundwater contamination from the chemicals added to the fracturing fluid and from naturally occurring chemicals mobilized during the hydraulic fracturing process from formations below the water table. According to Sierra Club, hydraulic fracturing has resulted in groundwater contamination in at least five documented instances, and EPA has found groundwater contamination likely resulting from hydraulic fracturing in Pavillion, Wyoming, and Dimock, Pennsylvania.[144]

Sierra Club states that natural gas production, particularly hydraulic fracturing, produces liquid and solid wastes that must be managed and disposed, including drilling mud, drill cuttings, flowback (the fracturing fluid that returns to the surface after the hydraulic fracturing is completed), and produced water (a mixture of water naturally occurring in the shale formation and lingering fracturing fluid). Sierra Club contends that these wastes are often stored onsite in open pits that may produce harmful air emissions, leach into shallow groundwater, and/or result in surface discharges. Sierra Club also notes that flowback and produced water must be disposed offsite, with a common method being underground injection wells. Sierra Club further claims that underground injection of hydraulic fracturing wastewater appears to have induced earthquakes in several regions—a phenomenon known as "induced seismicity."[145]

According to Sierra Club, as an alternative to underground injection, flowback and produced water is also sent to water treatment facilities, leading to eventual surface discharge.

---

[144] *Id.* at 43-44 (citing EPA, *Draft Investigation of Ground Water Contamination near Pavillion, Wyoming* (Dec. 2011) and EPA Region III, *Action Memorandum - Request for Funding for a Removal Action at the Dimock Residential Groundwater Site* (Jan. 19, 2012)).
[145] *See id*. at 45-46.

Sierra Club contends that this alternative presents a separate set of environmental hazards, because these facilities—particularly publicly-owned treatment works—are not designed to handle these nontraditional pollutants.

Sierra Club concludes its discussion of environmental impacts by arguing that DCP's proposal would have major environmental effects throughout the country, especially in the Northeast, where Sierra Club contends DCP's exports would intensify Marcellus Shale extraction activities. Sierra Club contends that DOE/FE must consider all of the above enumerated environmental impacts in its public interest determination. Furthermore, Sierra Club argues that the negative environmental impacts of natural gas production are substantial and will only worsen with the added impacts of LNG exports.

Finally, addressing the scope of NEPA review, Sierra Club states that the public will not experience DCP's LNG export terminal, and other proposed LNG export terminals, as individual projects, but rather will experience them cumulatively through increases in natural gas and electricity prices and through environmental damage associated with the LNG exports. For this reason, Sierra Club maintains that DOE/FE must not approve DCP's Application without considering the cumulative impact of all reasonably foreseeable LNG export projects, including DCP's project. On this basis, Sierra Club argues that DOE/FE should exercise its discretion to "conduct[] a programmatic EIS considering the impacts of *all* gas export proposals at once."[146]

At a minimum, Sierra Club asserts that DOE/FE cannot grant DCP's Application without a "full consideration" of the environmental impacts of gas export and extraction under NEPA, which—in Sierra Club's view—requires DOE/FE to analyze the direct, indirect, and cumulative

[146] *Id*. at 52.

impacts of increased gas production linked to exports of LNG from the Cove Point Terminal.[147] Sierra Club therefore protests DCP's Application "to the extent that DOE/FE grants … a full approval without the completion of a full and legal EIS and Record of Decision …."[148]

F. Response of Applicant and Replies of Protestors and Commenters

On February 21, 2012, DCP filed a response to the motions to intervene, comments, and/or protests of the Trades Council, Riverkeeper, APGA, and Sierra Club (Response).[149] On February 29, 2012, Sierra Club filed a motion to reply and reply comments in response to DCP (Reply).[150] On March 6, 2012, Riverkeeper filed a request to submit a "rebuttal" to DCP's response (Rebuttal).[151] In the Conditional Order, DOE/FE granted Sierra Club's motion to reply and Riverkeeper's request to submit a rebuttal.[152]

1. DCP Response to Environmental Arguments of Sierra Club, Riverkeeper, APGA, and the Trades Council

In its Response to Motions to Intervene, Comments, and Protests, DCP notes that many of the environmental arguments made by the protestors and commenters involve allegations about the environmental effects of hydraulic fracturing and attacks on the development of natural gas resources in the Marcellus Shale region. DCP states that it disagrees with these arguments, but contends that these issues are not relevant in this proceeding. FERC, as the agency responsible for the physical siting of DCP's Liquefaction Project, is the lead agency charged with conducting any environmental analysis required by NEPA. DCP therefore contends that the scope of NEPA review for DCP's Project will not be determined in this proceeding, but rather in

[147] Sierra Club Mot. at 49.
[148] *Id*.
[149] Dominion Cove Point LNG, LP, FE Docket No. 11-128-LNG, Response of Dominion Cove Point LNG, LP to Motions to Intervene, Comments, and Protests (Feb. 21, 2012).
[150] Sierra Club's Motion to Reply and Reply Comments, FE Docket No. 11-128-LNG (Feb. 29, 2012).
[151] Riverkeeper Coalition Rebuttal to Applicant Response, FE Docket No. 11-128-LNG (Mar. 6, 2012) [hereinafter Riverkeeper Rebuttal Comments].
[152] DCP Conditional Order at 156 (Ordering Para. R).

the FERC proceeding involving the Liquefaction Project itself, in which DOE/FE will participate as a cooperating agency.

DCP also contends that a detailed analysis of issues associated with production of natural gas in the Marcellus Shale region is not an appropriate subject in the environmental review of DCP's Project, but again demurs to FERC for resolution of this issue.

Finally, DCP argues that the protesters and commenters raising environmental concerns are "unhappy" with the on-going development of shale gas and what they perceive to be inadequate environmental regulation of that activity.[153] DCP asserts that these issues are almost entirely within the ambit of state regulatory authorities, and therefore DOE/FE's proceeding is "not the place or time for such a debate."[154]

2. Sierra Club's Reply to DCP's Response

In its Reply to DCP's Response, Sierra Club argues that DCP's Response fails to rebut Sierra Club's claim that increased unconventional gas production associated with DCP's proposed exports will have major environmental impacts. Specifically, Sierra Club states that now that it has demonstrated that LNG exports likely have life-cycle carbon emissions close to that of coal, DCP has "changed its tune" and dismisses these environmental costs as "'not relevant'" to this DOE/FE proceeding.[155]

Sierra Club further states that DCP mischaracterizes its environmental concerns as relevant only to NEPA. According to Sierra Club, "environmental impacts are … of critical

[153] DCP Response at 27.
[154] *Id*. at 28.
[155] Sierra Club Reply at 5 (quoting DCP Response at 25).

relevance to the public interest analysis" under the Natural Gas Act, as both the Supreme Court and DOE/FE's Assistant Secretary Christopher Smith have acknowledged.[156]

Next, Sierra Club argues that DCP has not demonstrated that the economic benefits of increased natural gas production, if any, outweigh the environmental harms, or the concomitant economic damage that environmental harm will do. Sierra Club asserts that DOE/FE may not grant DCP's Application unless it can demonstrate that the environmental consequences of natural gas extraction and LNG export are not serious enough to outweigh any marginal economic benefit of DCP's proposal. Sierra Club argues that, on the record of this proceeding, DOE/FE cannot reach this conclusion.

Finally, Sierra Club asserts that the record in this proceeding illustrates the importance of conducting an EIS before DOE rules on DCP's Application. Sierra Club argues that NEPA requires DOE/FE to develop a "full" EIS that considers the "'reasonably foreseeable'" environmental impacts of the proposed action.[157] Sierra Club maintains that increases in the production of natural gas as a result of DCP's proposed exports are manifestly "reasonably foreseeable," and particularly so in the Marcellus and Utica shale plays near DCP's proposed Liquefaction Project. According to Sierra Club, it is irrational and illegal (under both NEPA and the NGA) for DCP to argue that its proposed LNG exports will increase domestic gas production and create economic benefits, while steadfastly opposing any consideration of their environmental impacts. Sierra Club states that, if FERC does not consider these impacts on DOE/FE's behalf, DOE/FE must do so in this proceeding.

[156] *Id*. at 5-6.
[157] *Id*. at 7 (citation omitted).

3. Riverkeeper's Rebuttal to DCP's Response

Riverkeeper's non-environmental rebuttal comments were summarized and addressed in the Conditional Order.[158] For purposes of this Order, Riverkeeper contends that DCP devoted "zero effort" to rebutting the significant impacts to land, air, and water associated with its proposed exports, instead maintaining those impacts are solely relevant under NEPA.[159]

Specifically, Riverkeeper maintains that DCP has failed to examine the environmental impacts arising from unconventional natural gas production as part of the public interest analysis required under the Natural Gas Act, in contravention of both Supreme Court precedent and DOE/FE's regulations. According to Riverkeeper, the administrative record in this proceeding is "devoid" of information rebutting the reasonably foreseeable, significant environmental impacts associated with DCP's proposed exports, and DPC has not shown that any economic benefits of exporting LNG outweigh the consequences of unconventional natural gas production.[160] In closing, Riverkeeper urges DOE/FE to conduct a EIS analyzing the impacts of unconventional gas production related to DCP's Project, and to deny DCP's requested authorization as inconsistent with the public interest.

VIII. DOE/FE *ADDENDUM TO ENVIRONMENTAL REVIEW DOCUMENTS CONCERNING EXPORTS OF NATURAL GAS FROM THE UNITED STATES*

On June 4, 2014, DOE/FE published the Draft Addendum for public comment. The purpose of the Addendum, DOE/FE explained, was to provide information to the public regarding the potential environmental impacts of unconventional natural gas production. Although not required by NEPA, DOE/FE prepared the Addendum in an effort to be responsive to the public and to provide the best information available on a subject that had been raised by commenters in

[158] DCP Conditional Order at 55-56.
[159] Riverkeeper Rebuttal Comments at 2.
[160] *Id*.

this and other LNG export proceedings. The 45-day comment period on the Draft Addendum closed on July 21, 2014. DOE/FE received 40,745 comments in 18 separate submissions, and considered those comments in issuing the Addendum on August 15, 2014.[161] DOE provided a summary of the comments received and responses to substantive comments in Appendix B of the Addendum.[162] DOE/FE has incorporated the Draft Addendum, comments, and final Addendum into the record in this proceeding.

The Addendum focuses on the environmental impacts of unconventional natural gas production, which primarily includes production from shale formations, but also includes tight gas and coalbed methane production. DOE/FE elected to focus the Addendum on unconventional production because such production is considered more likely than other forms of production to increase in response to LNG export demand. EIA's 2012 Study, published as part of the LNG Export Study, projected that more than 90% of the incremental natural gas produced to supply LNG exports would come from these unconventional sources.[163]

Although the 2012 EIA Study made broad projections about the types of resources from which additional production may come, the Addendum stated that DOE cannot meaningfully estimate where, when, or by what particular method additional natural gas would be produced in response to non-FTA export demand. Therefore, the Addendum focuses broadly on unconventional production in the United States as a whole, making observations about regional differences where appropriate.

[161] Addendum at 3.
[162] *Id*. at 79-151.
[163] *See* LNG Export Study – Related Documents, *available at* http://energy.gov/fe/services/natural-gas-regulation/lng-export-study (EIA 2012 Study) at 11 (total from shale gas, tight gas, and coalbed sources).

The Addendum discusses several categories of environmental considerations—Water Resources, Air Quality, Greenhouse Gas, Induced Seismicity, and Land Use Impacts—each of which is summarized briefly below.

A. Water Resources

1. Water Quantity

Natural gas production from shale resources requires water at various stages of development, approximately 89 percent of which is consumed through the process of hydraulic fracturing.[164] The Addendum presents information regarding water usage for shale gas production both in comparison to other energy sources and other regional uses. Although production of natural gas from shale resources is more water-intensive than conventional natural gas production, it is substantially less water-intensive than many other energy sources over the long term after the well has been put into production. As shown in the Addendum, the following table captures differences in water intensity across energy sources.

Table 1: Water Intensity[165]

Energy Source	Range in Water Intensity (gallons/mmBtu)
Conventional Natural Gas	~0
Shale Gas	0.6 – 1.8
Coal (no slurry transport)	2 – 8
Nuclear (uranium at plant)	8 – 14
Conventional oil	1.4 – 62
Oil Shale Petroleum (mining)	7.2 – 38
Oil Sands Petroleum (*in situ*)	9.4 – 16
Synfuel (coal gasification)	11 – 26
Coal (slurry transport)	13 – 32
Oil Sands Petroleum (mining)	14 – 33
Syn Fuel (coal Fischer-Tropsch)	41 – 60

[164] Addendum at 10.
[165] *Id*. at 11 (Table 2).

Enhanced Oil Recovery	21 – 2,500
Fuel ethanol (irrigated corn)	2,500 – 29,000
Biodiesel (irrigated soy)	13,800 – 60,000

The Addendum also explains that, despite its relatively low long-term water intensity, shale gas production could impact water supply in specific areas, particularly arid regions such as the Eagle Ford Shale play in Texas. The Addendum notes that the relationship between shale gas production and water quantity is principally a local issue, and that the degree of impact depends on "the local climate, recent weather patterns, existing water use rates, seasonal fluctuations, and other factors."[166] The following table shows the variation in the proportion of water usage by activity in shale gas regions:

Table 2: Water Usage in Shale Gas Regions[167]

Play	Public Supply (%)	Industry & Mining (%)	Power Generation (%)	Irrigation (%)	Livestock (%)	Shale Gas (%)	Total Water Use (Bgals/yr)*
Barnett 1	82.7	4.5	3.7	6.3	2.3	0.4	133.8
Eagle Ford[2]	17	4	5	66	4	3 – 6	64.8
Fayetteville[1]	2.3	1.1	33.3	62.9	0.3	0.1	378
Haynesville[1]	45.9	27.2	13.5	8.5	4.0	0.8	90.3
Marcellus[1]	12.0	16.1	71.7	0.1	0.01	0.06	3,570
Niobrara[3]	8	4	6	82		0.01	1,280

[*Bgal/yr = billion gallons per year]

2. Water Quality

Observing that water quality concerns may have received more attention than any other aspect of unconventional natural gas production, the Addendum addresses water quality issues arising from four aspects of unconventional natural gas production: construction, drilling, use of hydraulic fracturing fluids, and handling of flowback and produced waters.

[166] *Id.* at 12.
[167] *Id.* at 12 (Table 3) (citations omitted).

Runoff from the construction of access roads and other earth-disturbing activities can lead to temporary increases in turbidity and sedimentation in surface waters when well sites are being developed. However, the Addendum states that "when standard industry practices and preventative measures are deployed, only minor impacts are likely to result."[168]

Drilling in unconventional natural gas production requires penetrating shallower fresh water aquifers. Referring to NETL's *Modern Shale Gas Development in the United States: A Primer*, the Addendum briefly explains the manner in which such drilling can be undertaken to protect fresh water aquifers.[169] The Addendum acknowledges, however, that while unconventional natural gas formations are thousands of feet below aquifers associated with public water supply or surface hydrological connection, poor construction practices may cause failure of a casing or cement bond. This failure, in turn, could lead to potential contamination of an aquifer. The Addendum also observes that drilling may create connections with existing fractures or faults, or improperly plugged or abandoned wells, allowing contaminants to migrate through the subsurface.[170]

The fluid used for hydraulic fracturing consists of over 98 percent water, but also may include several different chemical compounds.[171] These compounds can vary from well to well based on site specific geological information. The Addendum describes federal and state efforts to gather information and require disclosure of the types of chemical additives being used in hydraulic fracturing. The risks posed by the use of these fluids may come from spills and leakages

---

[168] *Id.* at 13.
[169] Addendum at 13-14 (citing GWPC and ALL Consulting. 2009. *Modern Shale Gas Develop. In the United States: A Primer.* Nat'l Energy Tech. Lab.; *available at* http://www.netl.doe.gov/File%20Library/Research/Oil-Gas/Shale_Gas_Primer_2009.pdf).
[170] *Id.* at 14.
[171] *Id*. at 14-15.

during transport to the well, storage on the well pad, or during the chemical mixing process.[172] Further, chemical additives may contaminate groundwater should the integrity of the casing or cement seal of the well be compromised.[173]

The Addendum considers the potential environmental impacts associated with produced water recovered during flowback operations. Produced water may contain elevated levels of total dissolved solids, salts, metals, organics, and natural occurring radioactive materials, as well as the chemicals included in the fracturing fluid noted above. The Addendum discusses the three principal ways of mitigating the impacts associated with produced water: minimization of the quantity of water used, recycling and re-use of produced water, and disposal.

Concluding its discussion of water resources, the Addendum observes that "[u]nconventional natural gas production, when conforming to regulatory requirements, implementing best management practices, and administering pollution prevention concepts, may have temporary, minor impacts to water resources."[174] Further, risks may arise when best practices are not employed: "[I]mproper techniques, irresponsible management, inadequately trained staff, or site-specific events outside of an operator's control could lead to significant impacts on local water resources."[175]

B. Air Quality

The Addendum discusses air pollutants emitted at different stages of the natural gas production process. These emissions and their sources are captured in the table below:

[172] *Id.* at 18.
[173] *Id.*
[174] Addendum at 19.
[175] *Id.* at 19.

Table 3: Source Categories of Airborne Emissions from Upstream Natural Gas Activities (EPA, 2013)[176]

Category	Type of Emissions	Sources of Emissions
Combustion Emissions	NO_x and carbon monoxide (CO) resulting from the burning of hydrocarbon (fossil) fuels. Air toxics, PM, un-combusted VOCs, and CH_4 are also emitted.	Engines, heaters, flares, incinerators, and turbines.
Vented Emissions	VOCs, air toxics, and CH_4 resulting from direct releases to the atmosphere.	Pneumatic devices, dehydration processes, gas sweetening processes, chemical injection pumps, compressors, tanks, well testing, completions, and workovers.
Fugitive Emissions	VOCs, air toxics, and CH_4 resulting from uncontrolled and under-controlled emissions.	Equipment leaks through valves, connectors, flanges, compressor seals, and related equipment and evaporative sources including wastewater treatment, pits, and impoundments.

The Addendum describes the existing regulatory framework relating to such emissions, as well as the U.S. Environmental Protection Agency's (EPA) 2012 New Sources Performances Standards for hydraulically fractured natural gas wells[177] and EPA's 2013 update to those standards covering storage tanks.[178] The Addendum also summarizes the existing literature on each significant category of air pollutant and describes the potential contribution of oil and gas production activities to ground-level ozone pollution and reduced visibility in sensitive areas.

The Addendum concludes its discussion of air quality by stating that natural gas development leads to both short- and long-term increases in local and regional air emissions, especially methane, VOCs, and HAPs. According to the Addendum, the intermittent nature of air emissions from sources such as wells makes it difficult to analyze impacts at the regional level.

[176] *Id*. at 23 (Table 6).
[177] *Id*. at 20-22.
[178] *Id*. at 22.

As more data become available, a better understanding of trends in local and regional air quality and potential impacts may emerge.[179]

C. GHG Emissions

Separate from the LCA GHG Report described below in Section IX, the Addendum includes a discussion of GHG emissions associated with unconventional natural gas production—principally methane and carbon dioxide. The Addendum describes the nature of GHG emissions from each phase of the production process, including: well drilling and completion; gas production; well re-completions, workovers, and maintenance; gas processing; and gas transmission and storage.

The Addendum also summarizes regulations affecting GHG emissions from upstream natural gas activity. As in the air quality section, the Addendum discusses EPA's 2012 New Source Performance Standards regulations. The Addendum also describes EPA's publication in April 2014 of five technical white papers on potentially significant sources of emissions in the oil and gas sector, including completions and ongoing production of hydraulically fractured oil wells, compressors, pneumatic valves, liquids unloading, and leaks.[180] EPA stated that it will use these white papers, along with input from peer reviewers and the public to determine how best to pursue emissions reductions from these sources, possibly including the development of additional regulations.[181]

Finally, the Addendum summarizes the existing literature estimating GHG emissions and methane leakage rates from the upstream natural gas industry, noting that most studies suggest that

---

[179] *Id*. at 32.
[180] Addendum at 22 (*citing* U.S. Envtl. Prot. Agency, Office of Air Quality Planning & Standards, *White Papers on Methane and VOC Emissions, available at* http://www.epa.gov/airquality/oilandgas/whitepapers.html) (released April 15, 2014).
[181] *Id*. at 44.

"emissions of GHGs from the upstream industry are of similar magnitude for both conventional and unconventional sources."[182]

D. Induced Seismicity

The Addendum provides information on induced seismicity across various types of energy resource activities, namely the production of natural gas, gas condensates, and oil from currently targeted unconventional plays. More specifically, it provides greater detail about the potential for induced seismicity from hydraulic fracturing and wastewater disposal via injection, which is one method of disposing of produced water. Because the duration of injection of hydraulic fracturing fluids is generally minutes or hours and the quantity of injected fluid is relatively low, the Addendum states that "the probability of injecting enough fluid into a natural fault to trigger a felt earthquake is relatively low."[183] By contrast, the Addendum states that the "incidence of felt earthquakes is higher for wastewater disposal via wastewater injection wells because a large volume of water is injected over a longer period of time without any withdrawal of fluids, with the result that fluid pressures can be increased within a large area surrounding the injection well."[184] The Addendum identifies seismic events thought to have been triggered by wastewater disposal into injection wells in Oklahoma, Colorado, Arkansas, and Ohio.

Addressing the severity of seismic events induced by natural gas activities, the Addendum cites a 2013 National Research Council report characterizing the risk of induced seismicity as principally one of alarm to the public and minor property damage, as opposed to significant disruption.[185]

---

[182] *Id.* at 40.
[183] *Id.* at 51.
[184] *Id*. at 52.
[185] *Id* at 55-56 (citing *Induced Seismicity Potential in Energy Technologies*. National Research Council. The National Academies Press, Washington, D.C. (2013) at 5).

E. Land Use

The Addendum addresses potential land use impacts resulting from unconventional natural gas production. Land use impacts arise from the construction and development of new access roads, heavy truck traffic on existing local roadways, well pads, pipeline rights of way, and other structures such as compressor stations. The Addendum includes discussions of increased vehicle traffic, habitat fragmentation, reflective light pollution, noise, and other impacts associated with these land use changes. According to the Addendum, "[t]he real issue with land use impacts is not the minor impacts related to each well pad, access road, or pipeline."[186] Rather, "[w]hen the impacts from these individual components of shale gas development are considered in aggregate, or cumulatively, the impacts become magnified on an ecosystem or regional scale."[187] The Addendum identifies siting and design considerations that may minimize land use impacts, as well as traffic and road way impacts associated with large vehicles and concerns for vehicular safety for the motoring public.

IX. DOE/FE *LIFE CYCLE GREENHOUSE GAS PERSPECTIVE ON EXPORTING LIQUEFIED NATURAL GAS FROM THE UNITED STATES*

A. Description of LCA GHG Report

In January 2014, DOE/FE commissioned NETL to undertake a study analyzing the life cycle emissions of greenhouse gases (GHG), including carbon dioxide (CO_2) and methane (CH_4), associated with natural gas produced in the United States and exported as LNG to other countries for use in electric power generation. The study was intended to inform DOE/FE's decisionmaking under NGA section 3(a) and to provide additional information to the public. The study—entitled *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United*

[186] Addendum at 62.
[187] *Id*.

States (LCA GHG Report)—estimated the life cycle GHG emissions of domestically produced LNG (also referred to as U.S. LNG) exports to Europe and Asia, compared with alternative fuel supplies (such as regional coal and other imported natural gas), for electric power generation in the destination countries.

NETL published the LCA GHG Report on May 29, 2014, as well as a 200-page supporting document entitled, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*.[188] On June 4, 2014, DOE/FE provided notice of the documents in the *Federal Register* and invited public comment.[189] The 45-day public comment period closed July 21, 2014. In this section, we summarize the scope of the LCA GHG Report, as well as its methods, limitations, and conclusions. Below, we summarize the public comments on the Report and respond to those comments. *See infra* § IX.B.

1. Purpose of the LCA GHG Report

The LCA GHG Report was designed to answer two principal questions:

- How does LNG exported from the United States compare with regional coal (or other LNG sources) used for electric power generation in Europe and Asia, from a life cycle GHG perspective?
- How do those results compare with natural gas sourced from Russia and delivered to the same European and Asian markets via pipeline?

In establishing this framework, NETL considered the following:

[188] *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://energy.gov/fe/LCA-GHG-Report (link to "NETL Natural Gas LCA Model and Analysis") [hereinafter NETL, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*].

[189] U.S. Dep't of Energy, Notice of Availability of Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States and Request for Comment, 79 Fed. Reg. 32,260 (June 4, 2014). The NETL documents and all comments received were placed in the administrative record for each of the 25 non-FTA export application dockets then before DOE/FE, including DCP's docket. *See id*.

- In what countries will the natural gas produced in the United States and exported as LNG be used?
- How will the U.S. LNG be used in those countries, *i.e.*, for what purpose?
- What are the alternatives to using U.S. LNG for electric power generation in those countries?

Because the exact destination country (or countries) of U.S. LNG cannot be predicted for this study, NETL considered one medium-distance destination (a location in Europe) and one long-distance destination (a location in Asia). NETL chose Rotterdam, Netherlands, as the European destination and power plant location, and Shanghai, China, as the Asian location. NETL used other locations for the alternative sources of natural gas and coal, as specified in the Report. NETL also determined that one of the most likely uses of U.S. LNG is to generate electric power in the destination countries. In considering sources of fuel other than U.S. LNG, NETL assumed that producers in Europe and Asia could generate electricity in the following ways: (1) by obtaining natural gas from a local or regional pipeline, (2) by obtaining LNG from a LNG producer located closer geographically than the United States, or (3) by using regional coal supplies, foregoing natural gas altogether.

Using this framework, NETL developed four study scenarios, identified below. To compare scenarios, NETL used a common denominator as the end result for each scenario: one megawatt-hour (MWh) of electricity delivered to the consumer, representing the final consumption of electricity. Additionally, NETL considered GHG emissions from all processes in the LNG supply chains—from the "cradle" when natural gas or coal is extracted from the ground, to the "grave" when electricity is used by the consumer. This method of accounting for

cradle-to-grave emissions over a single common denominator is known as a life cycle analysis, or LCA.[190]

Using this LCA approach, NETL's objective was to model realistic LNG export scenarios, encompassing locations at both a medium and long distance from the United States, while also considering local fuel alternatives. The purpose of the medium and long distance scenarios was to establish likely results for both extremes (*i.e.*, both low and high bounds).

2. Study Scenarios

NETL identified four modeling scenarios to capture the cradle-to-grave process for both the European and Asian cases. The scenarios vary based on where the fuel (natural gas or coal) comes from and how it is transported to the power plant. For this reason, the beginning "cradle" of each scenario varies, whereas the end, or "grave," of each scenario is the same because the uniform goal is to produce 1 MWh of electricity. The first three scenarios explore different ways to transport natural gas; the fourth provides an example of how regional coal may be used to generate electricity, as summarized below:

Table 4: LCA GHG Scenarios Analyzed by NETL[191]

Scenario	Description	Key Assumptions
1	• Natural gas is extracted in the United States from the Marcellus Shale. • It is transported by pipeline to an LNG facility, where it is cooled to liquid form, loaded onto an LNG tanker, and transported to an LNG port in the receiving country (Rotterdam, Netherlands, for the European case and Shanghai, China, for the Asian case).	The power plant is located near the LNG import site.

[190] The data used in the LCA GHG Report were originally developed to represent U.S. energy systems. To apply the data to this study, NETL adapted its natural gas and coal LCA models. The five life cycle stages used by NETL, ranging from Raw Material Acquisition to End Use, are identified in the LCA GHG Report at 1-2.
[191] The four scenarios are set forth in the LCA GHG Report at 2.

	• Upon reaching its destination, the LNG is re-gasified, then transported to a natural gas power plant.	
2	• Same as Scenario 1, except that the natural gas comes from a regional source closer to the destination. • In the European case, the regional source is Oran, Algeria, with a destination of Rotterdam. • In the Asian case, the regional source is Darwin, Australia, with a destination of Osaka, Japan.	Unlike Scenario 1, the regional gas is produced using conventional extraction methods, such as vertical wells that do not use hydraulic fracturing. The LNG tanker transport distance is adjusted accordingly.
3	• Natural gas is produced in the Yamal region of Siberia, Russia, using conventional extraction methods.[192] • It is transported by pipeline directly to a natural gas power plant in either Europe or Asia.	The pipeline distance was calculated based on a "great circle distance" (the shortest possible distance between two points on a sphere) between the Yamal district in Siberia and a power plant located in either Rotterdam or Shanghai.
4	• Coal is extracted in either Europe or Asia. It is transported by rail to a domestic coal-fired power plant.	This scenario models two types of coal widely used to generate steam-electric power: surface mined sub-bituminous coal and underground mined bituminous coal. Additionally, U.S. mining data and U.S. plant operations were used as a proxy for foreign data.

In all four scenarios, the 1 MWh of electricity delivered to the end consumer is assumed to be distributed using existing transmission infrastructure.

[192] Yamal, Siberia, was chosen as the extraction site because that region accounted for 82.6% of natural gas production in Russia in 2012.

3. GHGs Reported as Carbon Dioxide Equivalents

Recognizing that there are several types of GHGs, each having a different potential impact on the climate, NETL normalized GHGs for the study. NETL chose carbon dioxide equivalents (CO_2e), which convert GHG gases to the same basis: an equivalent mass of CO_2. CO_2e is a metric commonly used to estimate the amount of global warming that GHGs may cause, relative to the same mass of CO_2 released to the atmosphere. NETL chose CO_2e using the global warming potential (GWP) of each gas from the 2013 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) (IPCC, 2013). The LCA GHG Report applied the respective GWPs to a 100-year and a 20-year time frame.

4. Natural Gas Modeling Approach

NETL states that its natural gas model is flexible, allowing for the modeling of different methods of producing natural gas. For Scenario 1, all natural gas was modeled as unconventional gas from the Marcellus Shale, since that shale play reasonably represents new marginal gas production in the United States. For Scenarios 2 and 3, the extraction process was modeled after conventional onshore natural gas production in the United States. This includes both the regional LNG supply options that were chosen for this study (Algeria for Europe and Australia for Asia) and extraction in Yamal, Siberia, for pipeline transport to the power plants in Europe and Asia.

In the above three natural gas scenarios, the natural gas is transported through a pipeline, either to an area that processes LNG (Scenarios 1 and 2) or directly to a power plant (Scenario 3). NETL's model also includes an option for all LNG steps—from extraction to consumption—known as an LNG supply chain. After extraction and processing, natural gas is transported through a pipeline to a liquefaction facility. The LNG is loaded onto an ocean tanker,

transported to an LNG terminal, re-gasified, and fed to a pipeline that transports it to a power plant. NETL assumed that the natural gas power plant in each of the import destinations already exists and is located close to the LNG port.

The amount of natural gas ultimately used to make electricity is affected by power plant efficiency. Therefore, the efficiency of the destination power plant is an important parameter required for determining the life cycle emissions for natural gas power. The less efficient a power plant, the more gas it consumes and the more GHG emissions it produces per unit of electricity generated. For this study, NETL used a range of efficiencies that is consistent with NETL's modeling of natural gas power in the United States.[193] NETL also assumed that the efficiencies used at the destination power plants (in Rotterdam and Shanghai) were the same as those used in the U.S. model.

5. Coal Modeling Approach

NETL modeled Scenario 4, the regional coal scenario, based on two types of coal: bituminous and sub-bituminous. Bituminous coal is a soft coal known for its bright bands. Sub-bituminous coal is a form of bituminous coal with a lower heating value. Both types are widely used as fuel to generate steam-electric power. NETL used its existing LCA model for the extraction and transport of sub-bituminous and bituminous coal in the United States as a proxy for foreign extraction in Germany and China. Likewise, NETL modeled foreign coal production as having emissions characteristics equivalent to average U.S. coal production. No ocean transport of coal was included to represent the most conservative coal profile (whether regionally sourced or imported).

[193] *See* LCA GHG Report at 3 (*citing* NETL, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*).

The heating value of coal is the amount of energy released when coal is combusted, whereas the heat rate is the rate at which coal is converted to electricity by a power plant. Both factors were used in the model to determine the feed rate of coal to the destination power plant (or the speed at which the coal would be used). For consistency, this study used the range of efficiencies that NETL modeled for coal power in the United States. The study also assumed the same range of power plant efficiencies for Europe and Asia as the U.S. model.

6. Key Modeling Parameters

NETL modeled variability among each scenario by adjusting numerous parameters, giving rise to hundreds of variables. Key modeling parameters described in the LCA GHG Report include: (1) the method of extraction for natural gas in the United States, (2) methane leakage for natural gas production,[194] (3) coal type (sub-bituminous or bituminous),[195] (4) the flaring rate for natural gas,[196] (5) transport distance (ocean tanker for LNG transport, and rail for coal transport),[197] and (6) the efficiency of the destination power plant.

For example, as shown in Table 5-1 of the LCA GHG Report, NETL used two different ranges for methane leakage rates for Scenarios 1 and 2: from 1.2 to 1.6% for natural gas extracted from the Marcellus Shale, and from 1.1 to 1.6% from gas extracted using conventional extraction methods. For Scenario 3 (the Russian cases), however, NETL used a higher range for methane leakage rates for both the European and Asian locations, in light of the greater pipeline

[194] The key modeling parameters for the natural gas scenarios are provided in Table 5-1 (LNG) and Table 5-2 (Russian natural gas). *See* LCA GHG Report at 6. The key parameters for natural gas extraction, natural gas processing, and natural gas transmission by pipeline are set forth in Tables 5-4, 5-5, and 5-6, respectively. *See id*. at 7-8.
[195] The modeling parameters and values for the coal scenarios are provided in Table 5-3. *See* LCA GHG Report at 6.
[196] Flaring rate is a modeling parameter because the global warming potential of vented natural gas, composed mostly of methane, can be reduced if it is flared, or burned, to create CO_2. *See id*. at 7.
[197] The distances used for pipeline transport of Russian gas are provided in Table 5-2. *See id*. at 6.

distance from Russia.[198] As the pipeline distance increases, the total methane leakage from pipeline transmission also increases, as does the amount of natural gas that is extracted to meet the same demand for delivered natural gas. Notably, as part of the study, NETL conducted a methane leakage breakeven analysis to determine the "breakeven leakage" at which the life cycle GHG emissions for natural gas generated power would equal those for the coal reference case (Scenario 3).[199]

In sum, NETL noted that the LCA study results are sensitive to these key modeling parameters, particularly changes to natural gas and coal extraction characteristics, transport distances, and power plant performance.[200] NETL also identified several study limitations based on the modeling parameters, including: (1) NETL's LCA models are U.S.-based models adapted for foreign natural gas and coal production and power generation, and (2) the specific LNG export and import locations used in the study represent an estimate for an entire region (*e.g.*, New Orleans representing the U.S. Gulf Coast).[201]

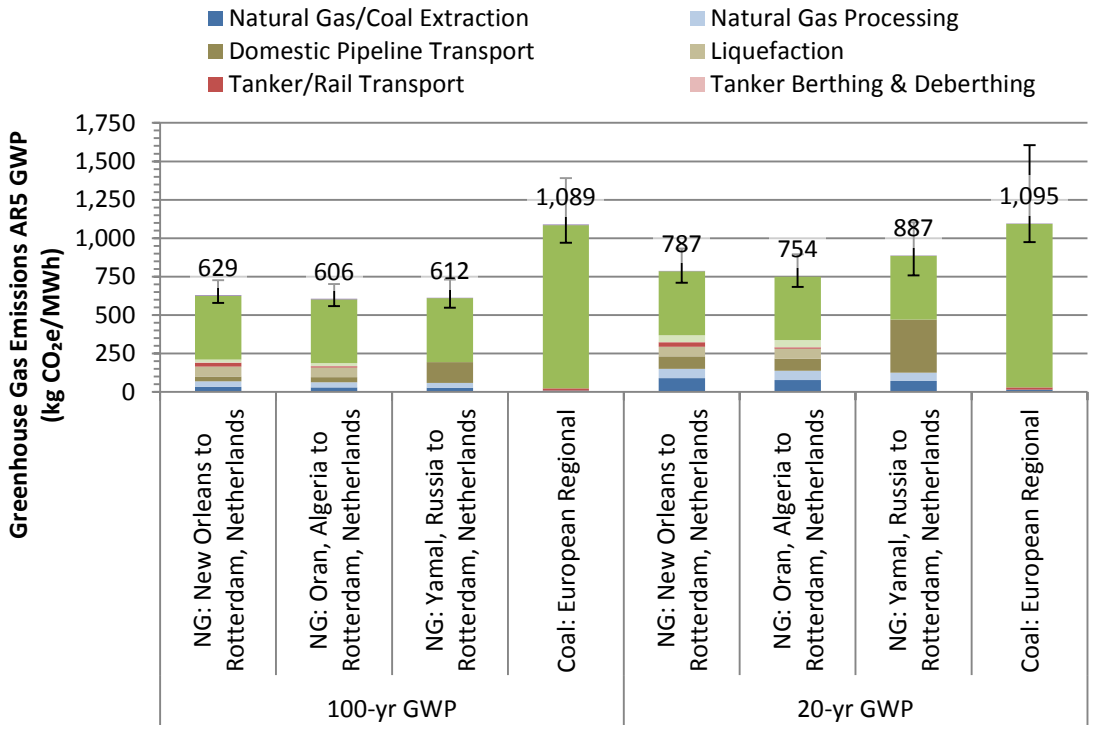
7. Results of the LCA GHG Report

NETL states that two primary conclusions may be drawn from the LCA GHG Report.[202] First, use of U.S. LNG exports to produce electricity in European and Asian markets will *not* increase GHG emissions on a life cycle perspective, when compared to regional coal extraction and consumption for power production. As shown below, NETL's analysis indicates that, for most scenarios in both the European and Asian regions, the generation of

[198] *See* LCA GHG Report at 5.
[199] The methane leakage breakeven analysis is described in the LCA GHG Report at 14 and 15.
[200] *See* LCA GHG Report at 5. To ensure that the study results were robust, NETL conducted several side analyses and sensitivity calculations, as discussed in the LCA GHG Report.
[201] The study limitations are described in the LCA GHG Report at 18.
[202] NETL's detailed study results, with corresponding figures, are set forth on pages 8 through 18 of the LCA GHG Report.

power from imported natural gas has lower life cycle GHG emissions than power generation from regional coal.[203] (The use of imported coal in these countries will only increase coal's GHG profile.) Given the uncertainty in the underlying model data, however, NETL states that it is not clear if there are significant differences between the corresponding European and Asian cases other than the LNG transport distance from the United States and the pipeline distance from Russia.

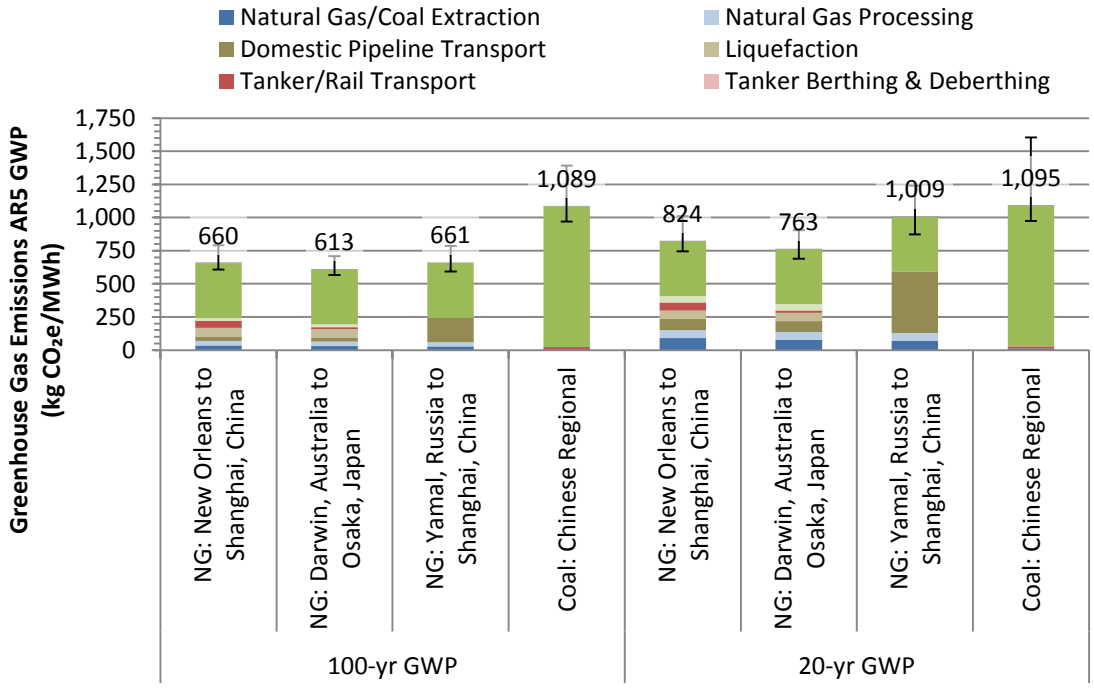
Table 5: Life Cycle GHG Emissions for Natural Gas and Coal Power in Europe[204]



[203] Although these figures present an expected value for each of the four scenarios, NETL states that the figures should not be interpreted as the most likely values due to scenario variability and data uncertainty. Rather, the values allow an evaluation of trends only—specifically, how each of the major processes (*e.g.*, extraction, transport, combustion) contribute to the total life cycle GHG emissions. *See* LCA GHG Report at 8-9.

[204] LCA GHG Report at 9 (Figure 6-1).

Table 6: Life Cycle GHG Emissions for Natural Gas and Coal Power in Asia[205]



Second, there is an overlap between the ranges in the life cycle GHG emissions of U.S. LNG, regional alternative sources of LNG, and natural gas from Russia delivered to the European or Asian markets. Any differences are considered indeterminate due to the underlying uncertainty in the modeling data. Therefore, the life cycle GHG emissions among these sources of natural gas are considered similar, and no significant increase or decrease in net climate impact is anticipated from any of these three scenarios.

B. Comments on the LCA GHG Report and DOE/FE Analysis

As discussed above, the LCA GHG Report compares life cycle GHG emissions from U.S. LNG exports to regional coal and other imported natural gas for electric power generation in Europe and Asia. Following the close of the public comment period on the LCA GHG

[205] LCA GHG Report at 10 (Figure 6-2).

Report, DOE/FE identified 18 unique submissions received from the general public, interest groups, industry, and academia/research institutions, which DOE/FE categorized into seven distinct comments.[206]

DOE/FE identifies below: (i) the pertinent arguments by topic, with reference to representative comments, and (ii) DOE/FE's basis for the conclusions that it drew in reviewing those comments. In so doing, DOE/FE will respond to the relevant, significant issues raised by the commenters.

1. Study Conclusions

a. Comments

Several commenters, including Citizens Against LNG and Oregon Wild, claim that the life cycle GHG emissions from natural gas are higher than those from coal.

b. DOE/FE Analysis

These comments assert that natural gas has higher GHGs than coal, but they do not cite data sources applicable to the comparison of U.S.-exported LNG to regional coal, nor do they acknowledge that the different end uses of coal and natural gas (i.e., heating, power, or transportation) affect their relative life cycle GHG performance. If the characteristics of each fuel (most critically, the carbon content per unit of the fuel's energy) and power plant efficiencies are considered, the lower per-MWh CO_2 emissions from natural gas power plants in comparison to coal power plants make natural gas lower than coal in the context of power plant operations by 61% (see Table 7 below, [(415 – 1,063)/1,063 x 100]). The life cycle of baseload

[206] In some instances, single letters were sent on behalf of a group of people. In one case, multiple copies of a form letter were received from 149 individuals, hereinafter referred to as "Concerned Citizens." Most of the individuals in the Concerned Citizens group live in New York, but other states and countries are also represented.

electricity generation is a reasonable basis for comparing natural gas and coal because both types of fuels are currently used on a large scale by baseload power plants.

The following table shows the life cycle GHG emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and sulfur hexafluoride (SF_6) from natural gas and coal systems and demonstrates the importance of power plant operations to total life cycle GHG emissions over 100- and 20-year GWP timeframes. This table is representative of European end-use scenarios, which consume natural gas exported from the United States and coal extracted in Europe. (This table is based on the same data as used by Figure 6-1 of the LCA GHG Report.)

Table 7: Life Cycle GHG Emissions from Natural Gas and Coal Systems (kg CO_2e/MWh)

Life Cycle Process	100-yr GWP		20-yr GWP	
	Natural Gas: New Orleans to Rotterdam, Netherlands	**Coal: European Regional**	**Natural Gas: New Orleans to Rotterdam, Netherland**	**Coal: European Regional**
Natural Gas/Coal Extraction	33.9	7.8	88.7	13.6
Natural Gas Processing	34.5	-	60.4	-
Domestic Pipeline Transport	32.3	-	81.4	-
Liquefaction	63.6	-	63.6	-
Tanker/Rail Transport	25.0	14.4	28.4	15.3
Tanker Berthing & Deberthing	1.5	-	1.6	-
LNG Regasification	20.0	-	45.3	-
Power Plant Operations	415	1,063	415	1,064
Electricity T&D	3.4	3.4	2.5	2.5
Total	**629**	**1,089**	**787**	**1,095**

2. Boundaries of the LCA GHG Report

a. Comments

Sierra Club,[207] Food & Water Watch,[208] Americans Against Fracking *et al*., Susan Sakmar, and Concerned Citizens, among others, contend that the LCA GHG Report has flawed boundaries and scenarios. In particular, these commenters contend that the LCA GHG Report assumes that LNG will displace coal power without also accounting for the displacement of renewable energy.

b. DOE/FE Analysis

The boundaries of the LCA were developed with respect to questions about two fossil fuels, coal and natural gas, and where they come from. The scenarios in the LCA do not model displacement of any kind. These two scenarios are purely attributional, meaning that they focus on independent supply chains for each scenario and do not account for supply or demand shifts caused by the use of one fuel instead of another fuel.

3. Natural Gas Transport between Regasification and Power Plants

a. Comments

Sierra Club and Concerned Citizens, among others, assert that the LCA GHG Report does not account for natural gas transport between LNG regasification facilities and power plants in the importing countries.

[207] Sierra Club submitted comments on behalf of its members and supporters as well as Cascadia Wildlands, Otsego 2000, Inc., Columbia Riverkeeper, Stewards of the Lower Susquehanna, Inc., Friends of the Earth, Chesapeake Climate Action Network, Food and Water Watch, and EarthJustice.

[208] Food & Water Watch submitted comments in the form of a letter signed by 85 individuals representing various national, state, and local public interest groups.

b. DOE/FE Analysis

The choice to exclude transportation between regasification and the power plant was a modeling simplification. The sensitivity analysis of GHG emissions with changes to pipeline transport distance, as illustrated by Figures 4-7 and 4-8 of NETL's *Life Cycle Analysis of Natural Gas Extraction and Power Generation*, shows that the *doubling* (i.e., a 100% increase) of natural gas pipeline transport distance increases the *upstream* GHG emissions from natural gas by 30%. When this upstream sensitivity is applied to the life cycle boundary of the LCA GHG Report, an additional 100 miles beyond the LNG import terminal increases the life cycle GHG emissions for the LNG export scenarios by 0.8%, and an additional 500 miles beyond the LNG import terminal increases the life cycle GHG emissions for the LNG export scenarios by 4% (using 100-year GWPs as specified by the IPCC Fifth Assessment Report). Although this parameter modification changes the results of the LCA slightly, it does not change the conclusions of the LCA GHG Report.

4. Data Quality for LNG Infrastructure, Natural Gas Extraction, and Coal Mining

a. Comments

Several commenters, including the American Petroleum Institute (API), Concerned Citizens, and Sierra Club, commented on whether the data used in the LCA GHG Report is current and fully representative In particular, API asserts that NETL's model is representative of inefficient liquefaction technologies that overstate the GHG emissions from the LNG supply chain, coal data that understates the methane emissions from coal mines, and natural gas extraction data that mischaracterizes "liquids unloading" practices.[209] API proposes the use of

[209] For purposes of this term, we refer to EPA's description of "liquids unloading" as follows: "In new gas wells, there is generally sufficient reservoir pressure to facilitate the flow of water and hydrocarbon liquids to the surface

newer data for both liquefaction terminals in the United States and methane emission factors from unconventional natural gas extraction and coal mining. Concerned Citizens argue that the LCA GHG Report does not clearly identify its source of data for estimates of loss related to LNG production, shipping, and regasification, as well as the basis for estimates of pipeline losses from Russia. Sierra Club points to inaccurate referencing of EPA's Subpart W report, which was the basis for many of NETL's emission factors for natural gas extraction.

b. DOE/FE Analysis

(1) Liquefaction Data

API points to newer data for liquefaction facilities that have higher efficiencies than the liquefaction process in the LCA GHG Report. API points to the GHG intensities of the liquefaction facilities proposed by Sabine Pass, Cameron LNG, LLC, and Freeport LNG Expansion, L.P., *et al.* (also called FLEX) (each of which has been granted one or more non-FTA LNG export orders by DOE/FE) that, according to API, produce 0.26, 0.29 and 0.12 tonnes of CO_2e per tonne of LNG, respectively. The majority of a liquefaction facility's energy is generated by combusting incoming natural gas, so the GHG intensity of a liquefaction facility is directly related to its efficiency. As API correctly points out, the LCA model assumes a GHG intensity of 0.44 tonnes of CO_2e per tonne of LNG; this GHG intensity is representative of a facility that consumes 12% of incoming natural gas as plant fuel.[210]

---

along with produced gas. In mature gas wells, the accumulation of liquids in the well can occur when the bottom well pressure approaches reservoir shut-in pressure. This accumulation of liquids can impede and sometimes halt gas production. When the accumulation of liquid results in the slowing or cessation of gas production (i.e., liquids loading), removal of fluids (i.e., liquids unloading) is required in order to maintain production. Emissions to the atmosphere during liquids unloading events are a potentially significant source of VOC and methane emissions." U.S. Envtl. Prot. Agency, Office of Air Quality Planning & Standards, *Oil & Natural Gas Sector Liquids Unloading Processes,* Report for Oil & Gas Sector Liquids Unloading Processes Review Panel, at 2 (April 2014), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20140415liquids.pdf.

[210] NETL (2010). NETL Life Cycle Inventory Data – Unit Process: LNG Liquefaction, Operation. U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: May 2010 (version 01); *available at*

The above GHG intensities and liquefaction efficiencies are not life cycle numbers, but represent only the gate-to-gate operations of liquefaction facilities, beginning with the receipt of processed natural gas from a transmission pipeline and ending with liquefied natural gas ready for ocean transport. As illustrated by Figures 6-1 and 6-2 in the LCA GHG Report (reproduced as tables herein), liquefaction accounts for approximately 10% of the life cycle GHG emissions of U.S. LNG used for electric power generation in Europe and Asia. A doubling of liquefaction efficiency (thus achieving a GHG intensity comparable to the average of the Sabine Pass, Cameron, and Freeport facilities) would lead to a 6% reduction in the feed rate of natural gas to the liquefaction plant.[211] This feed rate reduction would also reduce natural gas extraction, processing, and transmission emissions by 6%, but would not affect the processes downstream from liquefaction (ocean tankers, power plants, and electricity transmission networks). Applying the increased liquefaction efficiency and the 6% reduction in feed rate to the results of the LCA GHG Report would reduce the life cycle GHG emissions for LNG export scenarios by only 1.5% (using 100-year GWPs as stated in the IPCC Fifth Assessment Report). Increasing liquefaction efficiency may significantly reduce the emissions from one point in the supply chain, but it does not change the conclusions of the LCA.

http://www.netl.doe.gov/File Library/Research/Energy Analysis/Life Cycle Analysis/UP_Library/DS_Stage1_O_LNG_Liquefaction_2010-01.xls.

[211] *See id*.

(2) Natural Gas Methane Data

API and Concerned Citizens criticize the quality of data that DOE/NETL uses for natural gas extraction. API's concern is that NETL overstates the GHG emissions from unconventional well completion. API compares NETL's emission factor for unconventional well completions (9,000 Mcf of natural gas/episode) to the emission factor that EPA states in its 2014 GHG inventory (approximately 2,500 Mcf of natural gas/episode). EPA revised its unconventional completion emission factor between its 2013 and 2014 inventory reports,[212] after NETL's model had been finalized and during the time that NETL was completing the LCA GHG Report. These factors are referred to as "potential emission factors" because they do not represent natural gas that is directly released to the atmosphere, but they represent the volume of natural gas that can be sent to flares and other environmental control equipment. NETL uses a potential emission factor of 9,000 Mcf of natural gas per each episode of shale gas hydraulic fracturing, and a potential emission factor of 3.6 Mcf of natural gas per each episode of liquids unloading (with 31 liquids unloading episodes per well-year). NETL's model augments potential emission factors with flaring, thereby reducing the amount of methane that is released to the atmosphere. These emission factors are consistent with the findings of a survey jointly conducted by API and America's Natural Gas Alliance and released in September 2012.[213] They also match the factors used by EPA's 2013 GHG inventory.[214]

NETL's current model accounts for liquids unloading emissions from conventional wells, but does not account for liquids unloading from unconventional wells. Applying liquids

[212] U.S. Envtl. Prot. Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012, *available at* http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2014-Main-Text.pdf.
[213] *Characterizing Pivotal Sources of Methane Emissions from Natural Gas Production: Summary and Analysis of API and ANGA Survey Responses.* Final Report (Sept. 21, 2012).
[214] U.S. Envtl. Prot. Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011 (Apr. 12, 2013).

unloading to the unconventional wells in this analysis increases the life cycle GHGs by 0.6% for LNG export scenarios (using 100-year GWPs as stated in the IPCC Fifth Assessment Report). This 0.6% was estimated by assigning the liquid unloading emissions from onshore conventional natural gas to the upstream results for Marcellus Shale natural gas, followed by an expansion of the boundaries to a life cycle context. Simply put, liquids unloading accounts for 11% of the upstream GHG emissions from conventional onshore natural gas.[215] When liquids unloading is added to unconventional natural gas in our LCA model, it is scaled according to the unique production rates and flaring practices of unconventional wells in addition to the subsequent flows of natural gas processing, liquefaction, ocean transport, regasification, power plant operations, and electricity transmission. Thus, while liquids unloading may account for a significant share of *upstream* GHG emissions, none of the LCA GHG Report's conclusions would change with the addition of liquids unloading to unconventional natural gas extraction.

The potential emissions from unconventional well completions are modeled as 9,000 Mcf of natural gas per episode. It is important to remember that this factor does not represent methane emissions directly released to the atmosphere, but the flow of natural gas prior to environmental controls. For unconventional natural gas, NETL's model flares 15% of these potential emissions (flaring converts methane to CO_2, thus reducing the GWP of the gas) and apportions all completion emissions to a unit of natural gas by dividing them by lifetime well production (completion emissions occur as one-time episode that must be converted to a life cycle basis by amortizing them over total lifetime production of a well). Further, the life cycle GHG contributions from well completions are diluted when scaled to the subsequent flows of natural gas processing, liquefaction, ocean transport, regasification, power plant operations, and

[215] *See* NETL, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*.

electricity transmission. However, in NETL's model, life cycle completion emissions are directly affected by the estimated ultimate recovery (EUR) of a well because the total amount of natural gas produced by a well is used as a basis for apportioning completion and other one-time emissions to a unit of natural gas produced. From an engineering perspective, wells with high EURs are more likely to have a high initial reservoir pressure that increases the potential completion emissions. A reasonable uncertainty range around the potential emissions from unconventional completion emissions (9,000 Mcf/episode) is -30% to +50% (6,100 to 13,600 Mcf/episode). This uncertainty range matches the scale of uncertainty around the Marcellus Shale EUR used in the LCA GHG Report (see Table 5-4 of the LCA GHG Report). This -30% to +50% uncertainty around potential emissions from unconventional completions causes a -2% to 3% uncertainty around life cycle GHG emissions for the export scenarios of this analysis.

The recently revised New Source Performance Standards (NSPS) rules for the oil and natural gas sector, which will be in full effect by January 2015, will achieve significant methane emission reductions primarily by requiring all new or modified wells to capture and control potential emissions of VOCs during natural gas well completion. In addition to well completion emissions, the NSPS rules target other point sources of VOC emissions from new and modified sources at natural gas extraction and processing sites, but they do not address liquids unloading.[216] The LCA GHG Report does not account for the potential effects of the NSPS rules on natural gas emissions because the scope of the LCA accounts for GHG emissions from natural gas being produced today. EPA's Regulatory Impact Analysis estimated that the final NSPS rule would reduce annual methane emissions in 2015 by 18 million metric tons, meaning

[216] U.S. Envtl. Prot. Agency, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews (40 C.F.R. Part 63) (Apr. 17, 2012), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20120417finalrule.pdf.

that this rule will have the effect of reducing life cycle emissions from natural gas systems as new wells are developed and existing wells are modified. The likely effects of the NSPS rule therefore suggest that the conclusions of the LCA GHG Report are conservative with respect to the life cycle GHG emissions of natural gas produced in the United States.

Sierra Club contends that NETL's documentation, including the 200-page supporting LCA document, does not clearly cite EPA's Subpart W document. NETL's Report has three references to Subpart W, cited as EPA 2011a, 2011b, and 2011c. These three references should refer to the same document.[217] Future versions of the Report will correct these duplicate citations. Sierra Club also calls out the citation for EPA, 2012c, although this is a correct reference that points to EPA's documentation of New Source Performance Standards.

(3) Coal Methane Data

API and Concerned Citizens criticize the quality of data that DOE/NETL uses for coal extraction. In particular, API claims that coal mine methane emissions may be higher than the factors used by NETL. Concerned Citizens claim that NETL used a limited set of references to characterize coal mine emissions.

Methane emissions from coal mines are based on data collected by EPA's Coalbed Methane Outreach Program and have been organized by coal type and geography. Due to data limitations, the LCA GHG Report used this data as a proxy for emissions from foreign coal. This limitation is noted in the LCA GHG Report and is accounted for by uncertainty.[218] The bounds on coal methane uncertainty were informed by the variability in coal mine methane emissions between surface mines (subbituminous coal) and underground mines (bituminous

[217] U.S. Envtl. Prot. Agency, Greenhouse Gas Emissions Reporting from the Petroleum and Natural Gas Industry: Background Technical Support Document (2011), *available at* http://www.epa.gov/ghgreporting/documents/pdf/2010/Subpart-W_TSD.pdf.

[218] *See, e.g.*, NETL, *Life Cycle Analysis of Natural Gas Extraction and Power Generation.*

coal) in the United States. The default parameters in NETL's model represent subbituminous coal, which has lower coal mine methane emissions than bituminous coal (these parameters are specified in Table 5-3 of the LCA GHG Report). If coal mines in Europe and Asia emit methane at rates similar to the underground, bituminous coal mines in the United States, then the life cycle GHG emissions from coal power would increase. This increase in coal mine methane emissions would increase the life cycle GHG emissions of coal power by 8 percent (from 1,089 to 1,180 kg CO_2e/MWh, using 100-year GWPs as stated in the IPCC Fifth Assessment Report). This uncertainty is illustrated by Figure 6-16 in the LCA GHG Report. Again, even though changes to coal mine methane emissions change the GHG results of the LCA, they do not change the conclusions of the LCA.

5. Methane Leakage Rate Used in the LCA GHG Report

a. Comments

A number of commenters, including Sierra Club, Food & Water Watch, Americans Against Fracking et al., and Zimmerman and Associates, claim that the methane leakage rate used by NETL is too low. They assert that it does not match top-down (or aerial) measurements recently conducted in regions with natural gas activity, nor does it match the leakage rate in a recent analysis of wellhead casings in Pennsylvania.

b. DOE/FE Analysis

Recent studies lack consensus concerning the extent and rates of leakage from the upstream natural gas supply chain, with the leakage rates reported by these studies ranging from less than 1% to as high as 10%.[219] One reason for this broad range of leakage rates is the fact

[219] *See* NETL, *Life Cycle Analysis of Natural Gas Extraction and Power Generation* (Section 6.2.1) (identifying reports that include various leakage rates).

that different analysts use different boundaries (*e.g.*, extraction only, extraction through processing, extraction through transmission, and extraction through distribution). Further, top-down measurements are taken over narrow time frames and limited geographic scopes that represent only a snapshot of operations. They do not necessarily represent long-term operations over a broad area.

Another reason for this range of leakage rates is confusion between leaks and losses. Natural gas leaks include emissions from pneumatically controlled devices, valves, compressor seals, acid gas removal units, dehydrators, and flanges. These leaks are a mix of methane and other hydrocarbons, and are a subset of total natural gas losses. Another type of loss includes flaring, which converts methane to CO_2 and thus reduces methane venting to the atmosphere. Similarly, the combustion of natural gas by reboilers in a natural gas processing plant or by compressors on a pipeline represents the loss of natural gas that is used to improve the purity of the gas itself and move it along the transmission network.

NETL's expected cradle-through-transmission leakage rate is 1.2%. In other words, the extraction, processing, and transmission of 1 kg of natural gas releases 0.012 kg of CH_4 to the atmosphere. In contrast, NETL's expected loss rate from the same boundary is approximately 8%: for the delivery of 1 kg of natural gas via a transmission pipeline, 0.012 kg of CH_4 is released to the atmosphere, and 0.068 kg is flared by environmental controls or combusted for processing and transmission energy.

Sierra Club compares NETL's leakage rate to a 1.54% leakage rate derived from EPA's 2013 GHG inventory. The two types of leakage rates (the 1.2% calculated by NETL's life cycle model and the 1.54% implied by EPA's 2013 inventory) are not directly comparable. LCAs and national inventories have different temporal boundaries. NETL's leakage rate is a life cycle

number based on a 30-year time frame; it levelizes the emissions from one-time well completion activities over a 30-year time frame of steady-state production. The leakage rate implied by EPA's inventory represents 2011 industry activity; it captures the spike in completion emissions due to the atypically high number of wells that were completed that year. In other words, national inventories calculate all emissions that occur in a given year, while LCAs apportion all emissions that occur during a study period (*e.g.*, 30 years) to a unit of production (*e.g.*, 1 MWh of electricity generated). Both approaches are legitimate with respect to the unique goals of each type of analysis.

Sierra Club also compares NETL's 1.2% leakage rate to the 2.01% leakage rate calculated by Burnham et al.[220] Again, a boundary difference explains why the two leakage rates are not directly comparable. Burnham et al.'s leakage rate includes natural gas distribution, which is an additional transport step beyond transmission. Natural gas distribution moves natural gas from the "city gate" to small scale end users (commercial and residential consumers). NETL's leakage rate ends after natural gas transmission, the point at which natural gas is available for large scale end users such as power plants. The natural gas distribution system is a highly-branched network that uses vent-controlled devices to regulate pressure. This boundary difference explains why Burnham et al.'s leakage rate is higher than NETL's rate. Sierra Club also compares NETL's leakage rate to a shale gas analysis conducted by Weber et al.[221] We have reviewed Weber et al.'s work and do not see any mention of leakage rate.

It is also important to note that leakage rate is not an input to NETL's life cycle model. Rather, it is calculated from the outputs of NETL's life cycle model. NETL uses an approach

[220] 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.
[221] 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.

that assembles all activities in the natural gas supply chain into a network of interconnected processes. The emissions from each process in this model are based on engineering relationships and emission factors from the EPA and other sources. This method is known as a "bottom-up" approach. Researchers are trying to discern why "top-down" studies such as Pétron's measurements in northeast Colorado[222] do not match the bottom-up calculations by NETL and other analysts. We believe that inconsistent boundaries (*i.e.*, bottom-up models that account for long term emissions at the equipment level in comparison to top-down measurements that encompass an entire region with more than one type of industrial activity over a narrow time frame) partly explain the differences between bottom-up and top-down results. As research continues, however, we expect to learn more about the differences between bottom-up and top-down methods.

Zimmerman and Associates references a recent study by Ingraffea et al. that assessed failure rates of well casings for oil and gas wells in Pennsylvania.[223] However, Ingraffea et al. do not calculate a methane leakage rate in their analysis; rather, they calculate the rate at which wells develop leaks. The rate at which leaks develop in well casings is a different phenomenon than the rate at which methane leaks from the natural gas supply chain. The former is a measurement of failure rates (the number of wells in a group that have leaks) and the latter is a measurement of the magnitude of total leakage (the amount of methane in extracted natural gas that is released to the atmosphere).

[222] Pétron, G., Frost, *et al*. (2012). Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study. *Journal of Geophysical Research: Atmospheres (1984–2012)*, *117*(D4).
[223] Ingraffea, A. R., Wells, M. T., Santoro, R. L., & Shonkoff, S. B. (2014). Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000–2012. *Proceedings of the National Academy of Sciences*, *111*(30), 10955-10960.

The breakeven analysis shown in Section 6 of the LCA GHG Report models hypothetical scenarios that increase the natural gas leakage rate to the point where the life cycle emissions from natural gas power are the same as those from coal power. The breakeven points between natural gas and coal systems are illustrated in Figures 6-8 and 6-9 of the Report. These results are based on the most conservative breakeven point, which occurs between the high natural gas cases (*i.e.*, lowest power plant efficiency, longest transport distance, and highest methane leakage) with the low coal case (*i.e*., highest power plant efficiency and shortest transport distance). These graphs show that on a 100-year GWP basis, methane leakage would have to increase by a factor of 1.7 to 3.6, depending on the scenario, before the breakeven occurs. The breakeven methane leakage is lower for the 20-year GWP basis and, for some scenarios, is lower than the modeled leakage rate.

6. The Uncertainty Bounds of the LCA GHG Report

a. Comments

Concerned Citizens claim that the LCA GHG Report has significant uncertainty, and contend that "poor modeling is not a reason to dismiss impacts."

b. DOE/FE Analysis

The results of the LCA GHG Report are based on a flexible model with parameters for natural gas extraction, processing, and transport. Uncertainty bounds are assigned to three key parameters: well production rates, flaring rates, and transport distances. These uncertainty bars are not an indication of poor modeling. To the contrary, they are used to account for variability in natural gas systems. If the analysis did *not* account for uncertainty, the results would imply that the GHG emissions from natural gas systems are consistently a single, point value, which

would be inaccurate. We therefore believe the chosen uncertainty bounds strengthen the LCA model, as opposed to indicating any weakness in modeling.

7. The LCA GHG Report and the NEPA Approval Process

a. Comments

Several commenters, including Citizens Against LNG, Dominion Cove Point LNG, Susan Sakmar, and Americans Against Fracking et al., note that the LCA GHG Report does not fulfill the requirements of an EIS as defined by NEPA. These commenters maintain that the LCA GHG Report should not be used as a basis for approving proposed LNG export terminals.

b. DOE/FE Analysis

We agree that the LCA GHG Report does not fulfill any NEPA requirements in this proceeding, nor has DOE/FE made any suggestion to that effect. The LCA GHG Report addresses foreign GHG emissions and thus goes beyond the scope of what must be reviewed under NEPA.

X. DISCUSSION AND CONCLUSIONS

In reviewing the potential environmental impacts of DCP's proposal to export LNG, DOE/FE has considered both its obligations under NEPA and its obligation under NGA section 3(a) to ensure that the proposal is not inconsistent with the public interest. To accomplish these purposes, DOE/FE has reviewed a wide range of information, including:

- DCP's Application and the submissions of protestors, intervenors, and commenters in response to the Application;
- FERC's EA and September 29 Order, including 79 environmental conditions recommended in the EA and adopted by FERC following DCP's submission of supplemental information;
- Comments regarding potential environmental impacts submitted in response to the 2012 LNG Export Study;

- The Draft Addendum, comments received in response to the Draft Addendum, and the final Addendum; and
- The LCA GHG Report (and the supporting NETL document), including comments submitted in response to those documents.

A. Compliance with NEPA

1. FERC's Environmental Assessment and DOE/FE's Finding of No Significant Impact

DOE/FE participated in FERC's environmental review of the proposed Liquefaction Project as a cooperating agency. On November 5, 2014, DOE adopted FERC's EA and issued a FONSI (DOE/EA-1942) based on FERC's EA and the FERC Order.[224] Although not required by NEPA, DOE also considered the Addendum.[225] In the FONSI, DOE determined that granting DCP's Application, subject to the environmental conditions imposed in the EA and adopted in the FERC Order, will not have a significant effect on the human environment.

2. Scope of NEPA Review

Sierra Club, Earthjustice, and other parties intervened in DCP's proceeding before FERC, challenging the adequacy of the EA. These intervenors asserted that the EA did not have a sufficiently broad scope because it failed to consider the indirect effects of induced natural gas production associated with the proposed Liquefaction Project. As discussed above, FERC rejected this argument.[226] FERC found that these intervenors had not demonstrated that the Liquefaction Project would induce additional upstream gas production. Even assuming that the Liquefaction Project would induce additional gas production, FERC found that such production is

[224] *See* FONSI at 3, *supra* at 6 n.26, *available at* http://energy.gov/sites/prod/files/2014/11/f19/EA-1942-FONSI-2014.pdf (adopting EA and incorporating it by reference in FONSI).
[225] *See id*.
[226] FERC Order at PP 225-37. Sierra Club made similar arguments on induced production when it filed comments in response to DOE/FE's 2012 LNG Export Study.

not "reasonably foreseeable" within the meaning of NEPA.[227] We find that FERC's environmental review covered all reasonably foreseeable environmental impacts of the Liquefaction Project,[228] and that NEPA does not require the review to include induced upstream natural gas production.

Fundamental uncertainties constrain our ability to foresee and analyze with any particularity the incremental natural gas production that may be induced by permitting exports of LNG to non-FTA countries. EIA's 2012 Study projected that incremental natural gas production in the United States would account for 63% of LNG export volumes and, of that amount, 93% would come from unconventional production.[229] For this reason, and because DOE/FE had received comments regarding the potential environmental impacts associated with unconventional production, DOE/FE produced the Addendum and made it available for public comment. The Addendum takes a broad look at unconventional natural gas production in the United States, with chapters covering water resources (including water quantity and quality), air quality, GHG emissions, induced seismicity, and land use.

The Addendum addresses unconventional natural gas production in the nation as a whole. It does not attempt to identify or characterize the incremental environmental impacts that would result from LNG exports to non-FTA nations. Such impacts are not reasonably foreseeable and cannot be analyzed with any particularity. To begin, there 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

[227] *See id*. at P 230.
[228] Under CEQ's regulations, "indirect effects" of a proposed action are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b).
[229] *See* LNG Export Study – Related Documents, *available at* http://energy.gov/fe/services/natural-gas-regulation/lng-export-study (EIA 2012 Study), at 11.

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.[230]

There is also 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*, 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.[231]

3. Cumulative Environmental Impacts

Sierra Club, Earthjustice, and other intervenors asserted in comments to FERC on the EA and/or in this DOE/FE proceeding that the EA was deficient. They argued, in relevant part, that the EA failed to adequately analyze cumulative impacts of projects related to natural gas development and gathering—including Marcellus shale development, natural gas transportation, and natural gas distribution—in areas outside of DCP's proposed Project area.

[230] *See Freeport LNG Expansion L.P., et al., LLC*, DOE/FE Order No. 3357, FE Docket No. 11-161-LNG, Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Freeport LNG Terminal on Quintana Island, Texas to Non-Free Trade Agreement Nations, at 100-01 n.161 (Nov. 15, 2013) (FLEX II Conditional Order).
[231] *Sabine Pass*, DOE/FE Order No. 2961-A, at 11 (quoting 40 C.F.R. § 1508.7).

As noted above, FERC found no merit to this argument. In rejecting this argument, FERC stated that the EA properly evaluated other projects in the vicinity of the proposed Cove Point Liquefaction Project that affect the same resources in the same approximate time frame, including but not limited to a proposed addition to the Calvert Cliffs Nuclear Power Plant.[232] FERC evaluated the potential cumulative impacts of these projects on numerous environmental areas, including waterbodies and wetlands, air quality, and climate change. FERC also reiterated that the EA's cumulative impacts analysis did not include potential cumulative impacts associated with the upstream production and transportation of natural gas—*i.e.*, impacts outside of the proposed Project area—because such impacts are not "reasonably foreseeable" under NEPA. In sum, FERC determined that the EA properly addressed potential cumulative environmental impacts of the proposed Cove Point Liquefaction Project; found that any adverse cumulative impacts that could occur in conjunction with the Project would be "temporary and minor;" and set forth measures that would mitigate, minimize, or eliminate any potential impacts.[233] We agree with FERC's reasoning and adopt its analysis concerning cumulative environmental impacts.

B. Environmental Impacts Associated with Induced Production of Natural Gas

The current rapid development of natural gas resources in the United States likely will continue, with or without the export of natural gas to non-FTA nations.[234] Nevertheless, a decision by DOE/FE to authorize exports to non-FTA nations could accelerate that development by some increment. For this reason, and because the environmental impacts associated with shale gas development have been raised by Sierra Club and other

[232] FERC Order at PP 241-42.
[233] *See id.* at PP 238-42.
[234] Addendum at 2.

commenters, DOE/FE prepared and received public comment on the Addendum. As discussed above, the Addendum reviewed the academic and technical literature covering the most significant issues associated with unconventional gas production, including impacts to water resources, air quality, greenhouse gas emissions, induced seismicity, and land use.

The Addendum shows that there are potential environmental issues associated with unconventional natural gas production that need to be carefully managed, especially with respect to emissions of VOCs and methane, and the potential for groundwater contamination. These environmental concerns do not lead us to conclude, however, that exports of natural gas to non-FTA nations should be prohibited. Rather, we believe the public interest is better served by addressing these environmental concerns directly—through federal, state, or local regulation, or through self-imposed industry guidelines where appropriate—rather than by prohibiting exports of natural gas. Unlike DOE, environmental regulators have the legal authority to impose requirements on natural gas production that appropriately balance benefits and burdens, and to update these regulations from time to time as technological practices and scientific understanding evolve. For example, in 2012, using its authority under the Clean Air Act, EPA promulgated regulations for hydraulically fractured wells that are expected to yield significant emissions reductions.[235] In 2013, EPA updated those regulations to include storage tanks,[236] and in 2014 EPA issued a series of technical white papers exploring the potential need for additional measures to address methane emissions from the oil and gas sector.[237]

[235] U.S. Envtl. Prot. Agency, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews; Final Rule, 77 Fed. Reg. 49,490 (Aug. 16, 2012).
[236] U.S. Envtl. Prot. Agency, Oil and Natural Gas Sector: Reconsideration of Certain Provisions of New Source Performance Standards; Final Rule, 77 Fed. Reg. 58,416 (Sept. 23, 2013).
[237] U.S. Envtl. Prot. Agency, Office of Air Quality Planning & Standards, *White Papers on Methane and VOC Emissions*, *available at* http://www.epa.gov/airquality/oilandgas/whitepapers.html) (released April 15, 2014), discussed *supra* § VIII.C.

More recently, in January 2015, EPA announced a strategy for "address[ing] methane and smog-forming VOC emissions from the oil and gas industry in order to ensure continued, safe and responsible growth in U.S. oil and natural gas production."[238] Specifically, as part of the Administration's efforts to address climate change, EPA will initiate a rulemaking to set standards for methane and VOC emissions from new and modified oil and gas production sources, and natural gas processing and transmission sources.[239] EPA states that it will issue a proposed rule in the summer of 2015, with a final rule to follow in 2016.[240]

Section 3(a) of the NGA is too blunt an instrument to address these environmental concerns efficiently. A decision to prohibit exports of natural gas would cause the United States to forego entirely the economic and international benefits identified in the DCP Conditional Order and discussed below, but would have little more than a modest, incremental impact on the environmental issues identified by Sierra Club and others. For these reasons, we conclude that the environmental concerns associated with natural gas production do not establish that exports of natural gas to non-FTA nations are inconsistent with the public interest.

C. Greenhouse Gas Impacts Associated with U.S. LNG Exports

Intervenors and commenters have expressed concern that exports of domestic natural gas to non-FTA nations may impact the balance of global GHG emissions in two principal ways:

[238] U.S. Envtl. Prot. Agency, Fact Sheet: EPA's Strategy for Reducing Methane and Ozone-Forming Pollution From the Oil and Natural Gas Industry (Jan. 14, 2015), *available at* http://www.epa.gov/airquality/oilandgas/pdfs/20150114fs.pdf.

[239] The White House, Office of the Press Secretary, Fact Sheet: Administration Takes Steps Forward on Climate Action Plan by Announcing Actions to Cut Methane Emissions (Jan. 14, 2015), *available at* https://www.whitehouse.gov/the-press-office/2015/01/14/fact-sheet-administration-takes-steps-forward-climate-action-plan-anno-1.

[240] *See id*. (stating that, in developing the proposed and final standards, EPA "will focus on in-use technologies, current industry practices, [and] emerging innovations, … to ensure that emissions reductions can be achieved as oil and gas production and operations continue to grow.").

domestically, through their impact on the price and availability of natural gas for electric generation and other uses; and, internationally, through their effect on the GHG intensity and total amount of energy consumed in foreign nations.

1. Domestic Impacts Associated with Increased Natural Gas Prices

To the extent exports of natural gas to non-FTA nations increase domestic natural gas prices, those higher prices would be expected, all else equal, to reduce the use of natural gas in the United States as compared to a future case in which exports to non-FTA exports were prohibited. Within the U.S. electric generation sector, reduced demand for natural gas caused by higher prices would be balanced by some combination of reduced electric generation overall (aided by conservation and efficiency measures), increased generation from other resources (such as coal, renewables, and nuclear), and more efficient use of natural gas (*i.e.*, shifting of generation to natural gas-fired generators with superior heat rates).

Although EIA's 2012 Study found that additional natural gas production would supply most of the natural gas needed to support added LNG exports, EIA modeled the effects of higher natural gas prices on energy consumption in the United States in the years 2015 through 2035, and found several additional results. In particular, EIA found that "under Reference case conditions, decreased natural gas consumption as a result of added exports are countered proportionately by increased coal consumption (72 percent), increased liquid fuel consumption (8 percent), other increased consumption, such as from renewable generation sources (9 percent), and decreases in total consumption (11 percent)."[241] Further, EIA determined that, in the earlier years of the 2015 to 2035 period, "the amount of natural gas to coal switching is greater," with "coal play[ing] a more dominant role in replacing the decreased levels of natural gas

[241] 2012 EIA Study at 18.

consumption, which also tend to be greater in the earlier years."[242] Likewise, "[s]witching from natural gas to coal is less significant in later years, partially as a result of a greater proportion of switching into renewable generation."[243] EIA ultimately projected that, for LNG export levels from 6 to 12 Bcf/d of natural gas and under Reference Case conditions, aggregate carbon dioxide emissions would increase above a base case with no exports by between 643 and 1,227 million metric tons (0.5 to 1.0 percent) over the period from 2015 to 2035.[244] It is worth noting, however, that a substantial portion of these projected emissions came from consumption of natural gas in the liquefaction process, rather than from increased use of coal. The liquefaction of natural gas is captured in the LCA GHG Report's estimate of the life cycle GHG emissions of U.S.-exported LNG, discussed below (§ IX).

We further note that EIA's 2012 Study assumed the continuation of regulations in effect at the time the AEO 2011 was prepared.[245] Therefore, EIA's analysis did not include the impacts that EPA's Mercury and Air Toxics Standard[246] and its Transport Rule[247] may have on the extent to which the U.S. coal fleet would compensate for reduced use of natural gas. Nor did EIA's analysis capture the potential for broad regulation of carbon dioxide emissions from the electric power sector. After publication of the EIA Study in early 2012, EPA proposed two rules that, if finalized, would likely reduce the extent to which increased use of coal would compensate for

[242] *Id*.
[243] *Id*.
[244] *Id.* at 19.
[245] 2012 EIA Study at 12 n.7 ("The degree to which coal might be used in lieu of natural gas depends on what regulations are in-place that might restrict coal use. These scenarios reflect current laws and regulations in place at the time [AEO 2011] was produced.").
[246] U.S. Envtl. Prot. Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial- Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Final Rule, 77 Fed. Reg. 9,304 (Feb. 16, 2012).
[247] U.S. Envtl. Prot. Agency, Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals; Final Rule, 76 Fed. Reg. 48,208 (Aug. 8, 2011).

reduced use of natural gas. In September 2013, EPA proposed a rule that would limit carbon dioxide emissions from new coal-fired electric-generating units.[248] In June 2014, EPA proposed a rule that would limit carbon dioxide emissions from existing coal-fired electric generating units.[249] Additionally, on January 7, 2015, EPA announced plans to issue the final carbon pollution rules for new, reconstructed, and existing coal-fired electric-generating units by the summer of 2015.[250]

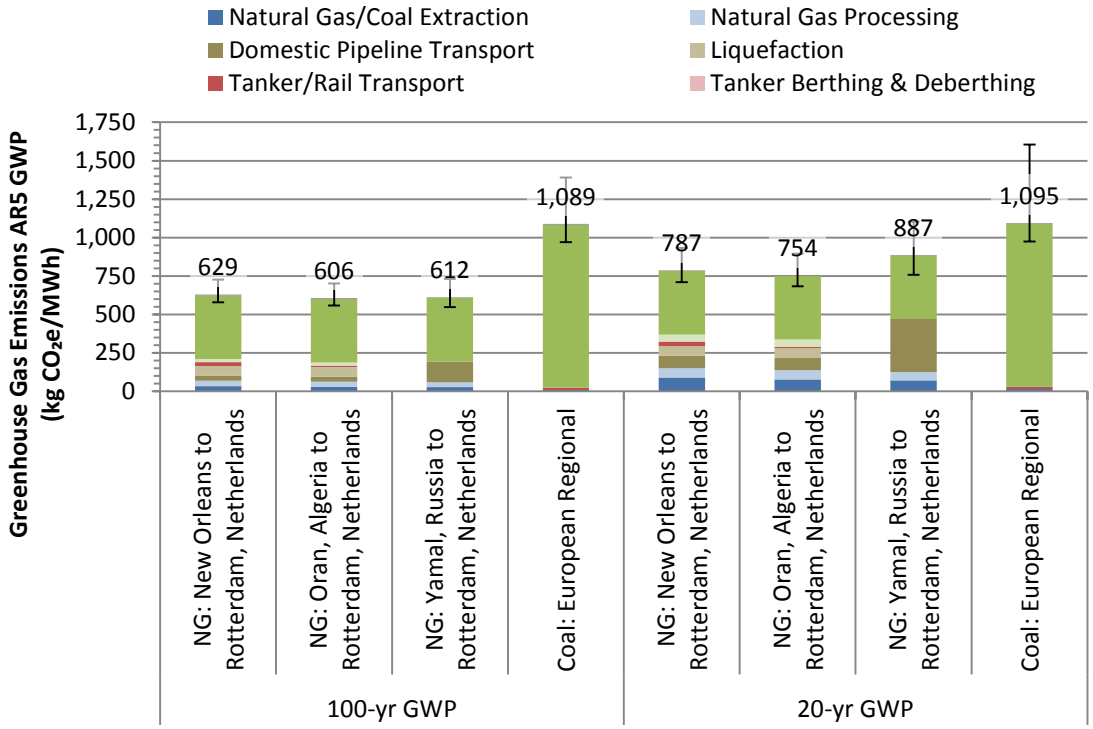
If and when finalized, these proposed rules have the potential to mitigate significantly any increased emissions from the U.S. electric power sector that would otherwise result from increased use of coal, and perhaps to negate those increased emissions entirely. Therefore, on the record before us, we cannot conclude that exports of natural gas would be likely to cause a significant increase in U.S. GHG emissions through their effect on natural gas prices and the use of coal for electric generation.

2. International Impacts Associated with Energy Consumption in Foreign Nations

The LCA GHG Report estimated the life cycle GHG emissions of U.S. LNG exports to Europe and Asia, compared with certain other fuels used to produce electric power in those importing countries. The key findings for U.S. LNG exports to Europe and Asia are summarized in the following two figures (also presented above):

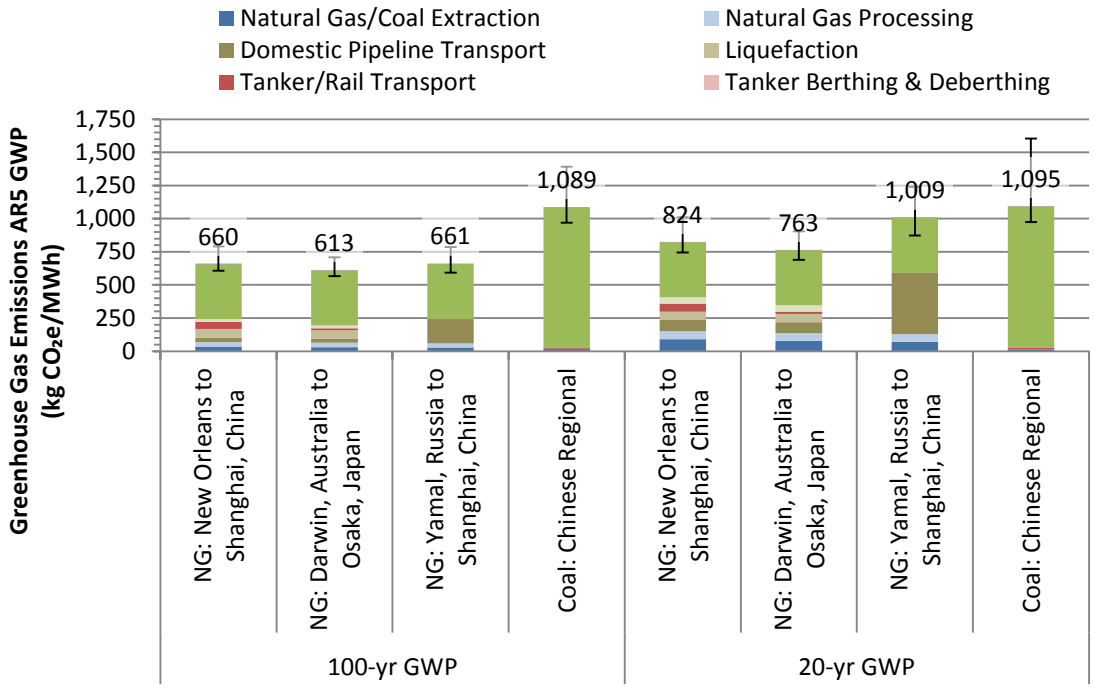
[248] U.S. Envtl. Prot. Agency, Standards of Performance for Greenhouse Gas Emissions From New Stationary Sources: Electric Utility Generating Units; Proposed Rule, 79 Fed. Reg. 1,430 (Jan. 8, 2014).
[249] U.S. Envtl. Prot. Agency, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule, 79 Fed. Reg. 34,830 (June 18, 2014).
[250] U.S. Envtl. Prot. Agency, Fact Sheet: Clean Power Plan and Carbon Pollution Standards Key Dates, *available at* http://www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-carbon-pollution-standards-key-dates; *see also id*., Announcements (Jan. 7, 2015), http://www2.epa.gov/carbon-pollution-standards.

Table 8: Life Cycle GHG Emissions for Natural Gas and Coal Power in Europe[251]



[251] LCA GHG Report at 9 (Figure 6-1).

Table 9: Life Cycle GHG Emissions for Natural Gas and Coal Power in Asia[252]



While acknowledging substantial uncertainty, the LCA GHG Report shows that to the extent U.S. LNG exports are preferred over coal in LNG-importing nations, U.S. LNG exports are likely to reduce global GHG emissions. Further, to the extent U.S. LNG exports are preferred over other forms of imported natural gas, they are likely to have only a small impact on global GHG emissions.[253]

As Sierra Club has observed, the LCA GHG Report does not answer the ultimate question whether authorizing exports of natural gas to non-FTA nations will increase or decrease global GHG emissions, because regional coal and imported natural gas are not the *only* fuels with which U.S.-exported LNG would compete. U.S. LNG exports may also compete with renewable energy, nuclear energy, petroleum-based liquid fuels, coal imported from outside East

[252] LCA GHG Report at 10 (Figure 6-2).
[253] *Id*. at 9, 18.

Asia or Western Europe, indigenous natural gas, synthetic natural gas derived from coal, and other resources, as well as efficiency and conservation measures. To model the effect that U.S. LNG exports would have on net global GHG emissions would require projections of how each of these fuel sources would be affected in each LNG-importing nation. Such an analysis would not only have to consider market dynamics in each of these countries over the coming decades, but also the interventions of numerous foreign governments in those markets.[254]

The uncertainty associated with estimating each of these factors would likely render such an analysis too speculative to inform the public interest determination in this proceeding. Accordingly, DOE/FE elected to focus on the discrete question of how U.S. LNG compares on a life cycle basis to regional coal and other sources of imported natural gas in key LNG-importing countries. This is a useful comparison because coal and imported natural gas are prevalent fuel sources for electric generation in non-FTA LNG-importing nations. For example, EIA notes that installed electric generation capacity in China was 66% coal and 3% natural gas in 2012.[255] For India, installed electric generation capacity in 2014 is 59% coal and 9% natural gas.[256] In both China and India, electric generation capacity is expected to increase substantially in coming years. For Japan, the largest importer of LNG in the world, electric generation from fossil fuels was 74% of total generation in 2011 and 89% in 2012 after the Fukushima disaster.[257] In

[254] Sierra Club observes that renewable energy has experienced significant growth in key LNG-importing countries such as India and China. Sierra Club does not, however, place the growth of renewable energy in the context of the aggregate use of fossil energy projects in those countries. Nor does Sierra Club explain the extent to which growth in renewable energy has been driven by public policies in those countries and how the availability of U.S. LNG exports would or would not impact the continuation of those policies.

[255] U.S. Energy Information Administration, China Analysis Brief (last updated Feb. 4, 2014), *available at* http://www.eia.gov/countries/cab.cfm?fips=CH.

[256] U.S. Energy Information Administration, India Analysis Brief (last updated June 26, 2014), *available at* http://www.eia.gov/countries/cab.cfm?fips=IN.

[257] U.S. Energy Information Administration, Japan Analysis Brief (last updated Jan. 30, 2015), *available at* http://www.eia.gov/countries/cab.cfm?fips=JA. In this updated Brief, EIA observed that, "[o]nce Japan removed its nuclear generation capacity from operation starting in 2011, other fuels such as LNG, oil, and coal displaced it. This

Europe, use of fossil fuels is slightly less than in the Asian nations noted above but still significant, comprising 68% and 49% of electric generation in the United Kingdom and Spain for 2012, respectively.[258]

The conclusions of the LCA GHG Report, combined with the observation that many LNG-importing nations rely heavily on fossil fuels for electric generation, suggests that exports of U.S. LNG may decrease global GHG emissions, although there is substantial uncertainty on this point as indicated above. In any event, the record does not support the conclusion that U.S. LNG exports will increase global GHG emissions in a material or predictable way. Therefore, while we share the commenters' strong concern about GHG emissions as a general matter, based on the current record evidence, we do not see a reason to conclude that U.S. LNG exports will significantly exacerbate global GHG emissions.

D. LNG Export Study

As explained above and detailed in the Conditional Order, DOE/FE commissioned the two-part LNG Export Study and invited public comment. DOE/FE analyzed this material and determined that the LNG Export Study provides substantial support for conditionally granting DCP's Application. The conclusion of the LNG Export Study is that the United States will experience net economic benefits from issuance of authorizations to export domestically produced LNG. We evaluated the initial and reply comments submitted in response to the LNG Export Study. Various commenters criticized the data used as inputs to the LNG Export Study

---

shift has markedly altered the generation portfolio," with reports that "LNG, oil, and coal shares rose to 43%, 14%, and 30%, respectively, in 2013." *Id.*

[258] EIA, International Energy Statistics, *available at* http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=2&pid=alltypes&aid=12&cid=SP,UK,&syid=2008&eyid=2012&unit=BKWH. To evaluate the effect that U.S. LNG exports may have on the mix of fuels used for electric generation in Western Europe also requires consideration of the role of the European Trading System (ETS). The ETS places a cap on GHG emissions. Therefore, where the cap is a binding constraint, the ETS ultimately may ensure that the availability of U.S.-exported LNG will not affect aggregate emissions.

and numerous aspects of the models, assumptions, and design of the Study. As discussed in the Conditional Order, however, we find that the LNG Export Study is fundamentally sound and supports the proposition that the proposed authorization will not be inconsistent with the public interest.

Since issuing DCP's Conditional Order in September 2013, we have seen no developments that would disturb these conclusions or alter the central conclusion of the LNG Export Study. To the contrary, we note that EIA's most recent projections, set forth in AEO 2015 (discussed *supra* § V), continue to show market conditions that will accommodate increased exports of natural gas. When compared to the AEO 2012 final projections and the final AEO 2013 Reference Case discussed in the Conditional Order (at 82-90), the AEO 2015 Reference Case projects increases in domestic natural gas production—well in excess of what is required to meet projected increases in domestic consumption.[259]

Additionally, we note that a number of commenters on the LNG Export Study raised environmental concerns that were not germane to the economic issues addressed in the Study.[260] The Conditional Order did not address those comments, but did encourage those commenters to participate in FERC's environmental review of the Liquefaction Project.[261] We have independently reviewed the environmental comments on the LNG Export Study to ensure that all issues regarding the environmental impact of our decision on the proposed exports have been considered. We find that all such issues have been addressed in the EA for the Liquefaction Project (which we have adopted) or in this Order.

---

[259] *See* AEO 2015 at A-1, *available at* http://www.eia.gov/forecasts/aeo/ (AEO 2015 reference case projecting domestic production of natural gas in 2040 of 5.9 quadrillion Btu, or approximately 5.8 Tcf/yr, above projected levels of domestic consumption for the same time period).

[260] *See, e.g.*, the comments on the LNG Export Study submitted by the Delaware River Keepers, the Oregon Shores Conservation Coalition, and Citizen Power, among others.

[261] *See* DCP Conditional Order at 122.

E. Benefits of International Trade

We have not limited our review to the contents of the LNG Export Study or the environmental issues discussed herein, but have considered a wide range of other information. For example, the National Export Initiative, established by Executive Order, sets an Administration goal to "improve conditions that directly affect the private sector's ability to export" and to "enhance and coordinate Federal efforts to facilitate the creation of jobs in the United States through the promotion of exports."[262]

We have also considered the international consequences of our decision. We review applications to export LNG to non-FTA nations under section 3(a) of the NGA. The United States' commitment to free trade is one factor bearing on that review. An efficient, transparent international market for natural gas with diverse sources of supply provides both economic and strategic benefits to the United States and our allies. Indeed, increased production of domestic natural gas has significantly reduced the need for the United States to import LNG. In global trade, LNG shipments that would have been destined to U.S. markets have been redirected to Europe and Asia, improving energy security for many of our key trading partners. To the extent U.S. exports can diversify global LNG supplies, and increase the volumes of LNG available globally, it will improve energy security for many U.S. allies and trading partners. As such, authorizing U.S. exports may advance the public interest for reasons that are distinct from and additional to the economic benefits identified in the LNG Export Study and discussed in the Conditional Order.

[262] National Export Initiative, Exec. Order 13,534, 75 Fed. Reg. 12,433 (Mar. 16, 2010).

F. Other Considerations

Our decision is not premised on an uncritical acceptance of the general conclusion of the LNG Export Study of net economic benefits from LNG exports. Both the LNG Export Study and many public comments identify significant uncertainties and even potential negative impacts from LNG exports. The economic impacts of higher natural gas prices and potential increases in natural gas price volatility are two of the factors that we view most seriously. Yet we also have taken into account factors that could mitigate such impacts, such as the current oversupply situation and data indicating that the natural gas industry would increase natural gas supply in response to increasing exports. Further, we note that 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. On balance, we find that the potential negative impacts of DCP's proposed exports are outweighed by the likely net economic benefits and by other non-economic or indirect benefits.

More generally, DOE/FE continues to subscribe to the principle set forth in our 1984 Policy Guidelines[263] that, under most circumstances, the market is the most efficient means of allocating natural gas supplies. However, agency intervention may be necessary to protect the public in the event there is insufficient domestic natural gas for domestic use. There may be other circumstances as well that cannot be foreseen that would require agency action.[264] Given

[263] 49 Fed. Reg. at 6684.

[264] As we noted in the Conditional Order, some commenters on the LNG Export Study asked DOE to clarify the circumstances under which the agency would exercise its authority to revoke (in whole or in part) previously issued LNG export authorizations. We cannot precisely identify all the circumstances under which such action would be taken. We reiterate our observation in *Sabine Pass* that: "In the event of any unforeseen developments of such significant consequence as to put the public interest at risk, DOE/FE is fully authorized to take action as necessary to protect the public interest. Specifically, DOE/FE is authorized by section 3(a) of the Natural Gas Act … to make a supplemental order as necessary or appropriate to protect the public interest. Additionally, DOE is authorized by

these possibilities, DOE/FE recognizes the need to monitor market developments closely as the impact of successive authorizations of LNG exports unfolds.

G. Conclusion

We have reviewed the evidence in the record and have not found an adequate basis to conclude that DCP's export of LNG to non-FTA countries will be inconsistent with the public interest. We find that the two intervenor-protestors in this proceeding—APGA and Sierra Club—have failed to overcome the statutory presumption that the proposed export authorization is consistent with the public interest. For that reason, we are authorizing DCP's proposed exports to non-FTA countries subject to the limitations and conditions described in this Order.

In deciding whether to grant a final non-FTA export authorization, we consider in our decisionmaking the cumulative impacts of the total volume of all final non-FTA export authorizations. With the issuance of this Order, DOE/FE has now issued final non-FTA authorizations in a cumulative volume of exports totaling 6.51 Bcf/d of natural gas, or 2.376 trillion cubic feet per year (Tcf/yr), for the six final authorizations issued to date—Sabine Pass (2.2 Bcf/d), Carib Energy (USA) LLC (0.04 Bcf/d),[265] Cameron LNG, LLC (1.7 Bcf/d),[266] FLEX I (1.4 Bcf/d),[267] FLEX II (0.4 Bcf/d),[268] and this Order (0.77 Bcf/d). This total export

---

section 16 of the Natural Gas Act 'to perform any and all acts and to prescribe, issue, make, amend, and rescind such orders, rules, and regulations as it may find necessary or appropriate' to carry out its responsibilities." *Sabine Pass*, DOE/FE Order No. 2961, at 33 n.45 (quoting 15 U.S.C. § 717*o*).

[265] *Carib Energy (USA) LLC*, DOE/FE Order No. 3487, FE Docket No. 11-141-LNG, Final Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas in ISO Containers by Vessel to Non-Free Trade Agreement Nations in Central America, South America, or the Caribbean (Sept. 10, 2014).

[266] *Cameron LNG, LLC*, DOE/FE Order No. 3391-A, FE Docket No. 11-162-LNG, Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Cameron LNG Terminal in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations (Sept. 10, 2014).

[267] *Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 3282-C, FE Docket No. 10-161-LNG, Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Freeport LNG Terminal on Quintana Island, Texas, to Non-Free Trade Agreement Nations (Nov. 14, 2014) (FLEX I Final Order).

[268] *Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 3357-B, FE Docket No. 11-161-LNG, Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the

volume is within the range of scenarios analyzed in the EIA and NERA studies, as discussed in the DCP Conditional Order. NERA found that in all such scenarios—assuming either 6 Bcf/d or 12 Bcf/d of export volumes—the United States would experience net economic benefits. As discussed above, the submissions of the intervenors do not undermine the reasonableness of the findings in the LNG Export Study.

DOE/FE will continue taking a measured approach in reviewing the other pending applications to export domestically produced LNG. Specifically, DOE/FE will continue to assess the cumulative impacts of each succeeding request for export authorization on the public interest with due regard to the effect on domestic natural gas supply and demand fundamentals. In keeping with the performance of its statutory responsibilities, DOE/FE will attach appropriate and necessary terms and conditions to authorizations to ensure that the authorizations are utilized in a timely manner and that authorizations are not issued except where the applicant can show that there are or will be facilities capable of handling the proposed export volumes and existing and forecast supplies that support that action. Other conditions will be applied as necessary.

The reasons in support of proceeding cautiously are several: (1) the LNG Export Study, like any study based on assumptions and economic projections, is inherently limited in its predictive accuracy; (2) applications to export significant quantities of domestically produced LNG are a new phenomena with uncertain impacts; and (3) the market for natural gas has experienced rapid reversals in the past and is again changing rapidly due to economic, technological, and regulatory developments. The market of the future very likely will not resemble the market of today. In recognition of these factors, DOE/FE intends to monitor

---

Freeport LNG Terminal on Quintana Island, Texas, to Non-Free Trade Agreement Nations (Nov. 14, 2014) (FLEX II Final Order).

developments that could tend to undermine the public interest in grants of successive applications for exports of domestically produced LNG and, as previously stated, to attach terms and conditions to the authorization in this proceeding and to succeeding LNG export authorizations as are necessary for protection of the public interest.

XI. TERMS AND CONDITIONS

To ensure that the authorization issued by this Order is not inconsistent with the public interest, DOE/FE has attached the following terms and conditions to the authorization. The reasons for each term or condition are explained below. DCP must abide by each term and condition or face rescission of its authorization or other appropriate sanction.

A. Term of the Authorization

DCP has requested a 25-year term for the authorization commencing from the date export operations begin. However, because the NERA study contains projections over a 20-year period beginning from the date of first export,[269] we believe that caution recommends limiting this conditional authorization to no longer than a 20-year term beginning from the date of first commercial export. In imposing this condition, we are mindful that LNG export facilities are capital intensive and that, to obtain financing for such projects, there must be a reasonable expectation that the authorization will continue for a term sufficient to support repayment. We find that a 20-year term is likely sufficient to achieve this result. We base that conclusion on the fact that both of DCP's terminal service agreements—with Pacific Summit Energy and GAIL Global (USA) LNG, respectively—involve a primary term of 20 years. We also note that a 20-year term is consistent with our practice in the final and conditional non-FTA export

[269] NERA study at 5 ("Results are reported in 5-year intervals starting in 2015. These calendar years should not be interpreted literally but represent intervals after exports begin. Thus if the U.S. does not begin LNG exports until 2016 or later, one year should be added to the dates for each year that exports commence after 2015.").

authorizations issued to date, including DCP's Conditional Order. Accordingly, the 20-year term will begin on the date when DCP commences commercial export of domestically sourced LNG at the Cove Point LNG Terminal, but not before.

B. Commencement of Operations Within Seven Years

DCP requested that this authorization commence on the earlier of the date of first export or six years from the date of the issuance of this Order. Consistent with the final and conditional non-FTA authorizations issued to date,[270] DOE/FE will add as a condition of the authorization that DCP must commence commercial LNG export operations no later than seven years from the date of issuance of this Order. The purpose of this condition is to ensure that other entities that may seek similar authorizations are not frustrated in their efforts to obtain those authorizations by authorization holders that are not engaged in actual export operations.

C. Commissioning Volumes

DCP will be permitted to apply for short-term export authorizations to export Commissioning Volumes prior to the commencement of the first commercial exports of domestically sourced LNG from the Cove Point LNG Terminal. "Commissioning Volumes" are defined as the volume of LNG produced and exported under a short-term authorization during the initial start-up of each LNG train, before each LNG train has reached its full steady-state capacity and begun its commercial exports pursuant to DCP's long-term contracts.[271] The Commissioning Volumes will not be counted against the maximum level of volumes authorized in DCP's FTA order (DOE/FE Order No. 3019) or in this Order.

[270] *See, e.g., Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 3357-B, at 100-01.
[271] For additional discussion of Commissioning Volumes and the Make-Up Period referenced below, see *Freeport LNG Expansion, L.P., et al.*, DOE/FE Order Nos. 3282-B & 3357-A, Order Amending DOE/FE Order Nos. 3282 and 3357, FE Docket Nos. 10-161-LNG & 11-161-LNG, at 4-9 (June 6, 2014).

D. Make-Up Period

DCP will be permitted to continue exporting for a total of three years following the end of the 20-year term established in this Order, solely to export any Make-Up Volume that it was unable to export during the original export period. The three-year term during which the Make-Up Volume may be exported shall be known as the "Make-Up Period."

The Make-Up Period does not affect or modify the total volume of LNG authorized in DCP's FTA order (DOE/FE Order No. 3019) or in this Order. Insofar as DCP may seek to export additional volumes not previously authorized for export, it will be required to obtain appropriate authorization from DOE/FE.

E. Transfer, Assignment, or Change in Control

DOE/FE's natural gas import/export regulations prohibit authorization holders from transferring or assigning authorizations to import or export natural gas without specific authorization by the Assistant Secretary for Fossil Energy.[272] As a condition of the similar authorization issued to Sabine Pass in Order No. 2961, DOE/FE found that the requirement for prior approval by the Assistant Secretary under its regulations applies to any change of effective control of the authorization holder either through asset sale or stock transfer or by other means. This condition was deemed necessary to ensure that, prior to any transfer or change in control, DOE/FE will be given an adequate opportunity to assess the public interest impacts of such a transfer or change.

DOE/FE construes a change in control to mean a change, directly or indirectly, of the power to direct the management or policies of an entity whether such power is exercised through one or more intermediary companies or pursuant to an agreement, written or oral, and whether

[272] 10 C.F.R. § 590.405.

such power is established through ownership or voting of securities, or common directors, officers, or stockholders, or voting trusts, holding trusts, or debt holdings, or contract, or any other direct or indirect means. A rebuttable presumption that control exists will arise from the ownership or the power to vote, directly or indirectly, 10 percent or more of the voting securities of such entity.[273]

F. Agency Rights

As described above, DCP requests authorization to export LNG solely as agent for other entities that hold title to the LNG, after registering each such entity with DOE/FE. DOE/FE previously addressed the issue of Agency Rights in Order No. 2913,[274] which granted FLEX authority to export LNG to FTA countries. In that order, DOE/FE approved a proposal by FLEX to register each LNG title holder for whom FLEX sought to export LNG as agent. DOE/FE found that this proposal was an acceptable alternative to the non-binding policy adopted by DOE/FE in *Dow Chemical*, which established that the title for all LNG authorized for export must be held by the authorization holder at the point of export.[275] We find that the same policy considerations that supported DOE/FE's acceptance of the alternative registration proposal in Order No. 2913 apply here as well. DOE/FE reiterated its policy on Agency Rights procedures in *Gulf Coast LNG Export, LLC*.[276] In *Gulf Coast*, DOE/FE confirmed that, in LNG export orders in which Agency Rights have been granted, DOE/FE shall require registration materials

[273] For information on DOE/FE's procedures governing a change in control, see U.S. Dep't of Energy, Procedures for Changes in Control Affecting Applications and Authorizations to Import or Export Natural Gas, 79 Fed. Reg. 65,641 (Nov. 5, 2014).
[274] *Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 2913, FE Docket No. 10-160-LNG, Order Granting Long-Term Authorization to Export Liquefied Natural Gas from Freeport LNG Terminal to Free Trade Nations (Feb. 10, 2011) [hereinafter *Freeport LNG*].
[275] *Dow Chem. Co.*, DOE/FE Order No. 2859, FE Docket No. 10-57-LNG, Order Granting Blanket Authorization to Export Liquefied Natural Gas, at 7-8 (Oct. 5, 2010), *discussed in Freeport LNG*, DOE/FE Order No. 2913, at 7-8.
[276] *Gulf Coast LNG Export, LLC*, DOE/FE Order No. 3163, FE Docket No. 12-05-LNG, Order Granting Long-Term Multi-Contract Authority to Export LNG by Vessel from the Proposed Brownsville Terminal to Free Trade Agreement Nations (Oct. 16, 2012).

filed for, or by, an LNG title-holder (Registrant) to include the same company identification information and long-term contract information of the Registrant as if the Registrant had filed an application to export LNG on its own behalf.[277]

To ensure that the public interest is served, the authorization granted herein shall be conditioned to require that where DCP proposes to export LNG as agent for other entities that hold title to the LNG (Registrants), it must register with DOE/FE those entities on whose behalf it will export LNG in accordance with the procedures and requirements described herein.

G. Contract Provisions for the Sale or Transfer of LNG to be Exported

DOE/FE's regulations require applicants to supply transaction-specific factual information "to the extent practicable."[278] Additionally, DOE/FE regulations allow confidential treatment of the information supplied in support of or in opposition to an application if the submitting party requests such treatment, shows why the information should be exempted from public disclosure, and DOE/FE determines it will be afforded confidential treatment in accordance with 10 C.F.R. § 1004.11.[279]

DOE/FE will require that DCP file or cause to be filed with DOE/FE any relevant long-term commercial agreements, including liquefaction tolling agreements, pursuant to which DCP exports LNG as agent for a Registrant. *See supra* § IV.D.

DOE/FE finds that the submission of all such agreements or contracts within 30 days of their execution using the procedures described below will be consistent with the "to the extent practicable" requirement of section 590.202(b). By way of example and without limitation, a "relevant long-term commercial agreement" would include an agreement with a minimum term

[277] *See id*. at 7-8.
[278] 10 C.F.R. § 590.202(b).
[279] *Id*. § 590.202(e).

of two years, an agreement to provide gas processing or liquefaction services at the Cove Point LNG Terminal, a long-term sales contract involving natural gas or LNG stored or liquefied at the Cove Point LNG Terminal, or an agreement to provide export services from the Cove Point LNG Terminal.

In addition, DOE/FE finds that section 590.202(c) of DOE/FE's regulations[280] requires that DCP file, or cause to be filed, all long-term contracts associated with the long-term supply of natural gas to the Cove Point LNG Terminal, whether signed by DCP or the Registrant, within 30 days of their execution.

DOE/FE recognizes that some information in DCP's or a Registrant's long-term commercial agreements associated with the export of LNG, and/or long-term contracts associated with the long-term supply of natural gas to the Cove Point LNG Terminal, may be commercially sensitive. DOE/FE therefore will provide DCP the option to file or cause to be filed either unredacted contracts, or in the alternative (A) DCP may file, or cause to be filed, long-term contracts under seal, but it also will file either: i) a copy of each long-term contract with commercially sensitive information redacted, or ii) a summary of all major provisions of the contract(s) including, but not limited to, the parties to each contract, contract term, quantity, any take or pay or equivalent provisions/conditions, destinations, re-sale provisions, and other relevant provisions; and (B) the filing must demonstrate why the redacted information should be exempted from public disclosure.

To ensure that DOE/FE destination and reporting requirements included in this Order are conveyed to subsequent title holders, DOE/FE will include as a condition of this authorization

[280] *Id*. § 590.202(c).

that future contracts for the sale or transfer of LNG exported pursuant to this Order shall include an acknowledgement of these requirements.

H. Export Quantity

We are not granting the Application in the full export quantity originally requested by DCP, and instead are granting the requested authorization only to the extent of the liquefaction capacity of the Liquefaction Project. As stated above and in the Conditional Order, DCP initially sought export authorization in a volume equivalent to 365 Bcf/yr of natural gas (1 Bcf/d), but subsequently informed DOE/FE that the Liquefaction Project will have a liquefaction capacity of 5.75 mtpa, which DOE/FE estimates is equivalent to 281 Bcf/yr, or 0.77 Bcf/d, of natural gas. As we have previously observed, DOE/FE's policy is not to authorize exports that exceed the capacity of a LNG export terminal.[281] Consequently, this Order authorizes the export of LNG up to the equivalent of 281 Bcf/yr of natural gas.

I. Combined FTA and Non-FTA Export Authorization Volume

DCP is currently authorized to export domestically produced LNG to FTA countries in a volume equivalent to approximately 365 Bcf/yr of natural gas (1 Bcf/d), as set forth in DOE/FE Order No. 3019. For the reasons explained above, however, the authorization issued in this Order will be limited to exports in a volume equivalent to 281 Bcf/yr of natural gas (0.77 Bcf/d) to non-FTA nations. Because the source of LNG proposed for export for both export authorizations is from the same facility (Cove Point LNG Terminal), DCP may not treat the volumes authorized for export in the two proceedings as additive to one another.

[281] *See e.g., Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 3357-B, at 105-06 (Para H, Export Quantity).

XII. FINDINGS

On the basis of the findings and conclusions set forth above and in DCP's Conditional Order, we find that it has not been shown that a grant of the requested authorization will be inconsistent with the public interest, and we further find that the Application should be granted subject to the terms and conditions set forth herein. The following Ordering Paragraphs reflect current DOE/FE practice and supersede the ordering paragraphs set forth in the Conditional Order.

XIII. ORDER

Pursuant to section 3 of the Natural Gas Act, it is ordered that:

A. DCP is authorized to export domestically produced LNG by vessel from the Cove Point LNG Terminal in Calvert County, Maryland, up to the equivalent of 281 Bcf/yr of natural gas for a term of 20 years to commence on the earlier of the date of first commercial export or seven years from the date that this Order is issued (May 7, 2022). DCP is authorized to export this LNG as agent for other entities who hold title to the natural gas, pursuant to one or more long-term contracts (a contract greater than two years).

B. The 20-year authorization period will commence when DCP commences commercial export of domestically sourced LNG from the Cove Point LNG Terminal, but not before. DCP may export Commissioning Volumes prior to the commencement of the terms of this Order, pursuant to a separate short-term export authorization. The Commissioning Volumes will not be counted against the maximum level of volumes previously authorized in DCP's FTA order (DOE/FE Order No. 3019) or in this Order.

C. DCP may continue exporting for a total of three years following the end of the 20-year export term, solely to export any Make-Up Volume that it was unable to export during the

original export period. The three-year Make-Up Period allowing the export of Make-Up Volumes does not affect or modify the total volume of LNG authorized for export in any of DCP's LNG export orders. Insofar as DCP may seek to export additional volumes not previously authorized for export, it will be required to obtain appropriate authorization from DOE/FE.

D. DCP must commence export operations using the planned liquefaction facilities no later than seven years from the date of issuance of this Order.

E. The LNG export quantity authorized in this Order is equivalent to 281 Bcf/yr of natural gas. This quantity is not additive to the export volume in DCP's FTA authorization, set forth in DOE/FE Order No. 3019.

F. This LNG may be exported to any country with which the United States does not have a FTA requiring the national treatment for trade in natural gas, which currently has or in the future develops the capacity to import LNG, and with which trade is not prohibited by United States law or policy.

G. DCP shall ensure that all transactions authorized by this Order are permitted and lawful under United States laws and policies, including the rules, regulations, orders, policies, and other determinations of the Office of Foreign Assets Control of the United States Department of the Treasury and FERC. Failure to comply with this requirement could result in rescission of this authorization and/or other civil or criminal remedies.

H. DCP shall ensure compliance with all terms and conditions established by FERC in the EA, including the 79 environmental conditions adopted in the FERC Order at Appendix B. Additionally, this authorization is conditioned on DCP's on-going compliance with any other

preventative and mitigative measures at the Cove Point LNG Terminal imposed by federal or state agencies.

I. (i) DCP shall file, or cause others to file, with the Office of Oil and Gas Global Security and Supply a non-redacted copy of all executed long-term contracts associated with the long-term export of LNG as agent for other entities from the Cove Point LNG Terminal. The non-redacted copies may be filed under seal and must be filed within 30 days of their execution. Additionally, if DCP has filed the contracts described in the preceding sentence under seal or subject to a claim of confidentiality or privilege, within 30 days of their execution, DCP shall also file, or cause others to file, for public posting either: i) a redacted version of the contracts described in the preceding sentence, or ii) major provisions of the contracts. In these filings, DCP shall state why the redacted or non-disclosed information should be exempted from public disclosure.

(ii) DCP shall file, or cause others to file, with the Office of Oil and Gas Global Security and Supply a non-redacted copy of all executed long-term contracts associated with the long-term supply of natural gas to the Cove Point LNG Terminal. The non-redacted copies may be filed under seal and must be filed within 30 days of their execution. Additionally, if DCP has filed the contracts described in the preceding sentence under seal or subject to a claim of confidentiality or privilege, within 30 days of their execution, DCP shall also file, or cause others to file, for public posting either: i) a redacted version of the contracts described in the preceding sentence, or ii) major provisions of the contracts. In these filings, DCP shall state why the redacted or non-disclosed information should be exempted from public disclosure.

J. Entities for whom DCP acts as agent shall include the following provision in any agreement or other contract for the sale or transfer of LNG exported pursuant to this Order:

> Customer or purchaser acknowledges and agrees that it will resell or transfer LNG purchased hereunder for delivery only to countries identified in Ordering Paragraph D of DOE/FE Order No. 3331, issued September 11, 2013, or Ordering Paragraph F of DOE/FE Order No. 3331-A, issued May 7, 2015, in FE Docket No. 11-128-LNG, and/or to purchasers that have agreed in writing to limit their direct or indirect resale or transfer of such LNG to such countries. Customer or purchaser further commits to cause a report to be provided to Dominion Cove Point LNG, LP that identifies the country of destination, upon delivery, into which the exported LNG was actually delivered, and to include in any resale contract for such LNG the necessary conditions to insure Dominion Cove Point LNG, LP are made aware of all such actual destination countries.

K. DCP is permitted to use its authorization in order to export LNG as agent for other entities, after registering the other parties with DOE/FE. Registration materials shall include an acknowledgement and agreement by the Registrant to supply DCP with all information necessary to permit DCP to register that person or entity with DOE/FE, including: (1) the Registrant's agreement to comply with this Order and all applicable requirements of DOE/FE's regulations at 10 C.F.R. Part 590, including but not limited to destination restrictions; (2) the exact legal name of the Registrant, state/location of incorporation/registration, primary place of doing business, and the Registrant's ownership structure, including the ultimate parent entity if the Registrant is a subsidiary or affiliate of another entity; (3) the name, title, mailing address, e-mail address, and telephone number of a corporate officer or employee of the registrant to whom inquiries may be directed; and (4) within 30 days of execution, a copy of any long-term contracts not previously filed with DOE/FE, described in Ordering Paragraph I of this Order.

L. Each registration submitted pursuant to this Order shall have current information on file with DOE/FE. Any changes in company name, contact information, change in term of the long-term contract, termination of the long-term contract, or other relevant modification, shall be filed with DOE/FE within 30 days of such change(s).

M. As a condition of this authorization, DCP shall ensure that all persons required by this Order to register with DOE/FE have done so. Any failure by DCP to ensure that all such persons or entities are registered with DOE/FE shall be grounds for rescinding in whole or in part the authorization.

N. Within two weeks after the first export of domestically produced LNG occurs from the Cove Point LNG Terminal, DCP shall provide written notification of the date that the first export of LNG authorized in Ordering Paragraph A above occurred.

O. DCP shall file with the Office of Oil and Gas Global Security and Supply, on a semi-annual basis, written reports describing the progress of the proposed Liquefaction Project. The reports shall be filed on or by April 1 and October 1 of each year, and shall include information on the progress of the Liquefaction Project, the date the liquefaction facility is expected to be operational, and the status of the long-term contracts associated with the long-term export of LNG and any long-term supply contracts.

P. Prior to any change in control of the authorization holder, DCP must obtain the approval of the Assistant Secretary for Fossil Energy. For purposes of this Ordering Paragraph, a "change in control" shall include any change, directly or indirectly, of the power to direct the management or policies of DCP, whether such power is exercised through one or more intermediary companies or pursuant to an agreement, written or oral, and whether such power is established through ownership or voting of securities, or common directors, officers, or stockholders, or voting trusts, holding trusts, or debt holdings, or contract, or any other direct or indirect means.[282]

[282] *See* U.S. Dep't of Energy, Procedures for Changes in Control Affecting Applications and Authorizations to Import or Export Natural Gas, 79 Fed. Reg. 65,641 (Nov. 5, 2014).

Q. Monthly Reports: With respect to the LNG exports authorized by this Order, DCP shall file with the Office of Oil and Gas Global Security and Supply, within 30 days following the last day of each calendar month, a report indicating whether exports of LNG have been made. The first monthly report required by this Order is due not later than the 30th day of the month following the month of first export. In subsequent months, if exports have not occurred, a report of "no activity" for that month must be filed. If exports of LNG have occurred, the report must give the following details of each LNG cargo: (1) the name(s) of the authorized exporter registered with DOE/FE; (2) the name of the U.S. export terminal; (3) the name of the LNG tanker; (4) the date of departure from the U.S. export terminal; (5) the country (or countries) of destination into which the exported LNG was actually delivered; (6) the name of the supplier/seller; (7) the volume in Mcf; (8) the price at point of export per million British thermal units (MMBtu); (9) the duration of the supply agreement; and (10) the name(s) of the purchaser(s).

(Approved by the Office of Management and Budget under OMB Control No. 1901-0294)

R. All monthly report filings shall be made to U.S. Department of Energy (FE-34), Office of Fossil Energy, Office of Oil and Gas Global Security and Supply, P.O. Box 44375, Washington, D.C. 20026-4375, Attention: Natural Gas Reports. Alternatively, reports may be e-mailed to ngreports@hq.doe.gov or may be faxed to Natural Gas Reports at (202) 586-6050.

S. The Consolidated Motion to Comment and Intervene Out of Time, filed by the

Industrial Energy Consumers of America on September 10, 2013, is denied.

Issued in Washington, D.C., on May 7, 2015.

Christopher A. Smith
Assistant Secretary
Office of Fossil Energy