UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

EMERA CNG, LLC	)	FE DOCKET NO. 13-157-CNG

FINAL OPINION AND ORDER GRANTING LONG-TERM, MULTI CONTRACT AUTHORIZATION TO EXPORT COMPRESSED NATURAL GAS BY VESSEL FROM A PROPOSED CNG COMPRESSION AND LOADING FACILITY AT THE PORT OF PALM BEACH, FLORIDA, TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO. 3727

OCTOBER 19, 2015

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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
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
DOE	U.S. Department of Energy
EIA	U.S. Energy Information Administration
EITE	Energy Intensive, Trade Exposed
EPA	U.S. Environmental Protection Agency
EUR	Estimated Ultimate Recovery
FDI	Foreign Direct Investment
FE	Office of Fossil Energy, U.S. Department of Energy
FERC	Federal Energy Regulatory Commission
FLEX	Freeport LNG Expansion, L.P. and FLNG Liquefaction LLC
FTA	Free Trade Agreement
GBPC	Grand Bahama Power Company
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GNGM	Global Natural Gas Model
IECA	Industrial Energy Consumers of America
kWh	Kilowatt-Hour
LNG	Liquefied Natural Gas
Mcf	Thousand Cubic Feet
MMBtu	Million British Thermal Units
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NERA	NERA Economic Consulting
NGA	Natural Gas Act
NGL	Natural Gas Liquid
NOA	Notice of Availability
TRR	Technically Recoverable Resources
VOC	Volatile Organic Compound

I. INTRODUCTION

On November 20, 2013, Emera CNG, LLC (Emera) filed an application (Application)[1] with the Office of Fossil Energy (FE) of the Department of Energy (DOE) under section 3 of the Natural Gas Act (NGA)[2] requesting long-term, multi-contract authorization to export domestically produced compressed natural gas (CNG) in a volume equivalent to approximately 9.125 billion cubic feet per year (Bcf/yr) of natural gas, or 0.025 Bcf per day (Bcf/d). Emera seeks to export this CNG by vessel[3] from a proposed natural gas compression and loading facility (Facility) to be located at the Port of Palm Beach, in Riviera Beach, Florida. In support of the requested export volume, Emera states that "[t]he Facility will initially be capable of loading 0.008 Bcf per day of CNG (2.92 Bcf per yr) and will be capable of expanding to load up to 0.025 Bcf per day (9.125 Bcf per yr)."[4] In the portion of the Application subject to this Order, Emera seeks authority to export this CNG to any country with which the United States does not have a free trade agreement (FTA) requiring national treatment for trade in natural gas and with which trade is not prohibited by U.S. law or policy (non-FTA countries). As discussed below, we are authorizing the export of CNG in this Order to non-FTA countries in a slightly lower volume than requested by Emera—2.92 Bcf/yr of natural gas, or 0.008 Bcf/d—in conformance with the maximum initial capacity of the proposed Facility.

Emera states that it is a wholly-owned indirect subsidiary of Emera Incorporated (Emera Inc.), a publicly traded energy and services company that invests in electricity generation,

[1] Emera CNG, LLC, Application for Long-Term Authorization to Export Compressed Natural Gas, FE Docket No. 13-157-CNG (Nov. 20, 2013) [hereinafter Emera App.].
[2] The authority to regulate the imports and exports of natural gas, including compressed 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.
[3] As discussed below, Emera informed DOE/FE by letter dated May 2, 2014, that it seeks authority to export CNG by waterborne vessel only, not also by truck, as the Application stated. *See* Emera CNG, LLC, Clarification of Application for Long-Term Authorization to Export Compressed Natural Gas, FE Docket No. 13-157-CNG (May 2, 2014) [hereinafter Emera Clarification Ltr.].
[4] Emera App. at 4.

transmission and distribution assets, as well as natural gas transmission and utility energy services assets. Emera states that it will construct, own, and operate the Facility within the Port of Palm Beach, Florida, off the Riviera Lateral, an intrastate pipeline owned and operated by Peninsula Pipeline Company, Inc. According to Emera, its affiliate, Emera Utility Services, has exclusive negotiating rights to lease the site on which Emera intends to construct the Facility. Emera expects construction of the Facility to be completed in 2015.[5]

Emera states that, to export the CNG, pressure vessels with an open ISO container frame will be filled with CNG under high pressure and loaded onto roll-on/roll-off ocean-going carriers or other waterborne vessels. Emera states that, although it seeks authorization to export CNG to any permitted non-FTA country, the primary purpose of the project is to fuel power generation facilities owned by an Emera affiliate, Grand Bahama Power Company (GBPC), located on the island of Grand Bahama.[6] Emera expects that it will enter into a long-term contract to supply natural gas to GBPC, and that under the terms of such agreement, CNG from the Facility will be transported approximately 75 nautical miles from the Port of Palm Beach to an unloading and decompression facility in Freeport, Grand Bahama.

For the reasons discussed below, this Final Opinion and Order authorizes Emera to export CNG on its own behalf from the proposed Facility to non-FTA countries up to the equivalent of 0.008 Bcf/d of natural gas (2.92 Bcf/yr) for a 20-year term, commencing on the earlier of the date of first export or seven years from the date this authorization is granted (October 19, 2022). Previously, in DOE/FE Order No. 3447, DOE/FE authorized Emera to export domestically produced CNG by vessel from the proposed Facility 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

[5] Emera App. at 1.
[6] *See id*. at 2; *see also infra* § IV.B, D.

(FTA countries),[7] up to the equivalent of 9.125 Bcf/yr of natural gas (0.025 Bcf/d) for a 20-year term.[8] As noted above, the volume of CNG authorized for export in this Order is lower than requested by Emera and reflects the planned initial capacity of the Facility; accordingly, it is not additive to the volume authorized for export in Emera's FTA Order. *See infra* § XI.F.

DOE/FE Proceeding. On July 3, 2014, DOE/FE published a Notice of Emera's Application in the Federal Register.[9] The Notice of Application called on interested persons to submit protests, motions to intervene, notices of intervention, and comments no later than 4:30 p.m., Eastern time, on September 2, 2014. In response to the Notice of Application, DOE/FE received one timely-filed motion for leave to intervene and protest from the American Public Gas Association (APGA). DOE/FE also received comments supporting the Application from Florida State Senator Joseph Abruzzo and Mr. Manual Almira, Executive Director of the Port of Palm Beach, respectively. Additional procedural history is set forth below. *See infra* §§ IV, VI.

Previously, on May 20, 2011, 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 liquefied natural gas (LNG) produced in the lower-48 states to non-FTA countries.[10] In that order, DOE/FE conditionally authorized Sabine Pass to export a volume of LNG equivalent to 2.2 Bcf/d of natural gas.

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[7] The United States currently has FTAs requiring national treatment for trade in natural gas with Australia, Bahrain, Canada, Chile, Colombia, Dominican Republic, El Salvador, Guatemala, Honduras, Jordan, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, Republic of Korea, and Singapore. FTAs with Israel and Costa Rica do not require national treatment for trade in natural gas.

[8] *See Emera CNG, LLC*, DOE/FE Order No. 3447, FE Docket No. 13-157-CNG, Order Granting Long-Term Authorization to Export Compressed Natural Gas by Vessel from a Proposed CNG Compression and Loading Facility at the Port of Palm Beach, Florida, to Free Trade Agreement Nations (June 13, 2014) [hereinafter Emera FTA Order]. *See infra* § IV.C.

[9] Emera CNG, LLC, Application for Long-Term Authorization to Export Compressed Natural Gas Produced From Domestic Natural Gas Resources to Non-Free Trade Agreement Countries for a 20-Year Period, 79 Fed. Reg. 38,017 (July 3, 2014) [hereinafter Emera Notice of Application].

[10] *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 (May 20, 2011) [hereinafter *Sabine Pass*]. In August 2012, DOE/FE granted

By August 2011, with other non-FTA export applications then pending before it, DOE/FE determined that further study of the economic impacts of LNG exports was warranted to better inform its public interest review under section 3 of the NGA.[11] 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.[12] Although the studies focus on the economic impacts of LNG exports, DOE/FE finds the studies applicable to reviewing CNG export applications as well.

First, in August 2011, DOE/FE requested that EIA assess how prescribed levels of natural gas exports above baseline cases could affect domestic energy markets. Using its National Energy Modeling System (NEMS), EIA examined the impact of two DOE/FE-prescribed levels of assumed natural gas exports (at 6 Bcf/d and 12 Bcf/d) under numerous scenarios and cases based on projections from EIA's 2011 *Annual Energy Outlook* (AEO 2011), the most recent EIA projections available at the time.[13] The new scenarios and cases examined by EIA included a variety of supply, demand, and price outlooks. EIA published its study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, in January 2012.[14] As discussed below, EIA generally found that LNG exports will 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.

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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).

[11] DOE/FE stated in *Sabine Pass* that it "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." DOE/FE Order No. 2961, at 33.

[12] *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).

[13] The Annual Energy Outlook (AEO) presents long-term projections of energy supply, demand, and prices. It is based on results from EIA's NEMS model. *See infra* §§ V.A.1, VIII.A.2.a (discussion of AEO projections).

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

Second, DOE contracted with NERA to assess the potential macroeconomic impact of LNG exports by incorporating EIA's then-forthcoming case study output from the NEMS model into NERA's general equilibrium model of the U.S. economy. 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.[15] 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.[16]

On December 11, 2012, DOE/FE published a Notice of Availability (NOA) of the EIA and NERA studies (collectively, the 2012 LNG Export Study or Study).[17] DOE/FE invited public comment on the Study, and stated that its disposition of the then-pending non-FTA LNG export applications would be informed by the Study and the comments received in response thereto.[18] The NOA required initial comments by January 24, 2013, and reply comments between January 25 and February 25, 2013.[19] DOE/FE received over 188,000 initial comments and over 2,700 reply comments, of which approximately 800 were unique.[20] The comments also included 11 economic studies prepared by commenters or organizations under contract to commenters.

[15] *See id*. (NERA Economic Consulting Analysis (Study - Part 2)).
[16] *See infra* § V.B.
[17] 77 Fed. Reg. at 73,627.
[18] *Id*. at 73,628.
[19] *Id*. at 73,627. On January 28, 2013, DOE issued a Procedural Order accepting for filing any initial comments that had been received as of 11:59 p.m., Eastern time, on January 27, 2013.
[20] Because many comments were nearly identical form letters, DOE/FE organized the initial comments into 399 docket entries, and the reply comments into 375 entries. *See* http://www.fossil.energy.gov/programs/gasregulation/authorizations/export_study/export_study_initial_comments.html (Initial Comments – LNG Export Study) & http://www.fossil.energy.gov/programs/gasregulation/authorizations/export_study/export_study_reply_comments.html (Reply Comments – LNG Export Study).

The public comments represent a diverse range of interests and perspectives, including those of federal, state, and local political leaders; large public companies; public interest organizations; academia; industry associations; foreign interests; and thousands of U.S. citizens. While the majority of comments were short letters expressing support or opposition to the 2012 LNG Export Study or to LNG exports in general, others contained detailed statements of differing points of views. The comments were posted on the DOE/FE website and entered into the public records of non-FTA export proceedings.[21] As discussed below, DOE/FE has carefully examined the comments and considered them in its review of Emera's Application.

On June 4, 2014, DOE/FE issued a notice in the *Federal Register* proposing to evaluate different environmental aspects of the LNG production chain. Specifically, 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 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*.[22] DOE/FE received comments on the Draft Addendum and, on August 15, 2014, issued the final Addendum with its response to the public comments contained in Appendix B.[23] *See infra* § IX.

DOE/FE has taken all public comments on the Addendum into consideration in this decision.[24] As explained below, the Addendum is not required by the National Environmental

[21] *See* 77 Fed. Reg. at 73,629.
[22] Dep't of Energy, Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States, 79 Fed. Reg. 32,258 (June 4, 2014) [hereinafter Draft Addendum]. DOE/FE announced the availability of the Draft Addendum on its website on May 29, 2014.
[23] Dep't of Energy, Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States, 79 Fed. Reg. 48,132 (Aug. 15, 2014) [hereinafter Addendum].
[24] *See* Emera Notice of Application, *supra* n.9.

Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*, but DOE/FE believes that it will inform its review of the public interest under NGA section 3(a), and is responsive to concerns previously raised in connection with non-FTA LNG export proceedings.

DOE/FE's Final Environmental Assessment and Issuance of Finding of No Significant Impact (FONSI) Under NEPA, and NGA Section 3(a) Authorization. NEPA requires DOE to consider the environmental impacts of its decisions on applications seeking authorization to export natural gas, including CNG. On September 19, 2014, the Federal Energy Regulatory Commission (FERC) issued an Order on Petition for Declaratory Order, in which it granted Emera's petition for a declaratory finding that its "proposed facilities and operations will not be subject to [FERC's] jurisdiction under the NGA."[25] Accordingly, to meet its NEPA responsibilities, DOE prepared an environmental assessment (EA) to analyze and describe the potential environmental impacts associated with Emera's Application. DOE published a notice of availability of the draft environmental assessment (Draft EA) [26] on February 13, 2015.[27] The Notice of Availability invited the public to submit comments on the Draft EA's analysis of the potential environmental impacts of implementing Emera's proposed action.

The Draft EA evaluated 16 resource areas for potential impacts associated with the proposed exports. After preliminary evaluation, DOE determined that there would be either no or negligible impacts for nine resource areas: aesthetics and visual resources; land use; community services; cultural resources; geology, topography and soils; terrestrial resources; noise and vibration; transportation; and utilities. Therefore, these nine resource areas were not

[25] Emera CNG, LLC, Order on Petition for Declaratory Order, FERC Docket No. CP14-114-000, 148 FERC ¶ 61,219 (Sept. 19, 2014).
[26] U.S. Dep't of Energy, Draft Environmental Assessment for the Emera CNG, LLC Compressed Natural Gas Project, Florida, EA-1976D, FE Docket No. 13-157-CNG (Feb. 13, 2015) *available at* http://energy.gov/nepa/downloads/ea-1976d-draft-environmental-assessment [hereinafter Draft EA].
[27] U.S. Dep't of Energy, Notice of Availability of Draft Environmental Assessment for the Emera CNG, LLC Compressed Natural Gas Project, Florida, EA-1976D, FE Docket No. 13-157-CNG (Feb. 13, 2015) [hereinafter NOA of Draft EA].

evaluated in detail in the Draft EA and were not given further consideration.[28] The Draft EA did evaluate seven resource areas: water resources, aquatic resources, air quality, solid and hazardous waste, socioeconomics, public and occupational health and safety, and environmental justice. For these resource areas, the Draft EA concluded that there would be no impacts or that potential impacts would be minor, temporary, or both.[29]

Contemporaneously with the issuance of this Order, DOE is issuing the Final EA and a Finding of No Significant Impact (FONSI) for Emera's proposed exports.[30] DOE determined in the FONSI that granting Emera's Application for authorization to export up to 0.008 Bcf/d of natural gas from the proposed Facility would not have a significant effect on the human environment. On this basis, and for the other reasons discussed herein, this Order grants Emera's Application under NGA section 3(a) for exports of CNG in that volume.

II. SUMMARY OF FINDINGS AND CONCLUSIONS

This Order presents DOE/FE's findings and conclusions on all issues associated with Emera's proposed exports of CNG under NGA section 3(a), both environmental and non-environmental.[31] We note that CNG, like LNG, constitutes "natural gas" subject to section 3(a) of the NGA.[32] We therefore apply the same public interest review in evaluating Emera's

[28] *See* Draft EA at 2.
[29] *Id.*
[30] U.S. Dep't of Energy, Finding of No Significant Impact for Proposed CNG Project Regarding Emera CNG, LLC Application Seeking Department of Energy Authorization to Export Compressed Natural Gas to Non-Free Trade Agreement Nations, DOE/EA-1976 (Oct. 19, 2015) [hereinafter Emera FONSI].
[31] As discussed below, the non-environmental issues primarily include economic and international impacts associated with the proposed exports, as well as security of the natural gas supply in the United States. *See infra* § III (public interest standard).
[32] *See K N Energy, Inc.*, Order Denying Reh'g, 24 FERC ¶ 61,200, at 61,474 (Aug. 2, 1983) ("CNG is natural gas within the meaning of the Natural Gas Act. We see no legal basis … for treating the subject sales of gas for resale in the form of CNG differently than similar sales of gas for resale in the form of liquefied natural gas, for example … The Natural Gas Act contains no basis for such a distinction."), *aff'g Kansas-Nebraska Natural Gas Co, Inc.*, Order Granting in Part and Denying in Part Petition for Declaratory Order and Denying Untimely Mots. to Intervene, 22 FERC ¶ 61,176 (Feb. 18, 1983).

Application to export CNG to non-FTA countries as we apply in evaluating applications to export LNG to non-FTA countries. *See infra* § III.

As the basis for this Order, DOE/FE has reviewed a substantial administrative record that includes (but is not limited to) Emera's Application, a letter of clarification submitted by Emera on April 24, 2014, comments filed in support of the Application, the single protest filed in opposition to the Application by APGA, the 2012 LNG Export Study, and public comments received on the 2012 LNG Export Study. Based on that record and for the reasons set forth below, DOE/FE has determined that APGA has not demonstrated that the proposed exports of CNG will be inconsistent with the public interest, as would be required to deny the Application under NGA section 3(a).

On this basis, DOE/FE is granting Emera's Application to export domestically produced CNG from the proposed Facility at the Port of Palm Beach to non-FTA countries in a volume equivalent to 2.92 Bcf/yr of natural gas (0.008 Bcf/d) for a 20-year term. As noted above, this volume—although slightly lower than the export volume requested by Emera—reflects the maximum initial capacity of the Facility as stated by Emera in the Application. This authorization is subject to the Terms and Conditions and Ordering Paragraphs set forth herein, but is not conditioned on additional environmental analysis or review. *See infra* §§ XI-XIII.

III. PUBLIC INTEREST STANDARD

Section 3(a) of the NGA sets forth the standard for review of Emera'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

[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.

> 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 the presumption is rebutted by an affirmative showing of inconsistency with the public interest.[34]

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 present 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]

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[34] *See, e.g., Sabine Pass*, Order No. 2961, at 28; *Phillips Alaska Natural Gas Corp. & Marathon Oil Co.*, DOE/FE Order No. 1473, Order Extending Authorization to Export Liquefied Natural Gas from Alaska, at 13 (April 2, 1999), *citing Panhandle Producers & Royalty Owners Ass'n v. ERA*, 822 F.2d 1105, 1111 (D.C. Cir. 1987).
[35] *See, e.g., Sabine Pass*, DOE/FE Order No. 2961, at 28-42 (reviewing record evidence in issuing conditional authorization); *Freeport LNG*, DOE/FE Order No. 3282, at 109-14 (discussing same); *Lake Charles Exports*, DOE/FE Order No. 3324, at 121-27.
[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.

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 section 3 of the NGA, 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 the portion of the Application subject to this Order, Emera requests long-term, multi-contract authorization to export domestically produced CNG on its own behalf from its proposed Facility at the Port of Palm Beach to non-FTA countries in a volume equivalent to 9.125 Bcf/yr of natural gas (0.025 Bcf/d). Emera requests this authorization for a 20-year term, commencing

[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, 71,128 (1989)).
[39] DOE Delegation Order No. 0204-111, at 1; *see also* 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)).

on the earlier of the date of first export or five years from the date of this Order. Emera also requests "separate treatment" by DOE/FE, insofar as it asks DOE/FE to consider the Application outside of DOE/FE's then-existing "order of precedence" for processing applications requesting authorization to export LNG and CNG to non-FTA countries.[41] Emera states that its Application is distinguishable from other pending non-FTA LNG export applications for several reasons, including that the small volume of CNG proposed for export will not have any detectable impact on the domestic natural gas market.

A. Description of Applicant

Emera states that it is a Delaware limited liability company with its principal place of business in West Palm Beach, Florida. Emera states that it is a wholly-owned indirect subsidiary of Emera Inc., a corporation formed under the laws of the province of Nova Scotia, Canada, with its principal place of business in Nova Scotia, Canada. According to Emera, Emera Inc. is a publicly traded energy and services company that invests in electricity generation, transmission and distribution assets, as well as gas transmission and utility energy services assets. Emera states that Emera Inc. holds interests throughout northeastern North America and owns and operates or has an interest in electric utilities in four Caribbean countries: the Bahamas, Barbados, Dominica, and St. Lucia.

B. Compression Project

Emera proposes to develop, own, and operate a CNG compression and loading facility (Facility) to be located within the Port of Palm Beach, Florida. Emera states that the Facility will be located off the Rivera Lateral, an intrastate pipeline owned and operated by Peninsula

[41] "Order of Precedence –Non-FTA LNG Export Applications," *http://energy.gov/fe/downloads/order-precedence-non-fta-lng-export-applications* (last revised Mar. 24, 2014). DOE/FE notes that, in August 2014, it published the final revised Procedures for Liquefied Natural Gas Export Decisions, which changed the order of precedence and obviates this request. *See* Dep't of Energy, Procedures for Liquefied Natural Gas Export Decisions, 79 Fed. Reg. 48,132 (Aug. 15, 2014); *see also infra* § X.A.1.

Pipeline Company, Inc. (a subsidiary of Chesapeake Utilities Corporation). Emera states that its affiliate, Emera Utility Services Incorporated (EUS), has entered into a reservation agreement with the Port of Palm Beach District, giving EUS exclusive negotiating rights to lease the site on which Emera intends to construct the Facility.[42]

According to Emera, the proposed Facility will consist of dehydration, compression, and filling equipment with nominal loading capacity of 0.025 Bcf/d of CNG, as well as staging and loading facilities for CNG trailers, associated utilities, infrastructure, and support systems. Emera states that pressure vessels with an open ISO container frame will be filled with CNG under high pressure and loaded onto a roll on/roll off ocean-going carrier. As noted above, the Clarification Letter states that "all exports will be by waterborne vessel," and that it "will not export CNG from the Facility by truck alone."[43]

Emera states that the Facility initially will be capable of loading 0.008 Bcf/d of CNG (2.92 Bcf/yr). Once completed, the Facility will be capable of expanding to load and deliver CNG in a volume equivalent to approximately 0.025 Bcf/d of natural gas (9.125 Bcf/yr), the requested export volume.[44] Emera notes that it has signed a reservation agreement and term sheet with the Port of Palm Beach to secure the land for the Facility.

C. Procedural History

Pertinent aspects of Emera's procedural history are summarized as follows:

Clarification Letter. On May 2, 2014, Emera submitted a letter in response to a letter from DOE/FE, in which DOE/FE asked Emera to clarify the facilities to be utilized or constructed for its proposed exports, and the source and security of the natural gas supply from

[42] A copy of the reservation agreement and related documents is appended to the Application at Appendix C.
[43] Emera Clarification Ltr. at 1.
[44] Emera App. at 4.

those facilities (Clarification Letter).[45] In the Clarification Letter, Emera states that it is seeking authority to export CNG by waterborne vessel only, not also by truck, as the Application stated. Emera also confirmed that the Facility will be the only source and supply of CNG to be exported pursuant to this Application. Emera states that purchases of CNG from other facilities during maintenance periods for the Facility will be short-term (*i.e.*, pursuant to contracts of less than two years in duration), and therefore, Emera intends to file an application for blanket authorization to export CNG from other facilities to be identified in such application as necessary.

FTA Order (DOE/FE Order No. 3447). On June 13, 2014, in DOE/FE Order No. 3447, DOE/FE granted the portion of Emera's Application requesting authorization to export domestically produced CNG by vessel from the proposed Facility to FTA countries.[46] Pursuant to that order, Emera is authorized to export CNG on its own behalf in a volume equivalent to 9.125 Bcf/yr of natural gas (0.025 Bcf/d) for a 20-year term commencing on the earlier of the date of first export or five years from the date authorization was dated (June 13, 2019). As stated above, the volumes authorized for export in the FTA Order and this Order are not additive to one another.

D. Business Model

Emera requests long-term authorization to engage in the proposed exports solely on its own behalf, and asserts that it will have title to the CNG at the point of export. Emera states that it seeks authorization to export CNG to any permitted non-FTA destination, although the primary purpose of the project is to fuel power generation facilities owned by Emera affiliate, Grand Bahama Power Company (GBPC), located on the island of Grand Bahama. Emera states that its

[45] Emera Clarification Ltr., *supra* at n.3.
[46] *See* Emera FTA Order, *supra* at n.8.

parent company, Emera Inc., owns 80.4 percent of GBPC, and that GBPC is a vertically integrated utility with a gross installed generating capacity of 102 megawatts.

Emera commits to observing all DOE/FE reporting requirements for exports. Citing DOE/FE precedent, Emera commits to filing a copy of any relevant long-term commercial agreements within 30 days of the agreement(s) being executed, including both a non-redacted copy for filing under seal and either a redacted version of the contract or major provisions of the contract for public posting.

Emera anticipates having a number of potential customers for the proposed exports, all of whom are expected to be located within the Caribbean. Specifically, Emera states that it expects to enter into a long-term contract to supply gas to GBPC. Under the terms of that anticipated agreement, CNG from the Facility will be transported approximately 75 nautical miles from the Port of Palm Beach to an unloading and decompression facility in Freeport, Grand Bahama. In Freeport, the natural gas pressure vessels will be unloaded from the carrier, and the gas will pass through a decompression station. The decompressed gas will be transported via pipeline to local power plant(s) owned and operated by GBPC for use in electricity generation. According to Emera, there will be an opportunity for other companies operating in Freeport in close proximity to the pipeline to utilize the exported natural gas.

E. Source of Natural Gas

Emera states that the natural gas supplying the proposed exports will come from domestic natural gas markets. As noted above, the Facility will be directly connected to the Riviera Lateral, which is regulated by the Florida Public Service Commission. Emera states that it has entered into a term sheet with Peninsula Pipeline Company for natural gas transmission through the Riviera Lateral. Emera also states that Peninsula Pipeline Company, Inc. is connected to Florida Gas Transmission Corporation, an interstate pipeline regulated by FERC. Emera asserts

that, through the combination of Peninsula Pipeline Company, Inc. and Florida Gas Transmission Corporation, it will have access to gas supplies available throughout the Gulf Coast region and beyond. According to Emera, the proposed Facility will be the only source and supply of CNG for export.[47]

F. Environmental Review

Emera asserts that (as noted above) the proposed Facility is not subject to FERC's jurisdictional authority under NGA section 3, and therefore asks DOE/FE to review the potential environmental impacts of the Facility under NEPA. Emera states that, based on the Facility's location, scope, and other factors, it expects the environmental impacts associated with the Facility to be minimal.[48]

V. 2012 LNG EXPORT STUDY

As noted above, in August 2011, with several 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. To address this issue, DOE/FE undertook a two-part study of the cumulative economic impact of LNG exports. The first part of the study was conducted by EIA and looked at the potential impact of additional natural gas exports on domestic energy consumption, production, and prices under several export scenarios prescribed by DOE/FE. The EIA Study did not evaluate macroeconomic impacts of LNG exports on the U.S. economy. The second part of the study, performed by NERA Economic Consulting, assessed the potential macroeconomic impact of LNG exports using its energy-economy model (the "NewERA" model). NERA built on the EIA Study requested by DOE/FE by calibrating the NERA U.S. natural gas supply model to the results of the study by

[47] Emera Clarification Ltr. at 1.
[48] Emera sets forth a description of the Facility's potential environmental impact is Appendix D to the Application.

EIA. The EIA Study was limited to the relationship between export levels and domestic prices without considering whether those quantities of exports could be sold at high enough world prices to support the calculated domestic prices. NERA used its Global Natural Gas Model (GNGM) to estimate expected levels of U.S. LNG exports under several scenarios for global natural gas supply and demand. A more detailed discussion of each study follows.

A. EIA Study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*

1. Methodology

DOE/FE asked EIA to assess how four scenarios of increased natural gas exports could affect domestic energy markets, particularly consumption, production, and prices. The four scenarios assumed LNG exports of:

- 6 Bcf/d, phased in at a rate of 1 Bcf/d per year (low/slow scenario);
- 6 Bcf/d phased in at a rate of 3 Bcf/d per year (low/rapid scenario);
- 12 Bcf/d phased in at a rate of 1 Bcf/d per year (high/slow scenario); and
- 12 Bcf/d phased in at a rate of 3 Bcf/d per year (high/rapid scenario).

According to EIA, total marketed natural gas production in 2011 was approximately 66 Bcf/d. Thus, exports of 6 Bcf/d and 12 Bcf/d represent roughly 9 and 18 percent of natural gas production in 2011, respectively.

DOE/FE also requested that EIA consider the above four scenarios of increased natural gas exports in the context of four cases from EIA's AEO 2011. These four cases are:

- The AEO 2011 Reference Case;
- The High Shale Estimated Ultimate Recovery (EUR) case (reflecting optimistic assumptions about domestic natural gas supply, with the EUR per shale gas well for new, undrilled wells assumed to be 50 percent higher than in the Reference Case);

- The Low Shale EUR case (reflecting pessimistic assumptions about domestic natural gas supply, with the EUR per shale gas well for new, undrilled wells assumed to be 50 percent lower than in the Reference Case); and

- The High Economic Growth case (assuming the U.S. gross domestic product will grow at an average annual rate of 3.2 percent from 2009 to 2035, compared to 2.7 percent in the Reference Case, which increases domestic energy demand).

Taken together, the four scenarios with different additional export levels imposed from the indicated baseline case (no additional exports) presented 16 case scenarios, listed in Table 1.

Table 1: Case Scenarios Considered By EIA in Analyzing Impacts of LNG Exports

	AEO 2011 Cases	Export Scenarios
1	AEO 2011 Reference	Low/Slow
2	AEO 2011 Reference	Low/Rapid
3	AEO 2011 Reference	High/Slow
4	AEO 2011 Reference	High/Rapid
5	High EUR	Low/Slow
6	High EUR	Low/Rapid
7	High EUR	High/Slow
8	High EUR	High/Rapid
9	Low EUR	Low/Slow
10	Low EUR	Low/Rapid
11	Low EUR	High/Slow
12	Low EUR	High/Rapid
13	High Economic Growth	Low/Slow
14	High Economic Growth	Low/Rapid
15	High Economic Growth	High/Slow
16	High Economic Growth	High/Rapid

EIA used the final AEO 2011 projections issued in April 2011 as the starting point for its analysis and applied the NEMS model. Because NEMS did not generate a projection of LNG export demand, EIA specified additional natural gas demand levels as a proxy for projected export levels consistent with the scenarios prescribed by DOE/FE.

EIA assigned these additional exports to the West South Central Census Division. This meant that EIA effectively assumed that the incremental LNG exports would be shipped out of the Gulf Coast states or Texas.

EIA also counted any additional natural gas consumed during the liquefaction process within the total additional export volumes specified in the DOE/FE scenarios. Therefore, the net volumes of LNG produced for export were roughly 10 percent below the gross volumes considered in each export scenario. By way of illustration, in the cases where cumulative export volumes are 6 Bcf/d, liquefaction would consume 0.6 Bcf/d with net exports of 5.4 Bcf/d.

EIA made other changes in modeled flows of gas into and out of the lower-48 United States where necessary to analyze the increased export scenarios.[49] Additionally, EIA assumed that a pipeline transporting Alaskan natural gas into the lower-48 states would not be built during the forecast period, thereby isolating the lower-48 states' supply response.

2. Scope of EIA Study

In the Preface to the EIA Study, EIA identifies several limiting factors governing use of the Study results:

> The projections in this report are not statements of what *will* happen but of what *might* happen, given the assumptions and methodologies used. The Reference case in this report is a business-as-usual trend estimate, reflecting known technology and technological and demographic trends, and current laws and regulations. Thus, it provides a policy-neutral starting point that can be used to analyze policy initiatives. EIA does not propose, advocate, or speculate on future legislative and regulatory changes.[50]

[49] U.S. natural gas exports to Canada and U.S. natural gas imports from Mexico are exogenously specified in all the AEO 2011 cases. U.S. imports of natural gas from Canada are endogenously set in the model and continue to be so for this study. However, U.S. natural gas exports to Mexico and U.S. LNG imports that are normally determined endogenously within the model were set to the levels projected in the associated AEO 2011 cases for this study. EIA Study at 2-3.

[50] EIA Study at ii (emphasis in original).

Additionally, the EIA Study recognizes that projections of energy markets over a 25-year period are highly uncertain, and that many events—such as supply disruptions, policy changes, and technological breakthroughs—cannot be foreseen. Other acknowledged limitations on the scope of the EIA Study include:

- The NEMS model is not a world energy model, and therefore does not address the interaction between the potential for additional U.S. natural gas exports and developments in world natural gas markets;
- Global natural gas markets are not integrated, and their nature could change substantially in response to significant changes in natural gas trading patterns;
- Macroeconomic results were not included in the analysis because energy exports are not explicitly represented in the NEMS macroeconomic module; and

The domestic focus of the NEMS model makes it unable to account for all interactions between energy prices and supply/demand in energy-intensive industries that are globally competitive.

3. Natural Gas Markets

The EIA Study recognized that natural gas markets are not integrated globally and natural gas prices span a wide range. EIA stated that the current large disparity in natural gas prices across major world regions is likely to narrow as markets become more globally integrated. However, key questions remain as to how quickly and to what extent convergence might occur.

U.S. market conditions are also variable, according to EIA, and lower or higher U.S. natural gas prices would tend to make additional exports more or less likely. EIA pointed out that prospects for LNG exports depend greatly on the cost-competitiveness of liquefaction projects in the United States relative to those at other locations.

EIA observed that relatively high shipping costs from the United States may add a cost disadvantage compared to exporting countries closer to key markets, such as in Asia. EIA notes

that LNG projects in the United States would frequently compete not just against other LNG projects, but also against pipeline projects from traditional natural gas sources or projects to develop shale gas in Asia or Europe.

4. Results of EIA Study

EIA generally found that LNG exports will 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. The impacts of exports, according to EIA, included:

Increased natural gas prices at the wellhead. EIA stated that larger export levels would lead to larger domestic price increases; rapid increases in export levels would lead to large initial price increases that moderate somewhat in a few years; and slower increases in export levels would lead to more gradual price increases but eventually would produce higher average prices during the decade between 2025 and 2035.

Increased natural gas production and supply. Increased exports would result in a supply response, *i.e.*, increased natural gas production that would satisfy about 60 to 70 percent of the increase in natural gas exports, with a minor additional contribution from increased imports from Canada. Across most cases, EIA stated that about three-quarters of this increased production would come from shale sources.

Decreased natural gas consumption. Due to higher prices, EIA projects a decrease in the volume of gas consumed domestically. EIA states that the electric power sector, by switching to coal and renewable fuels, would account for the majority of this decrease but indicates that there also would be a small reduction in natural gas use in all sectors from efficiency improvements and conservation.

Increased end-user natural gas and electricity delivered prices. EIA states that even while consuming less, on average, consumers will see an increase in their natural gas and electricity expenditures.

Additional details regarding these conclusions are discussed in the following sections.

5. Wellhead Price Increases

EIA projects that natural gas prices will increase in the Reference Cases even absent expansion of natural gas exports. This baseline increase in natural gas prices bears an inverse relationship to projected increases in the volumes of natural gas produced from shale resources. Thus, in the high shale EUR Reference Case, the long-term natural gas price is lower than it is in the low shale EUR case.

While EIA projected a rising baseline price of gas without exports, EIA also found that the price of gas will increase over the rising baseline when exports occur. Exports are projected to impact natural gas prices in two ways. First, the export scenarios that contained rapid growth in exports experienced large initial price increases that moderated in the long run, while cases projecting a slow growth in exports experienced more gradual price increases. Second, cases with larger cumulative exports resulted in higher prices in the long-term relative to those cases with lower overall export levels. The largest price increase over the baseline exists in the Low Shale EUR case. The High Shale EUR case yields the smallest price response.

6. Increased Natural Gas Production and Supply

EIA projected that most of the additional natural gas needed for export would be provided by increased domestic production with a minor contribution from increased pipeline imports from Canada. The remaining portion of the increased export volumes would be offset by decreases in consumption resulting from the higher prices associated with the increased exports.

7. Decreased Natural Gas Consumption

EIA projected that greater export levels would lead to decreases in natural gas consumption. Most of this projected decrease would occur in the electric power sector. Increased coal-fired generation accounts for about 65 percent of the projected decrease in natural gas-fired generation. However, EIA also noted that the degree to which coal might be used in lieu of natural gas depends on what regulations are in place. As noted above, EIA's projections reflected the laws and regulations in place at the time AEO 2011 was produced.

EIA further projected that small increases in renewable generation would contribute to reduced natural gas-fired generation. Relatively speaking, the role of renewables would be greater in a higher-gas-price environment (*i.e.*, the Low Shale EUR case) when renewables can more successfully compete with coal, and also in a higher-generation environment (*i.e.*, the High Economic Growth case), particularly in the later years.

EIA projected that increased natural gas exports would result in reductions in industrial natural gas consumption. However, the NEMS model does not capture the link between energy prices and the supply/demand of industrial commodities in global industries. To the extent that the location of production is sensitive to changes in natural gas prices, EIA acknowledged that industrial natural gas demand would be more responsive than shown in its analysis.

8. Increased End-User Natural Gas and Electricity Delivered Prices

EIA projected that, with increased natural gas exports, consumers would consume less and pay more on both their natural gas and electricity bills, and generally pay a little less for liquid fuels.

EIA projected that the degree of change to total natural gas bills with added exports varies significantly among economic sectors. This is because the natural gas commodity charge

represents significantly different portions of each natural gas consuming sector's bill. However, EIA projected that natural gas expenditures would increase at the highest percentages in the industrial sector, where low transmission and distribution charges constitute a relatively small part of the delivered natural gas price.

EIA projected that average electricity prices would increase between 0.14 and 0.29 cents per kilowatt-hour (kWh) (between 2 and 3 percent) when gas exports are added. The greatest projected increase in electricity prices occurs in 2019 under the Low Shale EUR case for the high export/rapid growth export scenario, with an increase of 0.85 cents per kWh (9 percent).

EIA projected that, on average between 2015 and 2035, total U.S. end-use electricity expenditures as a result of added exports would increase between $5 billion to $10 billion (between 1 to 3 percent), depending on the export scenario. The High Macroeconomic Growth case shows the greatest average annual increase in natural gas expenditures over the same time period, with increases over the baseline (no additional exports) scenario ranging from $6 billion to $12 billion.

9. Impact on Natural Gas Producer Revenues

As part of its analysis, EIA considered the impact of natural gas exports on natural gas producer revenues. According to EIA, total additional natural gas revenues to producers from exports would increase from 2015 to 2035 between $14 billion and $32 billion over the AEO 2011 Reference Case, depending on the export scenario. These revenues reflect dollars spent to purchase and move the natural gas to the export facility, but do not include any revenues associated with the liquefaction and shipping process.

EIA cautioned that these projected increases in natural gas producer revenues do not represent profits and a large portion of the additional revenues would be expended to cover the

costs associated with increased production, such as for equipment (*e.g.*, drilling rigs) and labor. In contrast, the additional revenues resulting from the higher price of natural gas that would have been produced and sold to largely domestic customers even in the absence of the additional exports posited in the analysis would preponderantly reflect increased profits for producers and resource owners.

10. Impacts Beyond the Natural Gas Industry

EIA stated that, other than impacts on their energy expenditures, impacts on non-energy sectors were generally beyond the scope of its study. However, EIA did project impacts on total energy use and energy-related carbon dioxide (CO_2) emissions. EIA projected that annual primary energy consumption in the AEO 2011 Reference Case will average 108 quadrillion Btu between 2015 and 2035, with a growth rate of 0.6 percent. Also, cumulative CO_2 emissions are projected to total 125,000 million metric tons for that 20-year period.

According to EIA, the changes in overall energy consumption would largely reflect changes in the electric power sector. While additional exports would result in decreased natural gas consumption, changes in overall energy consumption would be relatively minor as much of the decrease in natural gas consumption would be replaced with increased coal consumption.

While lower domestic natural gas deliveries resulting from added exports are projected to reduce natural gas related CO_2 emissions, EIA projected that the increased use of coal in the electric sector would generally result in a net increase in domestic CO_2 emissions. Exceptions occur in scenarios where renewables are better able to compete against natural gas and coal. However, when also accounting for emissions related to natural gas used in the liquefaction process, EIA projected that additional exports would increase domestic CO_2 levels under all

cases and scenarios, particularly in the earlier years of the projection period. EIA did not evaluate the effect of U.S. LNG exports on global CO_2 emissions.

B. NERA Study, *Macroeconomic Impacts of LNG Exports from the United States*

Because the NEMS model used by EIA did not account for the impact of energy price changes on global energy utilization patterns and did not include a full macroeconomic model, DOE/FE commissioned NERA to provide such an analysis. NERA developed a two-step approach. First, it modeled energy markets by drawing on several of the scenarios that EIA had developed and adding global market scenarios developed through its GNGM model. Second, using its "N_{ew}ERA" energy-economy model, NERA drew conclusions regarding the domestic macroeconomic impacts of LNG exports. The impacts measured using the N_{ew}ERA macroeconomic model included price, welfare,[51] gross domestic product (GDP), aggregate consumption, aggregate investment, natural gas export revenues, sectoral output,[52] and wages and other household incomes. In addition, NERA identified impacts that would affect certain energy intensive, trade exposed (EITE) industries, as discussed below.

1. Overview of NERA's Findings

NERA's key findings include the following:

Net economic benefits across all scenarios. Across all the scenarios studied, 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. Scenarios with unlimited exports had higher net economic benefits than corresponding cases with limited exports. In all cases, the benefits that come from export

[51] According to NERA, the measure of welfare used in its study is known as the "equivalent variation" and is the amount of income a household would be willing to give up in the case without LNG exports to achieve the benefits of LNG exports. NERA states that it measured welfare in present value terms, and therefore captures in a single number benefits and costs that might vary year by year over the period. NERA Study at 6, n.5 & 55.

[52] NERA evaluated seven key sectors of the U.S. economy: agriculture, energy intensive sector, electricity, natural gas, motor vehicle, manufacturing, refined petroleum products, and services. *Id*. at 9.

expansion outweigh the losses from reduced capital and wage income to U.S. consumers, and hence LNG exports have net economic benefits in spite of higher domestic natural gas prices.

Net benefits to the United States would be highest if the United States is able to produce large quantities of gas from shale at low cost, if world demand for natural gas increases rapidly, and if LNG supplies from other regions are limited. If the promise of shale gas is not fulfilled and costs of producing gas in the United States rise substantially, or if there are ample supplies of LNG from other regions to satisfy world demand, the United States would not export LNG. Under these conditions, allowing exports of LNG would cause no change in natural gas prices and do no harm to the overall economy.

Natural gas price increases. U.S. natural gas prices would increase if the United States exports LNG. However, the global market limits how high U.S. natural gas prices can rise under pressure of LNG exports because importers will not purchase U.S. exports if U.S. wellhead price rises above the cost of competing supplies.

Natural gas price changes attributable to LNG exports remain in a relatively narrow range across the entire range of scenarios. Natural gas price increases at the time LNG exports could begin range from zero to $0.33 per million cubic feet (Mcf) (2010$/Mcf). Price increases that would be observed after five more years of potentially growing exports could range from $0.22 to $1.11 (2010$/Mcf). The higher end of the range is reached only under conditions of ample U.S. supplies and low domestic natural gas prices, with smaller price increases when U.S. supplies are more costly and domestic prices higher.

Socio-economic impacts. How increased LNG exports will affect different socioeconomic groups will depend on their income sources. Like other trade measures, LNG exports will cause shifts in industrial output and employment and in sources of income. Overall,

both total labor compensation and income from investment are projected to decline, and income to owners of natural gas resources will increase. Different socioeconomic groups depend on different sources of income; workers with retirement savings that include shares of natural resource companies will benefit from higher incomes to those companies. Nevertheless, impacts will not be positive for all groups in the economy. Households with income solely from wages or government transfers, in particular, might not participate in these benefits.

Competitive impacts and impact on employment. Serious competitive impacts are likely to be confined to narrow segments of industry. About 10 percent of U.S. manufacturing, measured by value of shipments, has both energy expenditures greater than 5 percent of the value of its output and serious exposure to foreign competition. Employment in these energy-intensive industries is about one-half of one percent of total U.S. employment.

LNG exports are unlikely to affect the overall level of employment in the United States. There will be some shifts in the number of workers across industries, with those industries associated with natural gas production and exports attracting workers away from other industries. In no scenario is the shift in employment out of any industry projected to be larger than normal rates of turnover of employees in those industries.

Additional discussion of the above key findings is offered below and in the NERA Study itself.

2. Overview of NERA's Methodology

NERA states that it attempted to answer two principal questions:

- At what price can various quantities of LNG exports be sold?
- What are the economic impacts on the United States of LNG exports?

To answer these questions, NERA used the GNGM model to estimate expected levels of U.S.

LNG exports under several scenarios for global natural gas supply and demand. NERA also relied on the EIA Study to characterize how U.S. natural gas supply, demand, and prices would respond if the specified level of LNG exports were achieved. Further, NERA examined the same 16 scenarios for LNG exports analyzed by EIA but added additional scenarios to reflect global supply and demand. These additional scenarios were constructed on the basis of NERA's analytical model of global natural gas markets, as described below.

The resulting scenarios ranged from Reference Case conditions to stress cases with high costs of producing natural gas in the United States and exceptionally large demand for U.S. LNG exports in world markets. The three scenarios chosen for the U.S. resource outlook were the EIA Reference Case, based on AEO 2011, and two cases assuming different levels of EUR from new gas shale development. Outcomes of the EIA high demand case fell between the High and Low EUR cases and, therefore, would not have changed the range of results. The three different international outlooks were: (1) a Reference Case, based on EIA's International Energy Outlook 2011; (2) a Demand Shock case with increased worldwide natural gas demand caused by shutdowns of some nuclear capacity; and (3) a Supply/Demand Shock case that added to the Demand Shock a supply shock that assumed key LNG exporting regions did not increase their exports above current levels.

When the global and U.S. scenarios were combined with seven scenarios specifying limits on exports and export growth, NERA's analysis covered 63 possible scenarios. From these 63 scenarios, 21 scenarios resulted in some level of LNG export from the United States. Of these 21 scenarios, the GNGM model identified 13 "NewERA scenarios" that spanned the range of economic impacts from all of the scenarios and eliminated scenarios with essentially identical outcomes. As shown in Table 2 below, the 13 scenarios included:

Table 2: NewERA Scenarios Analyzed by NERA

	U.S. Scenarios	International Demand and Supply Scenarios	Export Scenarios
1	Reference	Supply and Demand Shock	Low/Rapid
2	Reference	Supply and Demand Shock	Low/Slow
3	Reference	Supply and Demand Shock	High/Rapid
4	Reference	Supply and Demand Shock	High/Slow
5	Reference	Demand Shock	Low/Rapid
6	Reference	Demand Shock	Low/Slow
7	Reference	Demand Shock	Low/Slowest
8	High EUR	Supply and Demand Shock	High/Rapid
9	High EUR	Supply and Demand Shock	High/Slow
10	High EUR	Supply and Demand Shock	Low/Rapid
11	High EUR	Supply and Demand Shock	Low/Slow
12	High EUR	Supply and Demand Shock	Low/Slowest
13	Low EUR	Supply and Demand Shock	Low/Slowest

To project the macroeconomic impacts of the above scenarios, NERA used its NewERA model to compare the impacts of each of the 13 export scenarios to baselines with no LNG exports. NERA thus derived a range of projected impacts on the U.S. economy, including impacts on welfare, aggregate consumption, disposable income, GDP, and loss of wage income.

3. Scope of the NERA Study

NERA started its analysis with the domestic economic AEO 2011 cases and the export scenarios present in the EIA Study.[53] In addition to the export scenarios used by EIA, NERA added two export cases, including the "low/slowest case" and a "no restraints" case in which no regulatory restraints on exports existed. The low/slowest case assumed exports of 6 Bcf/d, with a growth rate of 0.5 Bcf/d per year, which is half the growth rate in the slow scenarios used by EIA.

Because NERA, unlike EIA, modeled the international gas market, NERA also created three international gas market scenarios not contained in the EIA Study. The first was a business

[53] For a full discussion of the scope, see pages 3-15 of the NERA Study, http://energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.

as usual Reference Case. The second assumed an international demand shock with increased worldwide natural gas demand caused by shutdowns of some nuclear capacity. Finally, NERA created an international scenario that added to the demand shock a supply shock that assumed key LNG exporting regions did not increase their exports above current levels.

While these additional aspects of the analysis expanded the scope of the NERA Study relative to the study conducted by EIA, significant elements of the dynamics of the global natural gas trade and its domestic economic implications were outside the scope of the NERA Study or beyond the reach of the modeling tools used.[54] NERA expressly excluded the following factors from its analysis:

- The extent to which an overbuilding of liquefaction capacity could affect the ability to finance the projects and profitably export natural gas;
- The extent to which engineering or infrastructure limitations would impact the rate at which liquefaction capacity would come online, potentially impacting the cost of that capacity;
- The locations of the liquefaction facilities, or alternatives;
- The impacts of the liquefaction and exportation of natural gas on various regions within the United States;
- The extent to which the impacts of LNG export vary among different socio-economic groups; and
- The extent to which macroeconomic impacts to the United States would vary if the liquefaction projects were funded through foreign direct investment.

4. NERA's Global Natural Gas Model

The GNGM model is designed to estimate natural gas production, consumption, and trade in the major gas producing or consuming regions.[55] The model attempts to maximize the

[54] For a full discussion of the unexplored factors, see Appendix E of the NERA Study, http://energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.
[55] For a full discussion of GNGM, see page 20 of the NERA Study, http://energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.

difference between surplus and cost, constrained by various factors including liquefaction capacity and pipeline constraints. The model divides the world into 12 regions and specifies supply and demand curves for each region. The regions are: Africa, Canada, China/India, Central and South America, Europe, Former Soviet Union, Korea/Japan, Middle East, Oceania, Sakhalin, Southeast Asia, and the United States. The GNGM model's production and consumption assumptions for these regions are based on projections contained in the Reference Cases of EIA's AEO 2011 and International Energy Outlook 2011. NERA ran the GNGM model in five-year increments between 2015 and 2035.

According to NERA, the characteristics of a regional market will affect LNG trading patterns and the pricing of natural gas within the region. With respect to trading patterns, NERA observed that a significant portion of LNG, such as LNG moving to Europe, is traded on a long-term basis using dedicated supplies and dedicated vessels moving to identified markets. On the other hand, NERA stated that some LNG markets, particularly those in Asia, operate on the basis of open market competitive bids in which LNG is delivered to those who value it the most. NERA also found that Southeast Asian and Australian suppliers most often market LNG to Asian markets; African suppliers deliver LNG most often to Europe; and Middle Eastern suppliers deliver LNG both to Europe and Asia.

With respect to the pricing of LNG in global markets, NERA states that the price differential, or "basis," between two regions reflects the difference in the pricing mechanism for each regional market. If pricing for two market hubs were set by the same mechanism and there were no constraints in the transportation system, the basis would simply be the cost of transportation between the two market hubs. NERA asserts, however, that different pricing mechanisms set the price in each regional market, so the basis is often not set by transportation

differences alone.

NERA offers the following example: Japan depends on LNG as its source for natural gas and indexes LNG prices to crude oil prices. For Europe, on the other hand, NERA states that LNG is only one of three potential sources of supply for natural gas. The others are interregional pipelines and indigenous production. According to NERA, the competition for market share between these alternative sources of supply will establish the basis for LNG prices in Europe. NERA further states that within North America, pricing at Henry Hub has been for the most part set by competition between different North American supply sources and has been independent of pricing in Japan and Europe.

5. The NewERA Macroeconomic Model

NERA developed the NewERA model to forecast how, under a range of domestic and international supply and demand conditions, U.S. LNG exports could affect the U.S. economy.[56] Like other general equilibrium models, NewERA is designed to analyze long-term economic trends. NERA explained that, in any given year, actual prices, employment, or economic activity may differ from the projected levels.

The version of NewERA used in NERA's analysis considered all sectors of the U.S. economy. In short, the model:

- Contains supply curves for domestic natural gas,
- Accounts for imports of Canadian pipeline gas and other foreign imports,
- Recognizes the potential for increases to U.S. liquefaction capacity, and
- Recognizes changes in international demand for domestically produced natural gas.

[56] For a full discussion of the NewERA macroeconomic model, see pages 20 to 22 of the NERA Study, http://fossil.energy.gov/programs/gasregulation/reports/nera_lng_report.pdf.

As discussed below, the results of the NewERA model address changes in demand and supply of all goods and services, prices of all commodities, and impacts from LNG exports to U.S. trade, including changes in imports and exports. As with the GNGM model, NERA ran the NewERA model in five-year increments for 2015 through 2035.

6. Relationship to the EIA Study

As explained above, EIA's study focused on potential impacts of natural gas exports to domestic energy markets. Specifically, the study considered impacts to natural gas supply, demand, and prices within the United States. To provide a fuller scope of analysis, DOE asked NERA to examine the net macroeconomic impact of domestic LNG exports on the U.S. economy. To conduct this analysis, NERA first modeled international demand for U.S. LNG utilizing its GNGM model. NERA then incorporated the results from the GNGM model into its NewERA model, using the same parameters governing natural gas supply and demand that EIA used in the NEMS model.

NERA concluded that, in many cases, the global natural gas market would not accept the full amount of exports assumed in the EIA scenarios at export prices high enough to cover the U.S. wellhead prices calculated by EIA. In these cases, NERA replaced the export levels and price impacts found in the EIA scenarios with lower levels of exports (and prices) estimated by the GNGM model. These lower export levels were applied to the NewERA model to generate projected impacts to the U.S. economy from LNG exports.

7. Key Assumptions and Parameters of the NERA Study

NERA implemented the following key assumptions and parameters, in part to retain consistency with EIA's NEMS model:

i. All scenarios were derived from the AEO 2011 and incorporated EIA's

assumptions about energy and environmental policies, baseline coal, oil and natural gas prices, economic and energy demand growth, and technology availability and cost in the corresponding AEO cases.

ii. U.S. exports compete with LNG exports from other nations, who are assumed to behave competitively and to adjust their export quantities in response to prevailing prices. The single exception to this assumption is that the export decisions of the global LNG market's one dominant supplier, Qatar, were assumed to be independent of the level of U.S. exports.

iii. Prices for natural gas used for LNG production were based on the Henry Hub price, plus a 15 percent markup (to cover operating costs of the liquefaction process).

iv. The LNG tolling (or reservation) fee—paid by the exporter to the operator of the liquefaction terminal for the right to reserve capacity—was based on a return of capital to the operator.

v. All financing of investment was assumed to originate from U.S. sources.

The United States is assumed to have full employment, meaning that U.S. unemployment rates and the total number of jobs in the United States will not change across all cases.

8. Results of the NERA Study

As a result of its two-step analysis, the NERA Study yielded two sets of results, reported in five-year intervals beginning with 2015.[57] First, the GNGM model produced information regarding the conditions that will support exports of natural gas from the United States. Second, the N_{ew}ERA model provided information about the domestic macroeconomic impacts of natural gas exports. NERA found:

[57] These calendar years are not actual, but represent modeling intervals after exports begin. For example, if the United States does not begin LNG exports until 2016, one year should be added to the dates for each year that exports commence after 2015.

LNG exports would result in higher U.S. natural gas prices. NERA found that the United States would only be able to market LNG successfully with higher global demand or lower U.S. costs of production than in the Reference Cases. According to NERA, the market limits how high U.S. natural gas prices can rise under pressure of LNG exports because importers will not purchase U.S. exports if the U.S. wellhead price rises above the cost of competing supplies. In particular, under NERA's modeling, the U.S. natural gas price does not become linked to oil prices in any of the cases examined.

Macroeconomic impacts of LNG exports are positive in all cases. NERA found that the United States would experience net economic benefits from increased LNG exports in all cases studied. Only three cases had U.S. exports greater than the 12 Bcf/d maximum exports allowed in the cases analyzed by EIA.[58] NERA estimated economic impacts for these three cases with no constraint on exports, and found that even with exports reaching levels greater than 12 Bcf/d and associated higher prices than in the constrained cases, there were net economic benefits from allowing unlimited exports in all cases.

Across the scenarios, NERA projected that U.S. economic welfare would consistently increase as the volume of natural gas exports increased, including in scenarios with unlimited exports. The reason given was that even though domestic natural gas prices are pulled up by LNG exports, the value of those exports also rises so that there is a net gain for the U.S. economy measured by a broad metric of economic welfare or by more common measures such as real household income or real GDP. Although there are costs to consumers of higher energy prices and lower consumption and producers incur higher costs to supply the additional natural gas for export, these costs are more than offset by increases in export revenues along with a wealth

[58] The first case combined U.S. Reference natural gas production with an international supply and demand shock. The second combined the High EUR domestic case with an international demand shock. The third combined the High EUR domestic case with an international supply and demand shock. NERA Study at 6.

transfer from overseas received in the form of payments for liquefaction services. The net result is an increase in U.S. households' real income and welfare. NERA noted, however, that net benefits to the U.S. economy could be larger if U.S. businesses were to take more of a merchant role. NERA assumed that foreign purchasers would take title to LNG when it is loaded at a U.S. port, so that any profits that could be made by transporting and selling in importing countries accrue to foreign entities. In cases where exports are constrained to maximum permitted levels, this business model sacrifices additional value from LNG exports that could accrue to the United States.

Sources of income would shift. NERA states that at the same time that LNG exports create higher total income in the United States, exports would shift the composition of income so that both wage income and income from capital investment decline. NERA's measure of total income is GDP measured from the income side, that is, by adding up income from labor, capital, and natural resources and adjusting for taxes and transfers. According to NERA, expansion of LNG exports would have two major effects on income: it raises energy costs and, in the process, depresses both real wages and the return on capital in all other industries, but it also creates two additional sources of income. First, additional income would come in the form of higher export revenues and wealth transfers from incremental LNG exports at higher prices paid by overseas purchasers. Second, U.S. households also would benefit from higher natural gas resource income or rents. These benefits differentiate market-driven expansion of LNG exports from actions that only raise domestic prices without creating additional sources of income. According to NERA, the benefits that come from export expansion would more than outweigh the losses from reduced capital and wage income to U.S. consumers, and hence LNG exports would have

net economic benefits in spite of higher natural gas prices. According to NERA, this is the outcome that economic theory describes when barriers to trade are removed.

Some groups and industries will experience negative effects of LNG exports. NERA concluded that, through retirement savings, an increasingly large number of workers will share in the higher income received by natural resource companies participating in LNG export-related activities. Nevertheless, impacts will not be positive for all groups in the economy. According to NERA, households with income solely from wages or transfers, in particular, might not participate in these benefits. NERA stated that higher natural gas prices can also be expected to have negative effects on output and employment, particularly in sectors that make intensive use of natural gas, while other sectors not so affected could experience gains. There clearly would be greater activity and employment in natural gas production and transportation and in construction of liquefaction facilities. Overall, NERA projected that declines in output in other sectors would be accompanied by similar reductions in worker compensation in those sectors, indicating that there will be some shifting of labor between different industries. However, even in the year of peak impacts, the largest projected change in wage income by industry would be no more than one percent, and even if all of this decline were attributable to lower employment relative to the baseline, NERA concluded that no sector analyzed in its study would experience reductions in employment more rapid than normal turnover. In fact, NERA asserted that most of the changes in real worker compensation are likely to take the form of lower than expected real wage growth, due to the increase in natural gas prices relative to nominal wage growth.

Peak natural gas export levels (as specified by DOE/FE for the EIA Study) and resulting price increases are not likely. The export volumes selected by DOE/FE for the EIA Study define the maximum exports allowed in each scenario for the NERA macroeconomic

analysis. Based on its analysis of global natural gas supply and demand, NERA projected achievable levels of exports for each scenario. The NERA scenarios that found a lower level of exports than the limits specified by DOE/FE are shown in Table 5 of the NERA Study, as modified from trillion cubic feet per year (Tcf/yr) to Bcf/d in Table 3 below.

Table 3: NERA Export Volumes in Bcf/d, Adapted from Table 5 of the NERA Report

NERA Export Volumes (in Bcf/d)	2015	2020	2025	2030	2035
U.S. Reference Case with International Demand Shock and lower than Low/Slow export levels	***1.02***	2.69	3.92	3.27	***6.00***
U.S. Reference Case with International Demand Shock and lower than Low/Rapid export levels	2.80	2.69	3.92	3.27	3.76
U.S. Reference Case with International Supply/Demand Shock and lower than High/Slow export levels	***1.02***	6.00	10.77	***12.00***	***12.00***
U.S. Reference Case with International Supply/Demand Shock and lower than High/Rapid export levels	***3.02***	***8.00***	10.77	***12.00***	***12.00***
U.S. High Shale EUR with International Supply/Demand Shock at Low/Slowest export levels	***0.50***	2.69	3.92	3.27	3.76

The cells in bold italics indicate the years in which the model's limit on exports is binding. All scenarios hit the export limits in 2015 except the NERA export volume case with Low/Rapid exports. In no case does the wellhead price increase by more than $1.11/Mcf due to market-determined levels of exports. Even in cases in which no limits were placed on exports, competition between the United States and competing suppliers of LNG limits increases in both U.S. LNG exports and U.S. natural gas prices.

To match the characterization of U.S. supply and demand for natural gas in EIA's NEMS model, NERA calibrated its macroeconomic model so that for the same level of LNG exports assumed in the EIA Study, the NERA model reproduced the prices projected by EIA. Thus natural gas price responses were similar in scenarios where NERA export volumes were at the EIA export volumes. However, NERA determined that the high export limits were not economical in the U.S. Reference Case and that in these scenarios there would be lower exports than assumed by EIA. Because NERA estimated lower export volumes than were specified by DOE/FE for the EIA Study, U.S. natural gas prices do not reach the highest levels projected by EIA. NERA states that this implies no disagreement with the EIA Study. Instead, it reflects the fact that at the highest wellhead prices estimated by EIA, world demand for U.S. exports would fall far short of the levels of exports assumed in the EIA Study. Additionally, NERA found that U.S. wellhead prices would not become linked to oil prices in the sense of rising to oil price parity in any of the cases analyzed, even if the United States were exporting to regions where natural gas prices are presently linked to oil. NERA asserts that costs of liquefaction, transportation, and regasification would keep U.S. prices well below those in importing regions.

Serious competitive impacts are likely to be confined to narrow segments of U.S. industry. NERA gave special attention to the potential impact of LNG exports on EITE industries. NERA examined impacts on manufacturing industries where energy expenditures are greater than 5 percent of the value of the output created and the industries face serious exposure to foreign competition. Such industries, according to NERA, comprise about 10 percent of U.S. manufacturing and employment in these industries is one-half of one percent of total U.S. employment. NERA did not project that such energy-intensive industries as a whole would sustain a loss in employment or output greater than one percent in any year in any of the cases

examined and pointed out that such a drop in employment would be less than normal rates of turnover of employees in the relevant industries.

Even with unlimited exports, there would be net economic benefits to the United States. NERA estimated economic impacts associated with unlimited exports in cases in which even the High, Rapid limits were binding. In these cases, both LNG exports and prices were determined by global supply and demand. Even in these cases, NERA found that U.S. natural gas prices would not rise to oil parity or to levels observed in consuming regions, and net economic benefits to the U.S. increased over the corresponding cases with limited exports. To examine U.S. economic impacts under cases with even higher natural gas prices and levels of exports than in the unlimited export cases, NERA also estimated economic impacts associated with the highest levels of exports and U.S. natural gas prices in the EIA analysis, regardless of whether those quantities could actually be sold at the assumed netback prices. The price received for exports in these cases was calculated in the same way as in the cases based on NERA's GNGM model, by adding the tolling fee plus a 15 percent markup over Henry Hub to the Henry Hub price. Even with the highest prices estimated by EIA for these hypothetical cases, NERA found net economic benefits to the United States, with the net economic benefits growing as export volumes rise. Addressing this finding, NERA explained that LNG export revenues from sales to other countries at those high prices would more than offset the costs of freeing that gas for export.

VI. APPLICANT'S PUBLIC INTEREST ANALYSIS

Emera states that its requested authorization to export CNG to non-FTA countries is not inconsistent with the public interest, and therefore meets the statutory standard under NGA section 3(a). Citing DOE/FE precedent, Emera states that section 3(a) creates a rebuttable presumption that an application for CNG export authority is in the public interest, and that such

an application will be granted unless the presumption is overcome by opponents of the application. Emera notes that DOE/FE applies its 1984 Policy Guidelines (discussed *supra* § III) in considering natural gas export applications, including its stated intention to minimize federal control and involvement in energy markets. Emera states that, although the Policy Guidelines focus on imports of natural gas, DOE/FE has found that the same principles apply to exports.

To support its public interest analysis, Emera addresses the following four factors in greater detail: (i) economic impacts of the proposed exports, (ii) international impacts; (iii) supply impacts; and (iv) environmental impacts.

A. Economic Impacts

Emera refers to the 2012 LNG Export Study to support its view that the proposed exports will provide local, regional, and national economic benefits. Quoting DOE/FE precedent, Emera emphasizes the conclusion of the 2012 LNG Export Study—that "'the United States will experience net economic benefits from issuance of authorizations to export domestically produced LNG.'"[59] Emera asserts that, consistent with the 2012 LNG Export Study, its proposed exports of CNG will provide economic benefits to Palm Beach County and the broader U.S. national economy.

Yet, compared to the quantities of LNG exports studied in the 2012 LNG Export Study, Emera states that its proposed CNG export level is *de minimis*.[60] Emera argues that the quantity of natural gas it seeks to export is so minimal—approximately 0.036 percent of all domestic consumption based on 2012 data—as to have no practical impact on natural gas prices or security of domestic supply in the United States.[61]

[59] Emera App. at 9 (citation omitted).
[60] *Id.* at 10.
[61] *Id.*

Next, Emera states that the proposed exports will have an even more significant effect on the regional level. According to Emera, the construction and operation of the Facility will benefit the Palm Beach County economy in several ways: enhancing the value of existing pipeline infrastructure; adding to the local property tax base; creating construction jobs during development; and creating a number of long-term jobs during the initial operational phase (two jobs to maintain the Facility, five jobs associated with Facility and loading operations, and 10 jobs to crew the carrier operation).[62] Emera asserts that these economic benefits will continue for the life of the operation, bringing stable, long-term economic value to the State of Florida and specifically Palm Beach County.

B. International Impacts

Emera asserts that the proposed exports will foster good trade relations with and benefit development within the Bahamas, which it states is consistent with U.S. policy under the Caribbean Basin Initiative.[63] According to Emera, Caribbean countries, including the Bahamas, represent too small a market to be attractive to companies seeking to export LNG by tanker, but CNG is a feasible solution for this market due to the availability of U.S.-based natural gas supply, the simplified loading and unloading requirements of CNG, and the proven nature of CNG technology in the transportation sector.

C. Supply Impacts

Addressing the security of the domestic natural gas supply, Emera states that the quantity of LNG it proposes to export (0.025 Bcf/d, as requested in the Application) represents only 0.4

[62] *Id*.

[63] The Caribbean Basin Initiative is a collection of trade programs intended to facilitate the economic development and export diversification of the Caribbean Basin economies. *See* https://ustr.gov/issue-areas/trade-development/preference-programs/caribbean-basin-initiative-cbi.

percent of the quantity previously approved for export to non-FTA countries by DOE/FE.[64] Given this small volume, Emera contends that its proposed exports will not have a detectable impact on natural gas prices in the United States or on the security of domestic supply.

D. Environmental Impacts

Emera states that its proposed exports will enable electric generation facilities in the Bahamas and potentially elsewhere in the Caribbean to switch from using heavy fuel oil and diesel to natural gas. Emera asserts that, in addition to stabilizing electricity rates in the area, imports of CNG to Grand Bahama would have significant positive environmental benefits through the reduction of emissions at fuel oil and diesel burning electric generators. Emera states that the Bahamas and the Grand Bahama Power Company (GBPC), in particular, are currently importing 100 percent of their fuel, which consists of heavy fuel oil and diesel.[65] Emera anticipates that, in the case of GBPC, over 250,000 barrels of foreign-sourced heavy fuel oil per year currently used in electric generators would be displaced by domestic natural gas supplied pursuant to its Application.[66] Citing figures published by the U.S. Environmental Protection Agency (EPA), Emera contends that natural-gas fired generation produces one third less carbon dioxide per megawatt-hour, 99.2 percent less sulfur dioxide, and 58 percent less nitrogen oxides than fuel-oil fired generation.[67]

Regarding the potential environmental impacts of the Facility, Emera states that the Facility will be constructed on leased land located at the Port of Palm Beach that is characterized

[64] This percentage would be even smaller today, where we have issued 10 final LNG and CNG export authorizations to non-FTA countries (including this Order) totaling approximately 10.01 Bcf/d of natural gas, and where we are granting Emera's Application in a volume slightly lower than requested by Emera. *See infra* § X.E.
[65] Emera App. at 11.
[66] *Id*. at 12.
[67] *Id*. at 12 n.24 (citing http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html).

as a "'fully developed, highly urbanized area'" where "'no native areas remain.'"[68] Emera states that it will work with the Port of Palm Beach as it redevelops Slip 3—where it is expected that vessels to be loaded with CNG will berth—to comply with storm water management practices, lighting practices, and any other applicable regulations and guidelines.

VII. MOTIONS TO INTERVENE AND COMMENTS SUBMITTED IN RESPONSE TO THE NOTICE OF APPLICATION

A. Overview

DOE/FE received four letters in support of the Application that were included as Appendix E to the Application. In addition, the Notice of Application for Emera, published on July 3, 2014, invited interested persons to submit protest, motions to intervene, and comments by 4:30 p.m. Eastern time on September 2, 2014.[69] In response to the Notice of Application, DOE/FE received one timely-filed motion for leave to intervene and protest in this proceeding submitted by APGA.[70] DOE/FE also received two comments in support of Emera's Application from Florida State Senator Joseph Abruzzo and Manuel Almira. These filings are summarized below.

B. Non-Intervenor Comments in Support of the Application

The four letters contained in Appendix E to the Application were submitted, respectively, by Sarah MacDonald, President, Emera Caribbean, Ltd; J. Gregory Ebelhar III, Chief Operating Officer, Polymers International, Ltd; Randy S. Thompson, Chief Executive Officer, PharmaChem Technologies; and Kevin Webber, Vice President, Business Development & Operations, Florida Public Utilities. The first three letters point to anticipated regional economic

[68] *Id.* at 13 (quoting Port of Palm Beach Board of Commissioners, *Port of Palm Beach Master Plan Update 2012 – 2022, Master Plan Update as Approved by the Port of Palm Beach Board of Commissioners Thursday, August 23, 2012*, http://www.portofpalmbeach.com/business-opportunities/master-plan/).
[69] Emera Notice of Application, *supra* n.9 (79 Fed. Reg. at 38,017-38,018).
[70] American Public Gas Ass'n, Mot. for Leave to Intervene and Protest of the American Public Gas Assoc., FE Docket No. 13-157-CNG (Sept. 2, 2014) [hereinafter APGA Mot.].

benefits to the Bahamian economy that would be created by a grant of the Application. The fourth letter submitted in Appendix E represents the views of Florida Public Utilities, a potential supplier of natural gas to Emera, and describes the likelihood that construction and operation of the planned Facility will create jobs and other economic benefits in the State of Florida.

Two additional comments in support of the Application were filed in response to the Notice of Application. First, Senator Abruzzo filed a comment supporting the Application on July 17, 2014.[71] In his comment, Senator Abruzzo encourages DOE/FE to approve the Application by Emera, noting that DOE/FE has already approved applications for exports of much higher volumes of natural gas. Senator Abruzzo states that the project "will create major benefits in both Florida and on the island of Grand Bahama," providing jobs, long-term economic benefits, and a reliable customer for the Port of Palm Beach. [72] He notes that CNG exports to Grand Bahama will enable use of CNG in place of more carbon-intensive fossil fuels for the generation of electricity by the GBPC, reducing greenhouse gas emissions and providing more stable fuel costs for the Bahamas. Senator Abruzzo also states that CNG exports will "help improve America's balance of payments and enable positive economic activity and environmental transformation in a nation whose stability is important to the United States' foreign policy interests."[73]

Second, on August 26, 2014, Manuel Almira, the Executive Director of the Port of Palm Beach, filed a comment supporting the Application.[74] Mr. Almira asserts that Emera's exports will provide major benefits in both Florida and the Bahamas and will enable positive economic activity and environmental transformation in the Bahamas through substitution of clean burning

[71] Comment of Senator Joseph Abruzzo on Application of Emera CNG, LLC, FE Docket No. 13-157-CNG (July 17, 2014).
[72] *Id.* at 1.
[73] *Id.* at 2.
[74] Comment of Manuel Almira on Application of Emera CNG, LLC, FE Docket No. 13-157-CNG (Aug. 26, 2014).

natural gas for heavy fuel oil in electricity generation. Mr. Almira also states that CNG is a feasible solution for such a small market due to the availability of U.S.-based natural gas, the simplified loading and unloading requirements of CNG, and the proven nature of CNG technology in the transportation sector.

C. APGA's Motion for Leave to Intervene and Protest

On September 2, 2014, APGA timely filed a motion for leave to intervene in this proceeding. APGA asserts that it is the national, non-profit association of publicly-owned natural gas distribution systems, with approximately 700 members in 36 states. APGA states that its membership covers 950 not-for-profit retail distribution entities that are owned by, and accountable to, the citizens they serve, including municipal gas distribution systems, public utility districts, county districts, and other public agencies that have natural gas distribution facilities.

Motion to Intervene. According to APGA, its members are active participants in the domestic market for natural gas where they secure supplies of natural gas to serve their end users. As such, APGA asserts that it has a direct and substantial interest in this proceeding that cannot be adequately represented by any other party.

Protest of Application. APGA claims that Emera's request for authority to export domestic CNG to non-FTA countries is inconsistent with the public interest and should be denied. APGA asserts that the proposed exports will increase domestic natural gas and electricity prices to the detriment of all consumers, inhibit the United States' ability to forge a path toward energy independence, and undermine sustained economic growth in key manufacturing sectors. APGA states that ultimately, natural gas exports by Emera and others will cause domestic and international natural gas prices to reach a new equilibrium, "squandering

the current opportunity to take full advantage of lower domestic natural gas prices to boost the U.S. economy."[75]

APGA states that previously issued studies, as well as new EIA information, evidence the fact that exporting natural gas will affect the domestic economy in ways that are not in the public interest. According to APGA, both the 2012 EIA and NERA Studies conclude that the higher the volume of LNG exports, the more domestic natural gas prices will rise. APGA states that DOE/FE should also consider the fact that these studies underestimate potential price increases because they are based on outdated projections of domestic demand and questionable assumptions that the demand for natural gas is sufficiently elastic to prevent significant price spikes.[76] However, APGA states that even new AEO 2014 data may underestimate growth in natural gas use for manufacturing if domestic prices remain low.

APGA argues that increases in the price of natural gas will: (i) adversely impact households, (ii) suppress domestic industries, (iii) threaten the transition away from coal, and (iv) keep the United States dependent on foreign oil. APGA states that the higher prices will increase costs to households that rely on natural gas for heating and cooking. Further, APGA states that NERA projected that these higher costs would be offset by increases in the value of natural gas resources and related companies, but which APGA argues will not be the case for those customers without investments or retirement savings.

Request for Suspension of Emera's Application. In addition to its Protest, APGA urges DOE/FE to suspend Emera's Application, and any other pending natural gas export approvals to non-FTA countries, until an updated EIA study is completed.[77] According to APGA, the 2012 EIA and NERA studies are deeply flawed. APGA contends that the data and

[75] *Id*. at 7.
[76] *See id.* at 8.
[77] APGA Mot. at 5.

assumptions upon which natural gas applications have been approved are stale given the pace of recent developments in natural gas markets. According to APGA, AEO 2011, on which both the EIA and NERA studies relied for projected natural gas demand, fails to account for current EIA expectations regarding future demand and tends to overestimate demand elasticity. APGA states that this same trend also means that the increase in the price of electricity caused by LNG exports that are projected by the EIA and NERA are understated.

In addition, APGA claims that DOE/FE has tacitly conceded this point by requesting an updated study from the EIA based on AEO 2014 data and modeling export levels more representative of the volume of LNG export applications filed with DOE/FE.[78] According to APGA, DOE/FE's request shows that the existing studies do not provide a reliable record for DOE/FE to determine whether a natural gas export application is in the public interest.

D. Answer of Emera

Emera filed an answer to APGA's motion for leave to intervene and protest on September 17, 2014 (Answer).[79] Emera does not oppose APGA's motion to intervene, but does oppose APGA's Protest of Emera's Application and Request to Suspend review of Emera's Application. Emera contends that the merits of APGA's arguments fail to rebut the presumption that Emera's proposed exports are in the public interested under NGA section 3(a). Emera claims that APGA has merely alleged a variety of generalized arguments, many of which DOE/FE has previously considered and rejected, and on which APGA relies without any significant arguments against Emera's Application in particular.

Specifically, Emera notes that its proposed exports are *de minimis* compared to the scale of other natural gas exports approved by DOE/FE and are primarily for Emera's own use

[78] *See id.* at 4, 25.
[79] Emera CNG, LLC, Answer to the Protest of the American Public Gas Association, FE Docket No. 13-157-CNG (Sept. 17, 2014) [hereinafter Emera Answer].

(through affiliate GBPC).[80] Because the proposed exports are minimal, Emera contends, the resulting effects claimed by APGA (*i.e.*., increased natural gas prices) could not result from such exports. Moreover, Emera states that CNG produced by the Facility will not be available for trading on the world market outside of the Caribbean region, and therefore, cannot contribute to a convergence of domestic and foreign natural gas prices. Thus, Emera argues that APGA's protest is irrelevant to Emera's proposed exports.

Emera also argues that APGA's reference to newer AEO 2014 data does not suffice to rebut the presumption in favor of natural gas exports and does not undermine DOE/FE conclusions. According to Emera, APGA neglects to cite EIA's prediction that natural gas production levels will more than offset increased U.S. consumption.[81] Emera notes that a tremendous number of factors influence U.S. natural gas production, demand, pricing, and exports, and states that to single out one piece of data from AEO 2014, as APGA has done, is misleading.

Additionally, Emera urges DOE/FE to deny APGA's Request to Suspend Emera's Application and other pending natural gas export approvals to non-FTA countries until the updated EIA study is complete. Emera asserts that DOE/FE's request for updated export scenarios does not necessitate a moratorium on export authorizations. Rather, Emera states that a "pause" in DOE/FE's export approvals is unnecessary because no party has provided sufficient evidence to undermine the conclusion of the 2012 LNG Export Study that natural gas exports provide benefits to the United States at all levels of export.[82]

Even if DOE/FE were to pause processing export applications while EIA prepares the updated study, Emera requests that DOE/FE not delay Emera's Application due to the *de*

[80] *See* Emera Answer at 4-5.
[81] *Id*. at 7-8.
[82] *See id.* at 9.

minimis quantities of natural gas proposed for export, which Emera states will have no noticeable effect on the U.S. natural gas industry.[83]

VIII. COMMENTS ON THE 2012 LNG EXPORT STUDY AND DOE/FE ANALYSIS

In the NOA, DOE/FE sought public comment on the EIA and NERA Studies, including the modeling scenarios used in both. 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."[84] DOE noted that, "[w]hile this invitation to comment covers a broad range of issues, the Department may disregard comments that are not germane to the present inquiry."[85]

As explained above, DOE/FE spent several months reviewing the more than 188,000 initial and 2,700 reply comments received in response to the NOA. Given the volume of comments, it is neither practical nor desirable for DOE/FE to summarize each of them. Therefore, DOE/FE identifies below both: (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.[86]

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[83] *Id.*
[84] 77 Fed. Reg. at 73,629.
[85] *Id.*
[86] *See, e.g., Public Citizen v. F.A.A.*, 988 F.2d 186, 197 (D.C. Cir. 1993).

A. Data Inputs and Estimates of Natural Gas Demand

1. Comments

Several commenters, including Sierra Club,[87] Dow Chemical Company (Dow), along with U.S. Representative Edward Markey, U.S. Senator Ron Wyden, Alcoa, Save Our Supplies, IECA, and Jannette Barth, challenge the data used as inputs to the 2012 LNG Export Study. Most of these commenters assert that NERA should have used projections from AEO 2012 or AEO 2013, rather than from AEO 2011, to produce a more accurate picture of the current and likely future state of the natural gas market and the likely macroeconomic impacts of LNG exports. These commenters assert that the AEO 2011 projections significantly underestimate actual and future demand for natural gas, especially in the U.S. electric, manufacturing, and transportation sectors, and in international markets. Some commenters identify additional factors, other than the vintage of the AEO 2011 data, to support their arguments that NERA underestimated present and future demand for natural gas. For example, Save Our Supplies argues that NERA underestimated international demand because the GNGM model did not appear to account for the continued growth of international LNG import infrastructure. Together, these commenters assert that the NERA Study underestimated future demand for natural gas and, consequently, underestimated the likely increases to natural gas prices from LNG exports.

A number of commenters, including Sierra Club, Dow, Senator Wyden, Representative Markey, Jannette Barth, and Save Our Supplies maintain that, as compared to AEO 2011, the AEO 2013 Early Release Overview projects a substantial increase in demand for natural gas in

[87] For purposes of this discussion, Sierra Club filed comments on the 2012 LNG Export Study 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 [hereinafter Sierra Club].

the industrial manufacturing sector.[88] Dow claims that there has been a manufacturing renaissance since completion of AEO 2011 involving announcements of approximately 100 capital investments representing some $95 billion in new spending and millions of jobs driven largely by the supply and price outlook for natural gas. These investments, according to Dow, will add about 5 million new jobs and 6 Bcf/d of industrial gas demand by 2020, which Dow states is nearly a 30 percent increase in industrial demand relative to 2009, the baseline year for AEO 2011.

Dow also asserts that projections of future natural gas demand by industry are more than double the demand predicted in AEO 2011's High EUR case, which includes significantly higher demand than the Reference Case. In addition to significantly higher projections of demand for manufacturing, Dow refers to projections from Wood Mackenzie, CERA, and others that indicate a potential increase of transportation demand from 0.2 to 1.5 Bcf/d from 2013 to 2020. This compares to AEO 2011's projection of a modest increase for natural gas demand in the transportation sector of 0.1 to 0.2 Bcf/d of natural gas. Dow states that the higher level of demand derived from Wood Mackenzie and CERA is the result of a projection of fleet vehicles converting to LNG and compressed natural gas.

According to Dow, AEO 2011 projects that natural gas demand for power generation will decrease through the end of the decade, whereas Wood Mackenzie and CERA predict that natural gas use in the power sector will increase 14 percent by 2020, ultimately resulting in 24.7 Bcf/d of power sector demand. This projected increase is due to unidentified, anticipated

[88] During the time of the comment period on the 2012 LNG Export Study, the AEO 2013 Early Release was the most current AEO available, and is therefore discussed in many of the comments. On May 2, 2013, after the comment period had closed, EIA issued its final AEO 2013 projections. *See* U.S. Energy Information Administration, *Annual Energy Outlook 2013 with Projections to 2040* (April 2013), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf [hereinafter AEO 2013]. This Order references both the final projections from AEO 2013 and more recent EIA projections, as noted.

changes in carbon policy, renewables policy, and nuclear policy favoring the use of natural gas in the power sector.

In addition to criticizing the projections of demand based on AEO 2011, Dow maintains that the level of exports authorized to date and additional exports that may be authorized in the future will drive up demand levels even higher. Specifically, Dow asserts that NERA's conclusion that prices will not increase by more than $1.11/Mcf is based on a faulty assumption that natural gas exports will never rise above 6.72 Tcf/yr, or roughly 18.5 Bcf/d by 2025. Dow points out that authorized exports to FTA nations as of January 1, 2013, had already reached approximately 28 Bcf/d. Dow complains that NERA did not consider what would happen if exports attained the authorized levels. In that event, Dow asserts that domestic gas prices undoubtedly would spike. Other commenters, such as Citizens Against LNG, make similar arguments. Citizens Against LNG alleges that the NERA Study is flawed because it failed to estimate the alleged impact of the full potential volume of exports (at that time) of approximately 31.41 Bcf/d to FTA nations and 24.80 Bcf/d to non-FTA nations.

Contrary to the above arguments, several commenters, such as Dominion Cove Point LNG, LP, Lakes Charles Exports, and Gulf LNG Liquefaction Company, LLC (Gulf LNG), argue that NERA reasonably relied on data from AEO 2011. These commenters state that NERA used the AEO 2011 data because the EIA portion of the 2012 LNG Export Study used that data, and DOE/FE sought to ensure consistency across both parts of the 2012 LNG Export Study. Further, a number of commenters, including API, America's Natural Gas Alliance, Exxon Mobil Corporation (ExxonMobil), Golden Pass Products LLC, former Secretary of Energy Spencer Abraham, Carl Foster, and the Western Energy Alliance, argue that NERA's use of the AEO 2011 data does not undermine the results of the 2012 LNG Export Study. These

commenters contend that the AEO 2013 Early Release data show higher production of natural gas and a more elastic supply of natural gas than the AEO 2011 data used by NERA, indicating that the domestic resource base could more easily accommodate increasing domestic demand as well as demand from new LNG export projects.

With respect to Dow's claim that there is $95 billion of new investment in domestic manufacturing, Lake Charles Exports, LLC and Secretary Abraham argue that many of the projects listed by Dow are currently under consideration and not projected to commence operation until far into the future. These commenters assert that Dow provided no information as to when or whether these projects will materialize. The commenters conclude that there is no reasonable basis to believe that these domestic manufacturing investments will lead to an additional 6 Bcf/d in domestic natural gas demand as claimed by Dow.

2. DOE/FE Analysis

a. Use of AEO 2011 Projections

DOE's basis for relying on AEO 2011. The 2012 LNG Export Study was based on AEO 2011 projections, which were the most recent, final projections available in August 2011 when DOE commissioned the EIA Study, and also in October 2011 when DOE commissioned the NERA Study. As explained above, the NERA Study was designed so that NERA would use the results from the EIA Study as inputs to the NERA model to ensure congruence between the two studies, which together formed the single 2012 LNG Export Study. If both studies had not relied on the same data, meaningful comparison and cross-analysis of the two studies would have been impossible.

Although some commenters have asserted that DOE should have required EIA and NERA to use newer projections than those in AEO 2011, this argument does not acknowledge

either the timing of the AEO publication cycles, or the lead time required of EIA and NERA to conduct their work. Using the final AEO 2011 projections, EIA published its study on January 19, 2012. Only four days later, on January 23, 2012, EIA published the 2012 AEO "Early Release Overview," which was a preliminary, abridged version of EIA's forthcoming AEO 2012. It would not have been possible for EIA to use the 2012 Early Release projections in its study without starting over once that data had been published.

Indeed, EIA did not publish the final AEO 2012 until June 2012, six months after EIA had published its study for this proceeding. By that time, the NERA Study was well underway. NERA published its final report in December 2012—the same month that EIA released the AEO 2013 Early Release Overview. As stated above, EIA did not publish the final AEO 2013 projections until May 2, 2013.

In an undertaking of this scope and magnitude, it was perfectly reasonable to base the 2012 LNG Export Study on AEO 2011, which contained the best, most authoritative economic projections available when DOE/FE commissioned the EIA and NERA Studies. Once both studies were underway, a decision to use AEO 2012 or AEO 2013 Early Release projections would have required EIA and NERA to abandon their existing work and redo much, if not all, of their analyses.

Courts have repeatedly recognized that agencies are not required to redo a study simply because newer data become available, "particularly given the many months required to conduct full [analysis] with … new data."[89] Requiring DOE to start over with new data "would lead to significant costs and potentially endless delays."[90] Moreover, under the commenters' rationale,

[89] *Theodore Roosevelt Conserv. P'ship v. Salazar*, 616 F.3d 497, 511 (D.C. Cir. 2010) (quotations and citations omitted) (alteration in original).
[90] *Sierra Club v. U.S. Envtl. Prot. Agency*, 356 F.3d 296, 308 (D.C. Cir. 2004) (upholding EPA's decision to use an existing computer model in lieu of a newly-released version).

DOE's 2012 LNG Export Study and administrative process would run indefinitely, as DOE would have to start over with new AEO projections whenever they became available. As the Supreme Court has observed, if an agency were required to rehear new evidence before it issues a final administrative decision, "there would be little hope that the administrative process could ever be consummated in an order that would not be subject to reopening."[91]

No material change using post-AEO 2011 projections. Further, we are not persuaded that using post-AEO 2011 EIA projections would have materially affected the findings of the 2012 LNG Export Study. Commenters point to the fact that AEO 2012 and the AEO 2013 Early Release Overview forecast greater domestic natural gas consumption in the years ahead than did AEO 2011. The commenters are correct in this observation, but it is also true that AEO 2012 and the AEO 2013 Early Release Overview projected much greater domestic natural gas production than did AEO 2011. For example, in the 2012 LNG Export Study proceeding, Jordan Cove submitted an analysis from Navigant correctly noting the increasing gas production projections in the later EIA analyses: For the period of 2013-2035, there was an average percentage increase in forecast total domestic natural gas consumption between AEO 2011 and AEO 2013 of 5.6 percent, while the increase in forecast total natural gas production was 16 percent. This important context helps explain why the AEO 2013 assumptions actually indicate the beneficial market impacts that come from LNG exports.[92]

Using the later-published final AEO 2013 Reference Case (see Table 4 below) illustrates that, although total natural gas consumption projected for 2035 was projected to increase by 6 Bcf/d between AEO 2011 and 2013 (from 72.7 Bcf/d to 78.7 Bcf/d), total domestic dry gas production was projected to increase by more than twice that amount, increasing by 13.8 Bcf/d

[91] *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 554-55 (1978).
[92] Comments of Navigant Consulting, Inc., at 6 (attached to Initial Comments of Jordan Cove Energy Project, L.P.).

(from 72.1 Bcf/d to 85.9 Bcf/d). In addition, the projected 2035 Henry Hub price declined from $7.07 per million British thermal units (MMBtu) to $6.32/MMBtu, despite net exports (including both pipeline and LNG exports) rising from -0.5 Bcf/d in AEO 2011 to +7.0 Bcf/d in AEO 2013. Although the data used in Table 4 for "AEO 2013 Reference Case" refer to the final AEO 2013 projections, the data are unchanged from EIA's projections in the AEO 2013 Early Release Overview. As the table shows, the final AEO 2013 Reference Case projects domestic supply and demand conditions that are more, not less, favorable to exports.

Likewise, on April 14, 2015, EIA issued its most recent update, the Annual Energy Outlook 2015 (AEO 2015), with projections to 2040.[93] As depicted in Table 4, projections from that report reflect net LNG exports from the United States in a volume equivalent to 9.0 Bcf/d of natural gas in 2035.[94] This estimate compares with projected net LNG imports of 0.4 Bcf/d in the lower-48 states for 2035 in the AEO 2011 Reference Case. The 2035 Henry Hub price in the AEO 2015 Reference Case is $6.50/MMBtu, down from $7.31/MMBtu in the AEO 2011 Reference Case (both in 2012 dollars).

Table 4 also compares the AEO 2015 Reference Case to the AEO 2013 Reference Case, indicating that:

- Total natural gas consumption for 2035 is projected to increase by 0.3 Bcf/d, from 78.7 Bcf/d to 79.0 Bcf/d;
- Net exports (including both pipeline and LNG exports) are projected to increase by 7.2 Bcf/d, from 7.0 Bcf/d to 14.2 Bcf/d; and
- The projected 2035 Henry Hub price is projected to increase by $0.17/MMBtu, from $6.43/MMBtu to $6.50/MMBtu (in 2012 dollars).

Indeed, in comparing the AEO 2015 Reference Case and AEO 2013 Reference Case projections,

[93] U.S. Energy Information Administration, *Annual Energy Outlook 2015* (April 14, 2015), *available at* http://www.eia.gov/forecasts/aeo/ [hereinafter AEO 2015].
[94] *See* AEO 2015 at A-27, Table A13.

total domestic dry gas production is projected to rise by 7.6 Bcf/d of natural gas, from 85.9 Bcf/d to 93.5 Bcf/d. For these and other reasons, these post-AEO 2011 projections in no way undermine our conclusion regarding the consistency of the proposed exports with the public interest.

Table 4: Comparison of AEO Cases

Projections for 2035	**AEO 2011 Reference Case**	**AEO 2012 Reference Case**	**AEO 2013 Reference Case**	**AEO 2015 Reference Case**	**AEO 2011 High Shale EUR Case**
Total Natural Gas Consumption (Bcf/d)	72.7	73.0	78.7	79.0	81.2
Electric Power Sector Consumption (Bcf/d)	21.6	24.5	25.9	25.1	26.4
Transportation Sector Consumption (Bcf/d)	0.4	0.4	1.6	0.8	0.7
Domestic Dry Gas Production (Bcf/d)	72.1	76.5	85.9	93.5	82.5
Net Natural Gas Exports by Pipeline (Bcf/d)	-0.1	1.9	3.0	5.2	1.9
Net Natural Gas Exports as LNG (Bcf/d)	-0.4	1.8	4.0	9.0	-0.4
Henry Hub Price, $/MMBtu (Reference Basis)	$7.07 (2009$)	$7.37 (2010$)	$6.32 (2011$)	$6.60 (2013$)	$5.35 (2009$)
Henry Hub Price (2012$ Basis)	$7.31/MMBtu	$7.62/MMBtu	$6.43/MMBtu	$6.50/MMBtu	$5.53/MMBtu

We again note that NERA also modeled a wide range of possible future supply and demand conditions, thereby reducing the dependence of its results on the accuracy of the AEO 2011 Reference Case. The AEO 2011 High Shale EUR case, for example, is represented in Table 4 above showing EIA's AEO 2011 assumption of no new LNG exports. The AEO 2011 High Shale EUR case projected natural gas consumption growth that was even greater than the AEO 2013 Reference Case and domestic natural gas production growth that was less than the

AEO 2013 Reference Case. Using the AEO 2011 High Shale EUR as a baseline, NERA modeled LNG exports across a range of international market conditions and found positive economic benefits to the U.S. economy in all cases where LNG exports were economically viable.[95] The inclusion of the AEO 2011 High Shale EUR case in NERA's analysis reinforces our conclusion that there is no reason to believe that using AEO 2013 Reference Case projections (or the more recent AEO 2015 projections) would have altered the central conclusion of the 2012 LNG Export Study.

Further, as reflected in the comments submitted by Lake Charles Exports[96] and Secretary Abraham,[97] Dow does not substantiate its claim that $95 billion of new investment in the manufacturing sector has led (or will lead) to an increase of 6 Bcf/d in incremental domestic consumption of natural gas by 2020. In making these estimates, Dow includes many projects that merely have been announced or that are under consideration with start dates far into the future. Dow provides no information as to when or whether these projects will be constructed or will begin operations.

b. Significance of Prior FTA Authorizations

Dow argues that the 28 Bcf/d of exports authorized to FTA countries (as of the date of Dow's comment) shows that the 2012 LNG Export Study underestimated future demand for natural gas.[98] However, the volume of authorized exports to FTA countries is by no means a reliable predictor of the number and capacity of LNG export facilities that will ultimately be

[95] NERA Study at 6.
[96] Reply Comments of Lake Charles Exports, LLC at 12-13.
[97] Reply Comments of Secretary Spencer Abraham at 8.
[98] As of the date of this Order, DOE has granted 48 long-term authorizations to export LNG totaling 46.3 Bcf/d of natural gas produced in the lower-48 states to FTA countries.

financed, constructed, and placed in operation.[99] We therefore are not persuaded that the current FTA authorizations undermine the assumptions of the 2012 LNG Export Study.

We note also that applicants typically request both FTA and non-FTA export authorizations for the entire output capacity of their proposed export facilities. Thus, as we explained above, the FTA and non-FTA authorizations are not additive. Citizens Against LNG contends that the NERA Study failed to consider the full potential volume of exports of 31.41 Bcf/d to FTA nations and 24.80 Bcf/d to non-FTA nations, but this argument is incorrect insofar as Citizens Against LNG is claiming that FTA and non-FTA authorization volumes must be added to calculate demand caused by LNG exports. Nevertheless, it bears mention that NERA did remove export constraints in its model for several of the cases evaluated. NERA found that, at the price required in the United States to free up 55 Bcf/d for export, there would be zero global demand for U.S. exports under any combination of domestic and international supply and demand conditions evaluated. Thus, the 55 Bcf/d case was found to be infeasible and was not included in the macroeconomic analysis.

[99] As America's Natural Gas Alliance explains, when domestic gas supply was forecast to be insufficient to meet domestic demand, many LNG import facilities were proposed, but few were constructed. Specifically, from 2000 through 2010, over 40 applications to build new LNG import facilities were submitted to federal agencies, but only eight new facilities were built. The increase in domestic natural gas production had reduced the need for imported LNG. Further, of those import facilities constructed, public records show their use has declined. In 2004, the United States imported 244 cargoes of LNG at the four terminals existing at that time. By comparison, in 2013, only 36 cargoes were imported at five of the 12 then-existing terminals (note that the U.S. Department of Transportation's Maritime Administration terminated the license for Gulf Gateway Energy Bridge on June 28, 2013). Seven of the 12 existing terminals did not receive any cargoes in 2013. *See* http://www.marad.dot.gov/ports_landing_page/deepwater_port_licensing/deepwater_port_licensing.htm; http://www.ferc.gov/industries/gas/indus-act/lng.asp; *Natural Gas Imports and Exports Fourth Quarter Report 2004*, DOE/FE-0485, Office of Natural Gas Regulatory Activities, Office of Fossil Energy, U.S. Department of Energy; *Natural Gas Imports and Exports Fourth Quarter Report 2013*, DOE/FE-0563, Office of Natural Gas Regulatory Activities, Office of Fossil Energy, U.S. Department of Energy;http://energy.gov/fe/listings/lng-reports.

B. Distributional Impacts

1. GDP Versus Welfare

a. Comments

Several commenters, including Sierra Club, allege that the NERA Study overstated the likely macroeconomic benefits from LNG exports. The National Resources Defense Council (NRDC), Sierra Club, and Clean Ocean Action, among others, maintain that NERA incorrectly conflated growth in GDP with growth in welfare. By concluding that LNG exports would create a net benefit to the economy, NERA also allegedly relied too much on the fact that exports would increase GDP and failed to give adequate weight to projected natural gas price increases and to deleterious socio-economic, sectoral, and regional impacts on consumers, households, and the middle class, including wage-earners.

A number of other commenters, including API, Paul Eikelboom, Gary Lambert, and Helen Rice, assert that LNG exports will create jobs and boost the economy. For example, API states that a report by ICF International shows that LNG exports will result in a net gain in employment in the United States and that the job impacts of LNG exports will grow larger as export volumes rise.

b. DOE/FE Analysis

The NERA Study presented the macroeconomic impacts of LNG exports using the different statistical measures noted above—price, welfare, GDP, aggregate consumption, aggregate investment, natural gas export revenues, sectoral output, and wages and other household incomes. NERA did not confuse the concepts of welfare growth and GDP growth. The study clearly shows that NERA distinguished these concepts and separately examined the

macroeconomic impacts of LNG exports using both measures.[100] Welfare is a term of art in economics that measures the well-being of consumers and reflects changes in the value placed on consumption and leisure by individuals. NERA calculated welfare in the study as the "equivalent variation," which measures the amount of money that, if taken away from the average household, would make the household no better off with LNG exports than without.[101] GDP, as NERA explained, is "another economic metric that is often used to evaluate the effectiveness of a policy by measuring the level of total economic activity in the economy."[102] NERA thus acknowledged the distinction between GDP and welfare, yet used both metrics, among others, to ensure that its conclusions were robust across various measures.

2. Sectoral Impacts

a. Comments

Numerous commenters debate whether LNG exports will impact the domestic EITE sectors disproportionately, at too high of a cost to the U.S. economy to justify exporting LNG. Specifically, Dow, the Fertilizer Institute, Alcoa, and other commenters assert that higher natural gas prices caused by the demand for LNG exports will make it difficult for U.S. manufacturing to compete in global markets, reversing the gains these industries have made in recent years due to low domestic gas prices. According to these commenters, LNG exports will lead to lost jobs and lower wages in the EITE sectors—such as the chemical, fertilizer, and primary metal manufacturing sectors. These commenters, together with the Aluminum Association, the American Iron and Steel Institute, and others, contend that EITE jobs tend to be high-paying, highly-skilled, and of strategic national importance, whereas they allege that jobs created due to LNG exports will be short-lived and potentially of lower value to the U.S. economy. In this

[100] NERA Study at 6.
[101] *Id*.
[102] *Id.* at 56.

regard, Alcoa, Representative Markey, and IECA, among others, charge that NERA failed to analyze the unique tradeoffs between the domestic natural gas industry—which obviously stands to benefit from LNG exports—and EITE industries, which they argue will feel the brunt of higher gas prices and price volatility brought on by LNG exports.

In addition, Dow argues that the NERA model should have addressed industry-specific impacts. Dow submits that NERA erred by positing that the impact of expanded natural gas exports will affect the chemical, paper, and plastic industries in the same ways. It contends that the single bundled sector represented in the NERA model as the energy intensive sector is actually comprised of five sectors, and that NERA mistakenly assumed that average behavior from the EITE sector is representative of each of the five sectors:

> By bundling these industries, NERA applies the same labor, capital, fuel, and other material inputs in the same way across industries. Such an aggregation mutes the true impact to the industries, especially the chemical products industry. The chemical products subsector varies significantly from the other four industries in terms of value added to the economy (GDP) and energy consumption by fuel source ….[103]

According to Dow, the chemical industry is composed of dozens of different business models with different inputs and outputs. Consequently, Dow contends that "[s]hoe horning the chemical industry into an aggregated [energy intensive sector] is not appropriate for studying the impact of LNG exports on the economy."[104]

More broadly, Dow maintains that NERA gave significant weight to a narrow economic benefit from LNG exports, but did not consider the greater economic value (the "value-added multiplier effect") when natural gas is used in the United States to manufacture finished goods for export, instead of being exported as LNG. Similarly, the Fertilizer Institute offers a study prepared at its request by Charles Rivers Associates to support its claim that NERA

[103] Initial Comments of Dow Chem. Co. at 27.
[104] *Id*. at 28.

underestimated the economic value of the fertilizer industry to the broader economy. Dow also contends that "take-or-pay" contracts used in the international trade of LNG will cause export activities to continue even if not economically warranted, thereby prolonging higher domestic gas prices.[105]

Senator Wyden, Representative Markey, Dow, and others contend that NERA misinterpreted a government-prepared 2009 Interagency Report that evaluated the effects of proposed greenhouse gas cap-and-trade legislation on EITE industries. According to these commenters, the findings in the Interagency Report led Congress to conclude that it was unacceptable to raise energy prices on EITE manufacturers because of the adverse employment implications across the economy. These commenters charge that the NERA Study, while borrowing heavily from the Waxman-Markey congressional debate, did not address the predictions of adverse employment impacts. Dow cites statistics from the Bureau of Economic Analysis indicating that, in 2011, total employment in the oil and gas industry was 171,000 while the chemical industry employed 785,000, the plastic and rubber industry employed 635,000, and the paper industry employed 388,000.[106] In addition, the Fertilizer Institute claims that the NERA Study should have assumed that the fertilizer industry directly supported 7,565 jobs while the NERA Study states that there were 3,920 jobs directly supported by the fertilizer industry.

On the other hand, a number of commenters, including API, ExxonMobil, the Energy Policy Research Foundation, Inc., and General Electric Oil & Gas dispute these arguments. They specifically challenge the notion that an LNG export industry cannot co-exist with a growing domestic manufacturing base, and that EITE industries should be given priority, whether directly or indirectly, over the LNG industry.

[105] *Id*. at 16-17.
[106] *Id*. at 28 (Dow table citing figures from the U.S. Bureau of Economic Analysis, *Gross Domestic Product by Industry Data*).

ExxonMobil supports NERA's conclusion that exports will yield net economic benefits to the United States, and states that, in fact, NERA understated those benefits because (among other reasons) NERA did not factor in the greater supply of natural gas liquids (NGLs) that will be produced in conjunction with increased natural gas production due to exports. The Institute for 21st Century Energy (an affiliate of the U.S. Chamber of Commerce) and API, among others, note that additional production of NGLs will benefit chemical companies with U.S. plants because NGLs, such as ethane, are critical feedstock in chemical manufacturing processes. These commenters state that an increase in the supply of NGLs will exert downward price pressure on the cost of manufactured goods that use NGLs as a feedstock, thereby at least in part offsetting for those industries (primarily EITE industries) any increases in domestic natural gas prices associated with LNG exports.

ExxonMobil, API, Shell Oil Company, and many other commenters emphasize the size and productivity of the U.S. natural gas resource base, stating that there is an abundance of natural gas to support both LNG export demand and continued growth in the EITE industries. According to ExxonMobil, Western Energy Alliance, Energy Policy Research Foundation, Inc., and others, the vast supply of natural gas in the United States will continue to support current gains in domestic manufacturing, even as LNG exports take place. They state that LNG exports will both sustain and increase domestic production of natural gas, which, in turn, will provide EITE industries with a greater supply of natural gas at more stable prices, allowing them to stay globally competitive. According to these commenters, opponents of LNG exports are incorrect in speculating that natural gas used for export otherwise would be used for domestic manufacturing when, in fact, the natural gas likely would not be extracted if there is not increased demand created by LNG exports.

Further, 110 members of the U.S. Congress,[107] ExxonMobil, and others maintain that there would be serious consequences to hindering the export of LNG. If exports are prohibited or constrained, they believe the United States will lose economic benefits that other countries will capture as those countries begin extracting their shale gas resources and competing in the global LNG export market. Numerous commenters, including ExxonMobil, the National Association of Manufacturers, and the Energy Policy Research Foundation, Inc., similarly assert that it would not be in the public interest for DOE to limit LNG exports, in contravention of U.S. free trade principles. As noted above, these commenters state that restricting exports of natural gas would subsidize domestic manufacturing at the expense of the larger U.S. economy. They contend that the U.S. Government should not suppress trade in one industry to benefit other industries.

b. DOE/FE Analysis

With respect to the argument that natural gas confers greater value on the U.S. economy when used in manufacturing than when produced for export, we observe that more natural gas is likely to be produced domestically if LNG exports are authorized than if they are prohibited. There is no one-for-one trade-off between gas used in manufacturing and gas diverted for export. Although commenters are correct that such a trade-off may exist at the margin, this competition between the demand for natural gas for domestic consumption and the demand for natural gas for export is captured in the N_{ew}ERA model. The model projected that under the majority of scenarios examined, no exports would occur, thereby indicating that, for those scenarios, the gas was of greater value to domestic consumers than to foreign ones. On the other hand, in supply and demand conditions where exports were projected to occur and were not prohibited or limited, the model found that greater economic value was being placed on the LNG by foreign

[107] 110 members of the U.S. House of Representatives filed a single set of comments in support of LNG exports.

markets and, at the same time, greater economic benefits, both in terms of welfare and GDP accrued to the U.S. economy due to those exports.

NERA grouped the U.S. economy into a workable number of supply and demand sectors as appropriate for a macroeconomic model of this nature. NERA divided the EITE industries into five categories: paper and pulp manufacturing, chemical manufacturing, glass manufacturing, cement manufacturing, and primary metal manufacturing, including iron, steel and aluminum. NERA projected that the overall impact across these categories will be relatively muted, with no individual industry experiencing a dramatic negative impact:

Serious competitive impacts are likely to be confined to narrow segments of industry. About 10 percent of U.S. manufacturing, measured by value of shipments, has both energy expenditures greater than 5 percent of the value of its output and serious exposure to foreign competition. Employment in industries with these characteristics is about one-half of one percent of total U.S. employment. LNG exports are not likely to affect the overall level of employment in the U.S. There will be some shifts in the number of workers across industries, with those industries associated with natural gas production and exports attracting workers away from other industries. In no scenario is the shift in employment out of any industry projected to be larger than normal rates of turnover of employees in those industries.[108]

Some commenters contend that NERA grouped the EITE industries too broadly and assert that greater economic harms could have been identified by focusing more narrowly on the most gas-dependent industries. While we take these concerns seriously, ultimately we are guided by the principle that the public interest requires us to look to the impacts to the U.S. economy as a whole, without privileging the commercial interests of any industry over another.

[108] NERA Study at 2.

Similarly, with respect to the argument that some industries derive greater economic value from natural gas than others, we continue to be guided by the long-standing principle established in our Policy Guidelines that resource allocation decisions of this nature are better left to the market, rather than the Department, to resolve.

The Fertilizer Institute charges that the industry-specific employment data used by NERA is erroneous. The Fertilizer Institute claims that NERA underestimated employment directly supported by the nitrogen fertilizer industry and should have used a figure of 7,565 positions. However, NERA drew industry-specific employment data from the U.S. Census Bureau's Economic Census for 2007, which remains the most recent Economic Census data available. In estimating 3,920 positions directly supported by the nitrogen fertilizer industry, NERA selected a figure that is reasonably supported by an authoritative source.[109]

With respect to the Interagency Report prepared for the Waxman-Markey bill, we note that NERA used that report solely as a means of identifying industry segments that would be most acutely affected by higher energy costs, not as a way of determining the magnitude of such impacts. Therefore, although we acknowledge that the Interagency Report was prepared in a different context, we find nothing unreasonable in NERA's use of the Interagency Report.

3. Household and Distributional Impacts

a. Comments

Several commenters maintain that, for most citizens, the macroeconomic benefits of LNG exports, if any, will be minimal. These commenters contend that the main beneficiaries of LNG exports will be a narrow band of the population, chiefly wealthy individuals in the natural gas industry, foreign investors, and those holding stock or having retirement plans invested in natural gas companies.

[109] *Id*. at 69.

Other commenters assert that a majority of Americans will experience negative economic impacts, such as higher gas and electric bills, due to LNG exports. Senator Wyden, Dow, and Sierra Club, among others, contend that the NERA Study examined impacts on the labor market in terms of wages but failed to consider employment levels in terms of job equivalents or employment income. According to Clean Ocean Action, Dow, and Sierra Club, NERA also incorrectly assumed full employment and overestimated the positive job impacts associated with LNG exports. Dow, among others, charge that the NERA Study failed to adequately consider the cost of LNG exports in terms of lost jobs in the manufacturing sector and the cost of retraining workers for the LNG industry.

Several commenters support the 2012 LNG Export Study and argue that the macroeconomic impacts of LNG exports favor the public interest. ExxonMobil, the Center for Liquefied Natural Gas, and others, including several applicants for LNG export authorizations, submit that the NERA Study is comprehensive and rigorous and that LNG exports are in the public interest. ExxonMobil supports NERA's conclusion that exports will yield net economic benefits but asserts that the study understates the potential employment benefits from LNG exports. ExxonMobil argues that, because the NERA model assumed full employment, it did not identify the positive impact LNG exports would have on jobs. ExxonMobil observes that the economy is far from full employment, with forecasts prepared by the Congressional Budget Office in 2012 showing the unemployment rate above a full employment level through most of this decade. By exporting LNG, ExxonMobil argues, the U.S. economy can reach full employment faster than it can without exports. ExxonMobil also contends that the lingering effects of the recession mean that capital is underutilized today; and that, where there is

significant slack in the economy, there is no necessary trade-off between jobs in one sector versus another.

b. DOE/FE Analysis

NERA examined three components of household income directly affected by natural gas exports: income from wages, income from capital holdings (stocks, etc.), and income from resource ownership (royalties, rents, etc.). The NERA Study projected that for the economy as a whole, increases in resource income earned in the natural gas production process more than offset reductions in wage and capital income earned from all other activities outside of the natural gas production process. The NERA Study acknowledged, however, that exports would be accompanied by a shifting of income sources, and stated that some segments of the economy are likely not to participate in the benefits of LNG exports but are likely to face increased energy costs.

DOE believes that the public interest generally favors authorizing proposals to export natural gas that have been shown to lead to net benefits to the U.S. economy. While there may be circumstances in which the distributional consequences of an authorizing decision could be shown to be so negative as to outweigh net positive benefits to the U.S. economy as a whole, we do not see sufficiently compelling evidence that those circumstances are present here. None of the commenters advancing this argument has performed a quantitative analysis of the distributional consequences of authorizing LNG exports at the household level. Given the finding in the 2012 LNG Export Study that exports will benefit the economy as a whole, and absent stronger record evidence on the distributional consequences of authorizing Emera's proposed exports, we cannot say that those exports are inconsistent with the public interest on these grounds.

4. Regional Impacts

a. Comments

Many commenters addressed the issue of negative and positive regional impacts potentially associated with LNG exports. Commenters including Alice Zinnes, Keith Schue, Jannette Barth, the American Public Gas Association (APGA), Alex Bomstein, and Sierra Club assert that shale gas production associated with increasing LNG exports will trap local communities in a "boom-and-bust" cycle associated with extractive natural gas drilling. In a phenomenon they refer to as the "resource curse," they argue that natural gas production will cause long-term economic damage to local communities, leaving the communities poorer once the gas resource is depleted. Jennifer Davis, Dina DeWald, Andrew Goff, and others agree that shale gas development and production will have a negative impact on local industries that are incompatible with extraction-related activities, such as agriculture and tourism. Numerous commenters, including Hope Punnett, Robert M. Ross, the Environmental Working Group, Citizens Against LNG, and Sierra Club, enumerate specific ways in which they allege local communities near shale gas production areas or pipelines could be adversely affected if LNG exports lead to increased natural gas production. They cite increased noise, property devaluation, degradation of infrastructure, environmental and public health issues, and safety risks, among other issues.

Many other commenters seek to rebut these concerns by identifying the positive regional benefits associated with LNG exports, both in regions where shale development and production occur, and the regions in which LNG export terminals may be located. Commenters including Freeport LNG Expansion, L.P., *et al.* (also called FLEX), the Independent Petroleum Association of America, and scores of local, state, and federal political leaders—including 110 Members of

the U.S. House of Representatives and several U.S. Senators[110]—cite regional economic benefits associated with each LNG project, including the potential for thousands of new jobs, substantial direct and indirect business income, and millions of dollars in new tax revenue. Further, U.S. Representative Charles W. Boustany, Jr., 14 members of the Ohio House of Representatives, and numerous other commenters assert that authorizing exports of LNG will help to sustain natural gas exploration and production efforts, which will mitigate any local "boom-bust" cycle.

Finally, several other commenters, including Southern LNG Company, L.L.C., and Gulf LNG, assert that any general consideration of regional impacts is outside the scope of the NERA Study and is most appropriately considered by DOE/FE in reviewing individual export applications.

b. DOE/FE Analysis

We agree with the commenters who contend that a general consideration of regional impacts is outside of the scope of the 2012 LNG Export Study, and that regional impacts are appropriately considered by DOE/FE on a case-by-case basis during the review of each LNG export application.

C. Estimates of Domestic Natural Gas Supplies

1. Comments

Several commenters assert that, in addition to underestimating the demand for domestically produced natural gas, the NERA Study overestimated future domestic supplies of natural gas. Representative Markey, for example, argues that current projections provide for only 20 to 40 years of domestic natural gas supplies but NERA did not adequately consider these projections. Senator Wyden, the Fertilizer Institute, and others maintain that the NERA Study

[110] U.S. Senators James Inhofe, Lisa Murkowski, David Vitter, Mary Landrieu, Heidi Heitkamp, and John Cornyn submitted comments generally supporting LNG exports.

purports to treat the United States and Canada as a single North American market, but its assumptions ignore the potential effect of Canadian LNG exports to international markets.[111] These commenters are largely concerned that NERA has overestimated domestic supplies and that having lower supplies than estimated will exacerbate the likely price increases due to exports.

Contrary to these arguments, many commenters, such as API and Shell, argue that the United States has abundant domestic natural gas reserves. Center for LNG and Cheniere Energy argue that EIA and NERA underestimated the domestic natural gas resource base and, therefore likely overestimated the price impacts of LNG exports.

Dow, however, is concerned about certain indirect impacts that could arise if domestic supplies are exported. It asserts that domestic gas production would be unable to keep up with the demand required to meet unlimited LNG exports and that one-third of new shale gas production will be required to replace a decline in conventional gas production. Dow maintains that, as a consequence, gas production will have to ramp up significantly and this development will mean that gas supply will be diverted away from domestic industrial and other sectors of the economy:

> There would need to be rapid deployment of new drilling rigs, increased steel pipe manufacturing and an expanded work force throughout the value chain to be able to service such unprecedented growth in [natural gas] production. With an already well-documented skills shortage in the labor market, basic supply and demand economics will prevail and drive labor prices higher, which would in turn have a chilling impact on investment in the manufacturing sector.[112]

Other commenters take a somewhat longer view of the potential indirect impacts of LNG

[111] In his comments, Senator Wyden stated that Canada's National Energy Board has approved two LNG export projects in British Columbia and is considering a third. According to Senator Wyden, these projects could result in LNG exports totaling 9 Bcf/d of natural gas. DOE/FE notes that Canada has approved the third LNG export project mentioned by Senator Wyden—the Royal Dutch Shell Plc project.

[112] Initial Comments of Dow Chem. Co. at 16.

exports on domestic energy supplies. These commenters contend that, to become energy independent, the United States must preserve its supply of finite domestic energy resources, not export them. They argue that authorizing LNG exports will hasten the depletion of this country's natural gas resource base, the size of which is uncertain. Moreover, they assert, investment in LNG exports will take away from potential investment in renewable energy supplies, which will compound this country's dependency on fossil fuels.

Some commenters, such as Dow, IECA, and Citizens Against LNG, maintain that the NERA Study does not address significant policy changes that could impact domestic natural gas supply. These comments are focused in two areas: availability of energy production tax credits and uncertainty surrounding future environmental regulation regarding hydraulic fracturing. Specifically, Dow points to the possible elimination of energy production tax credits and states that elimination of this tax credit could result in a 5 percent decline in natural gas production and the loss of nearly 60,000 barrels per day of oil production. Dow, along with Jannette Barth, IECA, and Citizens Against LNG, argue that potential state and federal environmental regulations pertaining to hydraulic fracturing should have been considered by NERA. These commenters assert that these potential additional regulatory costs and could lower supply, increase demand, and raise prices of natural gas.

2. DOE/FE Analysis

a. Measures of Supply

Before turning to a consideration of the specific comments, it is important to clarify the various measures of supply used by commenters. DOE/FE notes that, by three measures of supply, there are adequate natural gas resources to meet demand associated with Emera's proposed exports (as well as the lesser volume of exports authorized by DOE/FE in this Order).

Because these supply estimates have changed over time, however, DOE/FE will continue to monitor them to inform future decisions. These estimates include:

i) AEO natural gas estimates of production, price, and other domestic industry fundamentals. As shown in Table 4 above, the Reference Case projection of dry natural gas production in 2035 increased significantly (by 21.4 Bcf/d) in AEO 2015 compared with AEO 2011, while projections of domestic natural gas consumption in 2035 also increased in AEO 2015 compared with AEO 2011 (by 6.3 Bcf/d). Even with higher production and consumption, the 2035 projected natural gas market price in the Reference Case declined from $7.31/MM Btu (2012$) in AEO 2011 to $6.50/MM Btu (2012$) in AEO 2015. The implication of the latest EIA projections is that a greater quantity of natural gas is projected to be available at a lower cost than estimated four years ago.

ii) Proved reserves of natural gas. Proved reserves of natural gas have been increasing. Proved reserves are those volumes of oil and natural gas that geologic and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. The R/P ratio measures the number of years of production (P) that proved reserves (R) represent at current production rates. Typically industry maintains proved reserves at about 10 years of production, but as Table 5 below demonstrates, reserves have increased from 9.2 years of production in 2000 to 13.7 years of production in 2010, the latest year statistics are available. Of particular note is that, since 2000, proved reserves have increased 72 percent to 304,625 Bcf, while production has increased only 16 percent, demonstrating the growing supply of natural gas available under existing economic and operating conditions.

Table 5: U.S. Dry Natural Gas Proved Reserves[113]

	Proved Reserves (R)		U.S. Dry Natural Gas Estimated Production (P)		
Year	**(Bcf)**	**Percent change versus year 2000**	**(Bcf)**	**Percent change versus year 2000**	**R/P Ratio - Years**
2000	177,427	--	19,219	--	9.2
2005	204,385	15	18,458	-4	11.1
2010	304,625	72	22,239	16	13.7

iii) Technically recoverable resources (TRR). Technically recoverable resources have also increased significantly. Technically recoverable resources are resources in accumulations producible using current recovery technology but without reference to economic profitability. They include both proved reserves and unproved resources.[114]

DOE/FE notes that EIA's natural gas TRR estimates have varied from below 2,000 Tcf in AEO 2010 to more than 2,500 Tcf in AEO 2011 and 2,266 Tcf in AEO 2015.[115] These TRR estimates include proved and unproved TRR shale gas resources, which have fluctuated in recent AEOs, as the EIA continues to monitor and estimate this resource base. For example, in AEO 2010, unproved shale gas TRR was estimated at 347 Tcf, which increased to 827 Tcf in AEO 2011, and was revised to 489 Tcf in AEO 2015.

b. Supply Impacts

Although TRR estimates in AEO 2011 were higher than the AEO 2015 estimates, we do not agree that NERA employed overly optimistic projections of domestic gas supply. The EIA

[113] EIA, *U.S. Dry Natural Gas Proved Reserves* (Aug. 2, 2012), *available at* http://www.eia.gov/dnav/ng/ng_enr_dry_dcu_nus_a.htm (additional calculations conducted to produce percentage change and R/P ratios).

[114] Unproved resources are generally less well known and therefore less precisely quantifiable than proved reserves, and their eventual recovery is less assured.

[115] *See* U.S. Energy Information Administration, *Assumptions to the Annual Energy Outlook 2014* (June 2014), Table 9.2. Technically recoverable U.S. dry natural gas resources as of January 1, 2012, at 114, *available at*: http://www.eia.gov/forecasts/aeo/assumptions/pdf/0554(2014).pdf.

and NERA Studies conclude that for the period of the analysis, the United States is projected to have ample supplies of natural gas resources that can meet domestic needs for natural gas and the LNG export market. Additionally, most projections of domestic natural gas resources extend beyond 20 to 40 years. While not all TRR is currently economical to produce, it is instructive to note that EIA's recent estimate of TRR equates to nearly 90 years of natural gas supply at the 2014 domestic consumption level of 27.12 Tcf. Moreover, given the supply projections under each of the above measures, we find that granting the requested authorization is unlikely to affect adversely the availability of natural gas supplies to domestic consumers such as would negate the net economic benefits to the United States.

We further find that, given these estimates of supply, the projected price increases and increased price volatility that could develop in response to a grant of the requested LNG export authorization are not likely to negate the net economic benefits of the exports. This issue is further discussed below. With regard to the adequacy of supply, however, it bears noting that while Dow contends that U.S. natural gas production would not be able to meet unlimited LNG exports and domestic demand, the NERA Study supports a different conclusion. The NERA Study included scenarios in which LNG exports were unconstrained. In these cases, LNG exports from the United States compete with LNG exports from all other international natural gas sources. Should the U.S. resource base be less robust and more expensive than anticipated, U.S. LNG exports would be less competitive in the world market, thereby resulting in lower export levels, and, in some instances, no exports, from the United States. By way of example, NERA modeled a number of Low EUR scenarios, which had U.S. resources that were less robust and more expensive than other cases. In these Low EUR scenarios, U.S. wellhead natural gas prices were driven up by higher production costs to meet domestic demand, and in those cases

prices increased to a level that choked off demand for exports so that LNG exports were limited or disappeared, leaving the available natural gas for domestic use. In other unconstrained cases evaluated with the High EUR scenarios, domestic natural gas production was able to keep up with the demand required to meet the unconstrained LNG export scenario. In this case, the EIA scenarios reflect the changes that would occur in the domestic market and reflect the limitations, as modeled in the NEMS model, of domestic natural gas production and consumption by different sectors of the economy. In all of these cases, the supply and price response to LNG exports did not negate the net economic benefit to the economy from the exports.

c. Supply Impacts Related to Alternative Energy Sources

To the degree that natural gas prices may increase, alternative sources of energy will become more attractive to consumers and investors. Accordingly, in nearly every year in which natural gas exports were reflected in the EIA Study, electricity from renewable energy resources increased compared to the no export case. Therefore, we do not agree with the suggestion that LNG exports would diminish investment in renewable energy.

d. Supply Impacts Related to Canadian LNG Exports

DOE/FE also disagrees with the argument that the NERA Study erred in its treatment of potential Canadian LNG exports to international markets. Although DOE/FE did not ask NERA to evaluate potential LNG exports from Canada, we note that LNG exports from Canada would compete with U.S. exports, thereby most likely reducing U.S. exports. Therefore, treating U.S. and Canadian LNG exports as those from a single market is a reasonable assumption, and would be consistent with the unconstrained LNG export cases evaluated by NERA, with the price impact more or less in line with the cases evaluated by NERA. DOE/FE would expect that

benefits estimated to accrue to the United States from U.S. LNG exports likely would be similar to the benefits that would accrue to Canada resulting from Canadian LNG exports.

The 2012 LNG Export Study did not evaluate the steps to become energy independent, as that was not part of the criteria evaluated. However, the NERA Study concluded that the United States has ample supplies of natural gas resources that can both meet domestic needs for natural gas *and* allow for participation in the LNG export market, without a significant impact on supplies or prices for the period of the analysis under the assumptions made.

e. Supply Impacts Related to Tax Law and Environmental Policy

NERA stated that the NewERA macroeconomic model includes a simple tax representation in which indirect taxes are included in the output values and not explicitly modeled.[116] NERA thus assumed no changes specific to existing law governing production tax credits. EIA did the same. On the other hand, at DOE/FE direction, NERA and EIA accounted for potential variability in domestic natural gas supply such as would occur due to changes in environmental regulation and other factors, including changes to production tax credits. They did so by incorporating the High EUR and Low EUR scenarios into their model.[117]

We find that it was reasonable for EIA and NERA to use the High EUR and Low EUR cases to capture a range of factors that may impact domestic natural gas supply. We further find that, given the range of scenarios studied, the decision not to specifically model the possible revocation of production tax credits or changes to environmental regulation does not lessen the reliability of the EIA or NERA Studies. As a practical matter, EIA and NERA were required to establish certain key assumptions as a foundation for their analyses. They reasonably evaluated alternative scenarios that would capture possible changes that would affect natural gas supplies.

[116] NERA Study at 110.
[117] *Id.* at 25.

D. Modeling the LNG Export Business

1. Comments

Some commenters complain that NERA failed to capture accurately the business model being employed by those involved in the business of LNG exports. Sierra Club states that NERA erroneously modeled the fossil fuel industry by assuming a zero-profit condition. Some commenters, including NRDC, maintain that NERA failed to consider that LNG exports will take place pursuant to long-term, *e.g.*, 25-year, contracts containing take-or-pay provisions, rather than contracts containing flexible or market-sensitive pricing provisions. IECA makes a similar argument in its reply comments. According to these commenters, the take-or-pay provisions in long-term contracts will inhibit the free flow of price signals. The commenters argue that NERA incorrectly assumed that: (1) exports of LNG from the United States would cease if the gap in prices between domestic and foreign supplies is closed; and (2) a foreign country will cease purchases of U.S.-sourced LNG if the country gains access to less expensive supplies. These commenters maintain that take-or-pay provisions in long-term contracts will have the effect of driving LNG exports even under circumstances when it would be more economical for the same natural gas to be sold in the domestic market. In this regard, Dow criticizes NERA's assertion that the global market for natural gas will limit how high U.S. natural gas prices can rise as a result of export activity because importing nations will not purchase U.S. supplies if U.S. wellhead prices rise above the cost of competing supplies. Dow contends that this arbitrage phenomenon may occur in competitive markets but does not make sense in the global LNG market due to the broad use of long term take-or-pay contracts.

Additionally, several commenters, including Representative Markey, NRDC, Sierra Club, Citizens Against LNG, and Alcoa, charge that NERA incorrectly assumed that the financing of investments in natural gas supplies for export and in the LNG export projects that will be used

for export operations would originate from U.S. sources. These commenters assert that, in fact, a substantial portion of the investment is being made by foreign entities and these foreign entities, not domestic corporations, will reap the benefits of export activity in the form of royalties, tolling fees, income, and tax proceeds from the resale of LNG overseas. Contrary to these arguments, FLEX and Lake Charles Exports argue that foreign financing of LNG export projects is beneficial. These commenters argue that foreign direct investment in the U.S. LNG industry frees up domestic capital for other investments. These commenters conclude that, as a result, NERA's results likely underestimate the benefits to the U.S. economy that will result from LNG exports.

Another commenter, Save Our Supplies, contends that the structure of international markets for natural gas and LNG and the high cost of building international LNG export infrastructure will give a cost advantage to U.S. LNG exports. This cost advantage, coupled with greater international demand than projected by NERA, allegedly will exacerbate the projected price increases within the United States due to LNG exports. More generally, Save Our Supplies claims that NERA made a series of incorrect assumptions concerning the structure of international natural gas markets. These include erroneously assuming that international natural gas markets are competitive. Save Our Supplies identifies the following three considerations: (1) the international market is not perfectly competitive because there are barriers to entry, trade, and foreign investment due in part to the participation of state-sponsored enterprises; (2) there is an international oligopoly in oil that, because of a link between the international price of oil and the international price of natural gas in certain markets, makes it impossible for the international market in natural gas to be perfectly competitive; and (3) NERA erroneously assumed that

natural gas is a "perfect substitute" for oil in all circumstances.[118] Based on these comments, Save Our Supplies challenges the NERA Study for allegedly assuming that Qatari and Russian suppliers of natural gas will cut their prices to compete with the lower priced supplies available from the United States. Save Our Supplies argues that such price competition will not be significant and, therefore, that there will be greater demand for U.S.-exported LNG. According to some commenters, NERA's asserted underestimate of international demand for natural gas was also exacerbated by its failure to account for the construction of natural gas infrastructure on a global basis. These commenters assert that NERA appears to underestimate both the supply cost of international LNG projects and the magnitude and trajectory of global LNG demand. They further claim that NERA appears to underestimate U.S. natural gas demand and potentially the elasticity of the U.S. natural gas supply curve.

A number of commenters take an opposing position by arguing that the domestic natural gas resource base is sufficient to meet both the domestic and international demand for U.S. natural gas. Center for LNG, Cheniere, and others go further by arguing that EIA and NERA underestimated the size of the resource base, and therefore overestimated the potential domestic price impacts of LNG exports. Dominion Cove Point LNG, America's Natural Gas Alliance and others argue that the international market will constrain the total volume of natural gas exported from the United States.

Several commenters, including Sierra Club and Dow, argue that NERA overestimated LNG transaction costs (*e.g.*, costs of liquefaction, transportation, and insurance). Sierra Club argues that NERA overstated the transportation costs associated with the export of U.S. gas by assuming all LNG would be exported from the Gulf Coast. Sierra Club states that several export terminals are planned for the West Coast, where it will be less expensive to transport gas to the

[118] Initial Comments of Save Our Supplies at 34, 41.

Asian market than it would be from the Gulf Coast. Dow states that NERA's estimate of transportation and insurance costs for shipping LNG to Asia would be on the order of $2.60/Mcf. Dow claims that official trade statistics published by the U.S. Census Bureau, however, establish that these costs would be closer to $0.50/Mcf. Commenters such as Dow and Sierra Club state that had NERA properly accounted for LNG transaction costs, the foreseeable volumes of LNG exports would have exceeded those predicted by NERA, thereby intensifying the impact of LNG exports on U.S. natural gas prices. For this reason, Sierra Club and Dow argue that NERA's projected price ceiling on domestic natural gas is too low. In addition, numerous individual members of the Sierra Club contend that NERA appears to have misrepresented the amount of natural gas used by LNG terminals in the liquefaction process, which understates the demand associated with exports.

2. DOE/FE Analysis

As explained below, we find that the NERA Study reflects an accurate understanding of the contractual terms and market environment affecting the fossil fuel industry and, more narrowly, provides a plausible future scenario of international trade in LNG with U.S. exports. It is also DOE/FE's view that NERA's conclusions of the impact of LNG exports would not have materially changed with alternative international market assumptions. In this regard, we note that NERA included one scenario in which LNG exports reached 23 Bcf/d, with a positive impact on the U.S. economy. We find as follows:

a. Zero Profit Condition

Sierra Club's charge that NERA erroneously modeled the fossil fuel industry by assuming a zero-profit condition appears to reflect a misunderstanding of the term "zero-profit" as used by NERA. The "zero-profit condition" assumed in the NERA Study does not mean that

firms in the natural gas industry will not make a "profit" as that word is ordinarily used. Rather, the zero-profit condition means only that firms will not make a profit above the risk-adjusted cost of capital. The assumption of a zero-profit condition is another way of saying that the model assumes a competitive market for natural gas, because in competitive markets new firms can enter and drive any profits above a risk-adjusted cost of capital down to zero. The assumption of a competitive market for natural gas production in the United States is valid given that natural gas wellhead prices have been deregulated for more than 30 years.[119] Moreover, Sierra Club and other commenters have not provided any evidence to suggest a lack of competition in the market for U.S. natural gas production.

b. Contract Terms

We disagree with the contention that NERA erred in the assumptions it used to model the export contracts that will be used by authorization holders. NERA assumed that these contracts will include payments to the exporting facility in the form of a tolling charge that is fixed based on the total export capacity reserved under the tolling agreement plus 115 percent of the Henry Hub price for each unit of gas that is liquefied. Because there is neither a throughput obligation nor a fixed commodity price in the commercial arrangements assumed by NERA, the supplies of natural gas or LNG subject to the contracts are not locked up for the export market. Instead, as NERA has properly assumed for purposes of its model, foreign and U.S. purchasers will compete for domestically produced supplies and, if the domestic price rises, the owners of the gas (in most cases, either the authorization holder or the foreign purchasers that are party to the export-related contracts) will have an incentive to sell the gas into the domestic market rather than the international market.

[119] Natural Gas Policy Act of 1978, 15 U.S.C. § 3301, *et seq.* (establishing a policy for phasing out the regulation of wellhead prices).

Commenters criticizing NERA's model on these assumptions have not submitted evidence to support their position that contracts will lock up natural gas for export. Moreover, we find it unlikely that a broad cross-section of commercial parties would lock themselves permanently into arrangements whereby LNG will be exported from the United States even when it is uneconomical to do so. Even contracts entered improvidently may be amended when there is a possibility for mutual benefit in doing so, as there would be in a case where domestic gas prices exceed netback prices.

c. Foreign Direct Investment

As described above, several commenters charge that the NERA Study incorrectly assumed that the financing of investments in natural gas supplies for export and in LNG liquefaction and export facilities would come from domestic sources. An examination of the NERA Study indicates that claim is not valid as to natural gas supplies. Early in the Study, NERA noted as follows:

> Net benefits to the U.S. economy could be larger if U.S. businesses were to take more of a merchant role. Based on business models now being proposed, this study assumes that foreign purchasers take title to LNG when it is loaded at a United States port, so that any profits that could be made by transporting and selling in importing countries accrue to foreign entities. In the cases where exports are constrained to maximum permitted levels, this business model sacrifices additional value from LNG exports that could accrue to the United States.[120]

On the other hand, the commenters are correct to the extent they argue that the NERA Study assumed that the financing for the liquefaction and export facilities associated with LNG exports would come solely from domestic sources. The NERA Study indicates that the timing of macroeconomic effects could be affected as a consequence:

> In this report it is assumed that all of the investment in liquefaction facilities and in increased natural gas drilling and extraction come from domestic sources.

[120] NERA Study at 6-7.

> Macroeconomic effects could be different if these facilities and activities were financed by foreign direct investment ("FDI") that was additional to baseline capital flows into the U.S. FDI would largely affect the timing of macroeconomic effects, but quantifying these differences would require consideration of additional scenarios in which the business model was varied.[121]

In the above statement, NERA has indicated that the timing of the impacts of LNG exports could change due to FDI. On the other hand, NERA has not stated that the nature of the impacts will change and no commenter has introduced evidence that FDI will produce negative economic benefits. Indeed, Lake Charles Exports explains why FDI may enhance the economic benefits to the United States:

> NERA thus acknowledged the possibility that investment necessary for LNG exports may come from foreign sources. The NERA model's assumption of domestic investment explicitly fails to capture the macroeconomic benefits that will result from the injection of any foreign investment into natural gas production and infrastructure.
>
> The United States has the leading economy in the world in part because the US is the leading destination of international flows of capital. Each dollar of new foreign investment capital into the US results in an equivalent increase in US GDP. The main positive components of GDP are private consumption, investment, government expenditures, and exports. Any foreign direct investment stemming from the development of a US LNG industry would not decrease domestic capital investment, but would merely free up such domestic capital for other investments. Therefore the total amount of investment in the US would increase, dollar-for-dollar, with foreign investment, increasing US GDP by the same amount. If that foreign investment earns a return and, after taxation by US local, state and federal governments, some of that return is repatriated, this reflects a small countervailing outflow (which seems to be what, for example, Representative Markey is focusing on). Nonetheless, foreign direct investment remains a major net contributor to the US economy. The 2012 LNG Export Study's simplifying assumption regarding the source of investment in LNG production infrastructure fails to capture the benefits of any capital provided from foreign sources and thus understates the impact of such investment on US GDP.[122]

Accordingly, while FDI may be used to finance purchases of natural gas for export as LNG and the construction of LNG liquefaction and export facilities, we are not persuaded that

[121] *Id.* at 211.
[122] Reply Comments of Lake Charles Exports at 31 (citations omitted).

the inflow of foreign capital for these purposes would be inconsistent with the public interest or would lessen the net economic benefits projected in the 2012 LNG Export Study.

d. International Natural Gas Markets

We are not persuaded by Save Our Supplies' claim that a projected cost advantage to exports of LNG from the United States as opposed to exports from other gas producing nations will necessarily exacerbate projected price increases within the United States due to LNG exports. This argument assumes that LNG will be available for export at a landed price overseas that is competitive with the international price set by foreign competitors. But NERA concluded that in many cases, the world natural gas market would not accept the full amount of exports assumed in the EIA scenarios at prices high enough to cover the U.S. wellhead domestic prices calculated by the EIA. Alternatively, foreign competitors supplying natural gas and LNG in international markets may match or, possibly, undercut the landed price of LNG exported from the United States.

With respect to the competitiveness of global LNG markets, NERA assumed that the production decisions of the world's dominant producer, Qatar, would be fixed no matter what the level of U.S. exports and that, generally, "there is a competitive market with exogenously determined export limits chosen by each exporting region and determined by their liquefaction capacity."[123] NERA described these assumptions as a "a middle ground between assuming that the dominant producer will limit exports sufficiently to maintain the current premium apparent in the prices paid in regions like Japan and Korea, or that dominant exporters will remove production constraints because with U.S. entry their market shares fall to levels that do not justify propping up prices for the entire market."[124] We find this to be a reasonable simplifying

[123] NERA Study at 34.
[124] *Id*. at 34-35.

assumption and note further that even imperfectly competitive markets are not static. The arrival of new entrants, such as U.S.-based LNG exporters, may well have a disruptive impact on markets where competition may presently be constrained.

Finally, we note that NERA also modeled a "supply shock" case that assumed key LNG exporting regions did not increase their exports above current levels. NERA found positive economic benefits to the United States in each supply shock scenario in which the United States exports LNG. These results strengthen our conclusion that the prospect of non-competitive behavior in global LNG markets is unlikely to have a material impact on the central conclusions of the 2012 LNG Export Study.

e. Estimates of LNG Transaction Costs

We disagree with the comments from Sierra Club and Dow arguing that NERA overestimated LNG transaction costs, including liquefaction, transportation, insurance, and the like. NERA based its liquefaction, shipping costs and regasification costs on a review of publicly available literature, including the International Group of LNG Importers 2010 LNG Industry report and other sources referenced in the NERA Study.[125]

With respect to transportation costs, Dow states that NERA's estimate of shipping cost to Asia was on the order of $2.60/Mcf, while statistics presented by Dow claim these to be $0.50/Mcf. In presenting this figure, Dow relies on trade statistics reported by the U.S. Census Bureau based on the average cost of insurance and freight expenses associated with U.S. *imports* of LNG in 2010 and 2011. As NERA points out, however, LNG transportation costs in large measure are a function of the distance traveled. Therefore, data on LNG imports, which largely

[125] *Id.* at 84-90.

travel shorter distances,[126] do not furnish a reliable basis for drawing inferences regarding transportation costs for LNG exports to Asia. Further, NERA provided a detailed description of the assumed transportation cost buildup, which is based on a daily charter rate of $65,000, and other reasonable assumptions.[127] Dow does not provide evidence challenging the accuracy of the information used by NERA or NERA's method of calculating transportation costs. Nor does Dow provide other evidence of daily charter rates.

As for the cost of natural gas consumed in the liquefaction process, NERA's model assumes a consumption level equal to 9 percent of the natural gas feedstock, a cost that is included in the NERA model. NERA based this assumption on publicly available information of liquefaction costs. Similarly, EIA assumed that 10 percent of feedstock was consumed in the liquefaction process.

Therefore, we find that NERA's cost build-up is appropriate and that the estimated costs for delivering LNG to end users considered in the NERA Study are reasonable.

E. Cost of Environmental Externalities

1. Comments

Sierra Club, along with Delaware Riverkeeper Network,[128] Jannette Barth, NRDC, Dow, and Save Our Supplies, among others, maintain that LNG exports will increase demand for natural gas, thereby increasing negative environmental and economic consequences associated with natural gas production. These commenters assert that NERA failed to consider the cost of environmental externalities that would follow such exports. The externalities identified by these commenters include:

[126] DOE/FE statistics show that the majority of LNG imports to the United States for 2010 and 2011 came from Atlantic Basin/North African sources. More than one-third of U.S. LNG imports in 2010 and 2011 came from Trinidad and Tobago, and none came from East Asia. *See* DOE/FE 2010 LNG Import Annual Report and DOE/FE 2011 LNG Import Annual Report, *available at* http://fossil.energy.gov/programs/gasregulation/publications/.

[127] NERA Study at 87.

[128] Delaware Riverkeeper Network filed comments on behalf of itself and more than 80 other organizations.

- Environmental costs associated with producing more natural gas to support LNG exports, including the costs, risks, and impacts associated with hydraulic fracturing and drilling to produce natural gas;

- Opportunity costs associated with the construction of natural gas production, transport, and export facilities, including the costs of investing in shale gas infrastructure to support LNG exports, as opposed to investing in renewable or sustainable energy infrastructure;

- Costs and implications associated with eminent domain necessary to build new pipelines to transport natural gas; and

- Potential for switching from natural gas-fired electric generation to coal-fired generation, if higher domestic prices cause domestic electric generation to favor coal-fired generation at the margins.

2. DOE/FE Analysis

Insofar as relevant to this proceeding, we have addressed these issues in the Discussion and Conclusions below. *See infra* § X.C.

F. Prices and Volatility

1. Natural Gas Price Volatility

a. Comments

Several commenters, such as Huntsman Corporation, address potential natural gas price volatility associated with LNG exports. Janette Barth, Dow, Sierra Club, and Save Our Supplies, among others, state that NERA did not account for price volatility. Sierra Club points to the results of the 2012 LNG Export Study, which project higher domestic natural gas price impacts when exports phase in rapidly. Additionally, Sierra Club argues that, pending the pace of DOE/FE approvals, demand for domestic natural gas may increase more rapidly than production, leading to periods of scarcity and price spikes. Sierra Club also contends that there is little evidence that domestic natural gas price volatility will be reduced by LNG exports.

America's Natural Gas Alliance argues that there is no evidence that LNG exports will increase volatility. According to the Alliance, LNG exports will lead to increased investment in domestic gas production, which will help protect against price volatility. API contends that the NERA and Brookings studies project natural gas prices to remain in a narrow, low range through 2030 in all scenarios. Further, API points out that in October 2009, a Dow representative testified before the Senate Energy and Natural Resources Committee that the U.S. chemical industry could operate successfully if natural gas prices remain in the $6-8 MMBtu range. API asserts that recent studies projecting natural gas prices—even with high, unconstrained levels of LNG export—do not forecast natural gas prices higher than that range. Several commenters, including America's Natural Gas Alliance and API, further assert that the market will have significant advanced notice of LNG export facilities. As a result, natural gas producers will be able to adjust supply to meet anticipated increases in demand. API also argues that, because the facilities and liquefaction trains at each facility will be built in sequence, a market buffer will be created where supply will grow incrementally and supply shocks will not be created in the market. Additionally, Lake Charles Exports argues that Dow's analysis of domestic natural gas exports is incorrect, and the additional investment in domestic natural gas reserve development associated with increases in LNG exports will insulate the United States from natural gas price volatility.

The Bipartisan Policy Center, through its own analysis, forecasts that LNG exports are unlikely to result in large domestic price impacts. The Bipartisan Policy Center states that the results of its analysis indicate that LNG exports are likely to have only modest impacts on domestic natural gas prices—and that LNG export levels will adjust as domestic prices rise or fall.

b. DOE/FE Analysis

Natural gas price volatility can be measured in terms of short term changes—daily or monthly volatility—or over longer periods. Short term volatility is largely determined by weather patterns, localized service outages, and other factors that appear unlikely to be affected substantially by DOE export authorization decisions. Moreover, the NERA Study was a long-term analysis covering a 20-year period that correctly did not focus on short term shocks or volatility.

To the extent commenters are concerned about the risk of large upward price spikes sustained over longer periods, such as those that occurred in 2005 and 2008, we do not agree that LNG exports will necessarily exacerbate this risk. First, as noted above, when domestic wholesale gas prices rise above the LNG netback price, LNG export demand is likely to diminish, if not disappear altogether. Therefore, under some international market conditions, LNG export facilities are likely to make natural gas demand in the United States more price-elastic and less conducive to sustained upward spikes. Second, in light of our findings regarding domestic natural gas reserves explained above, we see no reason why LNG exports would interfere with the market's supply response to increased prices. In any capital intensive industry, investments are made based on observed and anticipated market signals. In natural gas markets, if prices or expected prices rise above the level required to provide an attractive return on investment for new reserves and production, industry will make that investment to capture the anticipated profit. These investments spur development of reserves and production and increase availability of natural gas, exerting downward pressure on prices. This is part of the normal business cycle that has been captured in EIA's supply curves and, consequently, in NERA's

analysis. On balance, we are not persuaded that LNG exports will substantially increase the volatility of domestic natural gas prices.

2. Linking the Domestic Price of Natural Gas to World Prices

a. Comments

Several commenters, including APGA, Dow, and IECA, argue that LNG exports could link domestic natural gas prices to the price of natural gas in the world market, and that this could exacerbate the potential increase in domestic natural gas prices as well as increase price volatility. A number of other commenters, however, contend that domestic prices would not become linked to world prices. Citing the importance of the domestic natural gas price in determining the level of exports, the Bipartisan Policy Center and Southern LNG Company argue that domestic natural gas prices will remain independent of international prices.

In its reply comments, Dow expands on its argument that domestic natural gas prices will become linked to international prices. Dow argues that exports to Asia, where natural gas prices are "oil-indexed," will invariably lead to increases in domestic price. Dow also argues that it is incorrect to assume liquefaction, transportation and regasification costs will act as a buffer against world prices, pointing to the experience in Australia in which LNG exports resulted in a tripling of domestic natural gas prices. In reply comments, API and several LNG export applicants (and/or authorization holders) argue that natural gas prices will not rise to global prices because the market will limit the amount of U.S. natural gas that will be exported, since liquefaction, transportation and regasification costs act as a cushion. These commenters argue that if this cushion disappears and the U.S. export price rises to the global LNG price, market forces will bring U.S. exports to a halt. Several LNG export applicants also contend that the availability of bi-directional terminals will serve to limit domestic price increases.

b. DOE/FE Analysis

The NERA Study examined whether LNG exports from the United States will cause domestic prices to rise to the level of international prices and found that such a result is unlikely. NERA asserts that there will always be a difference between the international LNG price and the U.S. market price. That difference will be represented by the cost of inland transportation, liquefaction, shipping, and regasification. NERA's model assumes competition among different suppliers such that Asian buyers would have no incentive to buy natural gas from the United States if the delivered price after liquefaction and transportation is higher than the alternative delivered LNG price from other sources. DOE/FE agrees that a competitive market would behave in this manner and U.S. natural gas prices would be lower than international LNG prices in such a market by at least the costs previously described. Further, the introduction of LNG exported from the United States into the international market would tend to exert downward pressure on the prevailing higher delivered price for LNG in those foreign markets and could weaken the "oil-indexed" pricing terms.

In addition, all proposed LNG exports from the United States in applications DOE/FE has received to date would be pursuant to long-term contracts. To the extent that these contracts supply end-users in foreign markets, these exports represent a base-load demand for U.S. natural gas. As a base load, the United States market would adjust to this increased demand through increases in production, and plan for its delivery utilizing the significant production and storage infrastructure that exists. On average, prices would rise to levels that provide incentives for full marginal cost recovery for the incremental production of natural gas needed to meet this demand.

Hence we agree with those commenters, such as the Bipartisan Policy Center, that maintain that LNG exports from the United States will have difficulty competing with LNG

exports from other countries unless domestic U.S. natural gas can be produced much cheaper. They point out that the international supply of natural gas is growing, and the mobility of that supply is increasing as other countries develop their own LNG export capabilities. Further, there is no evidence before us that demonstrates that the prices of natural gas or LNG in the international market are more volatile than the prices in the U.S. domestic market.

G. Integrity of the 2012 LNG Export Study

1. Comments

Several commenters, such as Clean Ocean Action and Sierra Club, argue that DOE/FE cannot rely on the NERA Study unless DOE/FE discloses more details about the process by which DOE/FE selected NERA to conduct the study, DOE/FE's funding mechanism for paying NERA, and DOE/FE's involvement (if any) in guiding the study or reviewing drafts of the study prior to publication. In addition to Sierra Club, commenters Eugene Bruce, Ellen Osuna, Dow, and IECA assert that DOE/FE cannot rely on the NERA Study because NERA has not disclosed all technical details of its proprietary N_{ew}ERA model to the public. According to Sierra Club, DOE/FE "has refused to make [all of] this information available for review during the public comment period."[129] Further, Sierra Club, Save Our Supplies and several other commenters argue that, due to this alleged lack of transparency, DOE/FE should conduct a new study of the potential cumulative impacts of granting LNG export licenses for shipment to non-FTA countries. Sierra Club and other commenters also contend that NERA and/or NERA's Vice President (and the principal author of the NERA Study) Mr. David Montgomery may be biased in favor of LNG exports, which they argue necessitates a new study by a different contractor.

[129] Reply Comments of Sierra Club at 20.

2. DOE/FE Analysis

DOE has evaluated all submissions in this proceeding on their own merits, including the 2012 LNG Export Study and the arguments and analyses submitted by commenters. NERA conducted the Study within DOE/FE's requested parameters (which are included as Appendix F to the NERA Study) and provided detailed information regarding its assumptions, model design and methodology, and results. This information is set forth at length in the NERA Study and is discussed in Section V.B.2 and 5 of this Order. As evidenced by the number of detailed comments received, including additional studies offered by several of the commenters, NERA's explanation of its modeling design, methodology, and results has provided a sufficient basis both for the public to provide meaningful comments and for the Department to evaluate NERA's conclusions.

H. Peer Review

1. Comments

Dow, along with Eugene Bruce, IECA, and others, charge that the NERA Study is invalid because NERA failed to validate its proprietary N_{ew}ERA model by means of technical peer review. These commenters argue that technical peer review is required by the Office of Management and Budget's (OMB) guidance entitled, "Final Information Quality Bulletin for Peer Review" (OMB Bulletin).[130] The OMB Bulletin establishes that "important scientific information shall be peer reviewed by qualified scientists before it is disseminated by the Federal government." Dow asserts that the NERA Study should be considered "highly influential scientific information," subject to the highest standards outlined in the OMB Bulletin, and/or subject to internal DOE peer review guidelines. Due in part to these concerns, several

[130] Final Information Quality Bulletin for Peer Review, 70 Fed. Reg. 2664 (Jan. 14, 2005).

commenters, including Sierra Club and Save Our Supplies, urge that DOE/FE commission a new study by another independent contractor.

Cameron LNG, LLC, in its reply comments, counters that the OMB Bulletin does not apply to adjudications or permit proceedings such as this one. Cameron LNG therefore asserts that the public comment period held by DOE/FE on the 2012 LNG Export Study is more than adequate for DOE/FE to obtain constructive review of both the EIA and NERA Studies.

2. DOE/FE Analysis

The OMB Bulletin establishes a framework for independent, expert review of influential scientific information before the information is publicly disseminated. It defines "scientific information" as "factual inputs, data, models, analyses, technical information, or scientific assessments based on the behavioral and social sciences, public health and medical sciences, life and earth sciences, engineering, or physical sciences."[131] "Scientific information" does not include opinions where the presentation makes it clear the information is "opinion rather than fact or the agency's views."[132] Further, the OMB Bulletin, while applicable to rulemakings, provides that "official disseminations that arise in adjudications and permit proceedings" are exempt from peer review, unless "the agency determines that peer review is practical and appropriate …."[133]

We have considered commenters' request for peer review in light of the OMB Bulletin. Because this proceeding is an adjudication, peer review is not required unless DOE/FE determines that such review is appropriate. After consideration, we find that peer review is not required because the conclusions reached in the 2012 LNG Export Study are in the nature of expert opinion, not scientific fact, and also because the principal purpose of peer review of

[131] *Id*. at 2675.
[132] *Id*.
[133] *Id*. at 2677.

government-sourced documents—ensuring the government is well-informed by independently produced expert analyses—was accomplished in this proceeding.

Both the EIA and NERA Studies use market assumptions to project a range of possible future results. No claim is made by the authors of either study that the studies contain scientific fact. To the contrary, both studies caution the reader on the limits to their economic projections. The EIA Study states: "The projections in this report are not statements of what *will* happen but of what *might* happen, given the assumptions and methodologies used."[134] Similarly, the NERA Study was developed around assumptions of future scenarios and repeatedly acknowledges the uncertainties that could shift the results within the range of likely outcomes.[135]

Further, the procedures followed by DOE/FE in this proceeding have allowed numerous commenting parties and third-party experts to offer differing analyses. The comments included several expert studies critiquing the 2012 LNG Export Study. For example, Professor Wallace Tyner of Purdue University submitted results from a study that shows different results from NERA's. Sierra Club submitted a study by Synapse Energy Economics, Inc., that examined NERA's study and pointed out alleged "problems and omissions" in NERA's analysis.[136] Conversely, Southern LNG Company, Gulf LNG, and Jordan Cove Energy Project each submitted a study by Navigant that concluded that NERA's analyses were sound.[137]

DOE/FE has carefully weighed these competing analyses and viewpoints, and has conducted its own internal review of the 2012 LNG Export Study. In so doing, DOE/FE has recognized that its ultimate decision on the pending export applications would benefit from a

[134] EIA Study at ii.
[135] *See, e.g.*, NERA Study at 25-26.
[136] Synapse Energy Economics, Inc., *Will LNG Exports Benefit the United States Economy?* (Jan. 23, 2013), at 1, submitted with Initial Comments of Sierra Club.
[137] *See, e.g.*, Navigant Consulting, Inc. and Navigant Economics, Analysis of the Department of Energy's LNG Export Study (Jan. 24, 2013), App. A of Initial Comments of Gulf LNG.

public exchange of judgments and expert opinions.[138] The major purpose motivating the OMB Bulletin—to ensure that the government is well-informed by independent, expert analysis—was accomplished in this proceeding without the need for peer review.

I. Procedural Arguments

1. Comments

Several commenters, including Sierra Club, Senator Wyden, NRDC, and others argue that the current public interest standard, which focuses on meeting the nation's "essential domestic needs" for natural gas, is too narrow and that DOE/FE must undertake a rulemaking to establish criteria for making such a determination under the NGA. Similarly, Sierra Club, Alcoa, IECA, and CarbonX Energy Company, Inc., argue that DOE/FE should articulate, in the context of a separate rulemaking proceeding, the framework it will use in making its public interest determinations for individual export applications. Dow makes a related comment, stating that each of the individual LNG export dockets contains an insufficient record on which to base a public interest determination on the cumulative impact of LNG exports, and therefore DOE/FE is required to conduct a notice and comment rulemaking before it decides on any of the pending LNG export applications.

Dow, Sierra Club, Save Our Supplies, and other commenters contend that DOE/FE should conduct a public hearing regarding the applicable public interest standard in light of the cumulative impacts of LNG exports. Additionally, several commenters request that DOE/FE reopen the dockets of LNG export applicants to solicit additional public comment. Commenter Mary Altmann argues that DOE/FE should invite public comment on individual LNG applications before approving exports. IECA argues that many commenters could not

[138] *See* 77 Fed. Reg. at 73,628 ("The LNG Export Study and the comments that DOE/FE receives … will help to inform our determination of the public interest in each case.")

reasonably have been expected to intervene in individual license proceedings at the time license applications were filed, since they had no way of anticipating that more than 20 applications would eventually be filed. IECA argues that DOE/FE, therefore, has no alternative other than to allow every interested party to intervene in each proceeding. Along these same lines, CarbonX requests that its comment on the 2012 LNG Export Study be incorporated into the dockets for each pending LNG export applications.

Several commenters raise issues associated with their ability to comment on economic studies conducted by third parties and whether DOE/FE may rely on such studies in making a determination. Regarding DOE/FE's request for public comment in the NOA, Sierra Club, IECA, and others argue that DOE/FE narrowly instructed parties to address only the EIA and NERA Studies. Proponents of this argument assert that DOE/FE cannot assess whether it is in the public interest to issue additional LNG export permits by addressing only one aspect of the public interest analysis (*i.e.*, potential impacts on energy costs). Similarly, Sierra Club, IECA, CarbonX, and others, assert that citations to third-party studies in the record do not discharge DOE/FE's responsibility to evaluate the public interest because the studies are based on undisclosed proprietary data and models with limited information regarding their development and age.

Other commenters argue that DOE/FE should act now to decide each pending export application. These commenters contend additional administrative process is neither necessary nor appropriate as DOE/FE has already provided the "opportunity for hearing" required under NGA section 3(a) to make its public interest determination. Commenters such as ExxonMobil and the Center for Liquefied Natural Gas argue that the initial and reply comments submitted in response to the 2012 LNG Export Study do not change the NGA statutory and regulatory

requirements that place the burden of proof on opponents to demonstrate, with sufficient evidence, that each application is inconsistent with the public interest. These commenters argue that the record before DOE/FE regarding each individual application is sufficient for DOE/FE to determine whether LNG exports have been shown to be inconsistent with the public interest.

2. DOE/FE Analysis

Fundamentally, all of the above requests for procedural relief challenge the adequacy of the opportunity that we have given to the public to participate in this proceeding and the adequacy of the record developed to support our decision in this proceeding.

With respect to opportunity for public participation, we find that the public has been given ample opportunity to participate in this proceeding, as well as the other pending LNG export proceedings. Within this proceeding, the Notice of Application contained a detailed description of the Application, and invited the public to submit protests, motions to intervene, notices of intervention, and comments.[139] As required by DOE regulations, similar notices of application have been published in the Federal Register in each of the other non-FTA export application proceedings. Additionally, in December 2012, DOE/FE published the NOA for the EIA and NERA Studies in the Federal Register.[140] As explained above, the NOA described the content and purpose of the EIA and NERA Studies, invited the public to submit initial and reply comments, and stated that these comments will be part of the record in each individual docket proceeding.[141] DOE/FE thus has taken appropriate and necessary steps by offering the public multiple opportunities to participate in the non-FTA LNG export proceedings.

We also find the record is adequate to support the action we are taking in this Order. DOE/FE has reviewed all of the submissions made in this proceeding. Moreover, this Order sets

[139] See Emera Notice of Application, *supra* n.9.
[140] 77 Fed. Reg. at 73,627.
[141] *Id*. at 73,628.

out the reasons that support each of the determinations contained herein. Consequently, we do not find it is necessary or appropriate to delay issuance of this Order to augment the record, either through a rulemaking or public hearing. In this regard, we note that DOE/FE retains broad discretion to decide what procedures to use in fulfilling its statutory responsibilities under the NGA,[142] and our view is that the record is sufficient to support the actions that we are taking. The requests for additional procedures summarized above are denied.

IX. 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 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.[143] DOE provided a summary of the comments received and responses to substantive comments in Appendix B of the Addendum.[144]

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

[142] *See, e.g., Process Gas Consumers v. FERC*, 930 F.2d 926, 929 (D.C. Cir. 1991).
[143] Addendum at 3.
[144] *Id*. at 79-151.

increase in response to LNG export demand. EIA's Study, published as part of the 2012 LNG Export Study, projected that more than 90% of the incremental natural gas produced to supply LNG exports would come from these unconventional sources.[145]

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.

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.[146] 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 Table 6 captures differences in water intensity across energy sources.

[145] *See* 2012 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).
[146] Addendum at 10.

Table 6: Water Intensity[147]

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
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."[148] Table 7 shows the variation in the proportion of water usage by activity in shale gas regions:

[147] *Id*. at 11 (Table 2).
[148] *Id*. at 12.

Table 7: Water Usage in Shale Gas Regions[149]

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.

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."[150]

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.[151] The Addendum acknowledges, however, that while unconventional natural gas formations are thousands of feet below aquifers associated with public

[149] *Id.* at 12 (Table 3) (citations omitted).
[150] *Id.* at 13.
[151] 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).

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.[152]

The fluid used for hydraulic fracturing consists of over 98 percent water, but also may include several different chemical compounds.[153] 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 during transport to the well, storage on the well pad, or during the chemical mixing process.[154] Further, chemical additives may contaminate groundwater should the integrity of the casing or cement seal of the well be compromised.[155]

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,

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[152] *Id.* at 14.
[153] *Id.* at 14-15.
[154] *Id.* at 18.
[155] *Id.*

implementing best management practices, and administering pollution prevention concepts, may have temporary, minor impacts to water resources."[156] 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."[157]

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 Table 8 below:

Table 8: Source Categories of Airborne Emissions from Upstream Natural Gas Activities (EPA, 2013) [158]

Category	Type of Emissions	Sources of Emissions
Combustion Emissions	Nitrogen oxide (NO_x) and carbon monoxide (CO) resulting from the burning of hydrocarbon (fossil) fuels. Air toxics, particulate matter, un-combusted volatile organic compounds (VOCs), and methane (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.

[156] Addendum at 19.
[157] *Id.* at 19.
[158] *Id.* at 23 (Table 6).

The Addendum describes the existing regulatory framework relating to such emissions, as well as the EPA's 2012 New Sources Performances Standards for hydraulically fractured natural gas wells[159] and EPA's 2013 update to those standards covering storage tanks.[160] 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 hazardous air pollutants. 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. As more data become available, a better understanding of trends in local and regional air quality and potential impacts may emerge.[161]

C. Greenhouse Gas Emissions

The Addendum includes a discussion of greenhouse gas (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

[159] *Id*. at 20-22.
[160] *Id*. at 22.
[161] *Id*. at 32.

oil and gas sector, including completions and ongoing production of hydraulically fractured oil wells, compressors, pneumatic valves, liquids unloading, and leaks.[162] 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.[163]

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 "emissions of GHGs from the upstream industry are of similar magnitude for both conventional and unconventional sources."[164]

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."[165] 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

[162] 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).
[163] *Id.* at 44.
[164] *Id.* at 40.
[165] *Id.* at 51.

result that fluid pressures can be increased within a large area surrounding the injection well."[166] 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.[167]

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."[168] 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."[169] 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.

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[166] *Id*. at 52.
[167] *Id* at 55-56 (citing *Induced Seismicity Potential in Energy Technologies*. National Research Council. The National Academies Press, Washington, D.C. (2013) at 5).
[168] Addendum at 62.
[169] *Id*.

X. DISCUSSION AND CONCLUSIONS

As a preliminary matter, we again note that CNG, like LNG, constitutes "natural gas" subject to section 3(a) of the NGA.[170] We therefore apply the same public interest review in evaluating Emera's Application to export CNG to non-FTA countries as we apply in evaluating applications to export LNG to non-FTA countries. *See supra* § I.

In reviewing Emera's Application, DOE/FE has considered both its obligation under NGA section 3(a) to ensure that the proposed exports of CNG are not inconsistent with the public interest and its obligations under NEPA. To accomplish these purposes, DOE/FE has examined a wide range of information addressing non-environmental and environmental factors, including:

- Emera's Application and Clarification Letter, and APGA's Protest of the Application;
- The 2012 LNG Export Study, including comments received in response to the Study;
- The Draft Addendum, comments received in response to the Draft Addendum, and the final Addendum; and
- The Environmental Assessment (EA).

We also take administrative notice of EIA's most recent authoritative supply data and projections, set forth in AEO 2015 and discussed below.

To avoid repetition, the following discussion focuses on arguments and evidence presented by Emera and APGA (the single protestor in this proceeding), to the extent that

[170] *See K N Energy, Inc.*, Order Denying Reh'g, 24 FERC ¶ 61,200, at 61,474 (Aug. 2, 1983) ("CNG is natural gas within the meaning of the Natural Gas Act. We see no legal basis … for treating the subject sales of gas for resale in the form of CNG differently than similar sales of gas for resale in the form of liquefied natural gas, for example … The Natural Gas Act contains no basis for such a distinction."), *aff'g Kansas-Nebraska Natural Gas Co, Inc.*, Order Granting in Part and Denying in Part Petition for Declaratory Order and Denying Untimely Mots. to Intervene, 22 FERC ¶ 61,176 (Feb. 18, 1983).

DOE/FE has not already addressed the same or substantially similar arguments in its responses to comments on the 2012 LNG Export Study or the Addendum.

A. Procedural Issues

1. Emera's Request for Separate Treatment

In its Request for Separate Treatment submitted as part of the Application, Emera asks DOE/FE to consider its Application outside of the then-established order of precedence for processing LNG export applications. Under DOE's regulations, we find that Emera's Request, construed as a motion, was denied by operation of law when DOE/FE did not rule on it within 30 days after it was filed. 10 C.F.R. § 590.302(c). Additionally, we find that Emera's Request was mooted by DOE/FE's subsequent publication in August 2014 of its final Procedures for Liquefied Natural Gas Export Decisions,[171] as well as by our grant of the Application in this Order.

2. APGA's Motion for Leave to Intervene and Protest

The motion for leave to intervene submitted by APGA is unopposed and is deemed granted. 10 C.F.R. § 590.303(g).

3. AGPA's Request for Suspension of Emera's Application

As described above, APGA requested in its Motion to Intervene and Protest that DOE/FE suspend its consideration of Emera's Application (and any other pending natural gas export approvals to non-FTA countries) until any "updated EIA and external studies" of LNG exports are complete. APGA contends that, once completed, these "updated EIA and external studies" will provide a more accurate, complete record for DOE/FE to decide whether any additional natural gas exports to non-FTA countries are in the public interest.[172]

[171] *See supra* at n.41.
[172] APGA Mot. at 4-5, 25.

Emera opposes this Request and urges DOE/FE to deny it or, in the alternative, not to delay Emera's Application, citing the allegedly *de minimis* quantities of CNG that Emera proposes to export.

We find that APGA's Request, construed as a motion, was denied by operation of law when DOE/FE did not rule on it within 30 days after it was filed. 10 C.F.R. § 590.302(c). APGA's arguments in support of the Request are also mooted by DOE/FE's reliance in this Order on the most current EIA data available, set forth in AEO 2015. As discussed above in Section VIII.A, we find that using post-AEO 2011 EIA projections would not have materially affected the findings of the 2012 LNG Export Study, and therefore, we find it unnecessary to postpone review of Emera's Application, or any other pending CNG or LNG export proceedings, until such time as DOE/FE chooses to rely on new or updated LNG export studies.

B. Non-Environmental Issues

1. Emera's Application

Upon review, we find that several factors identified in the Application support a grant of the authorization to export CNG in an amount equivalent to 0.008 Bcf/d of natural gas, which represents the maximum initial capacity of the Facility.[173]

First, we agree with Emera that the volume of CNG authorized for export in this Order—equivalent to 0.008 Bcf/d of natural gas—will have no practical impact on natural gas prices or security of domestic supply in the United States, as evidenced by the 2012 LNG Export Study.

Second, as discussed below, the 2012 LNG Export Study shows that the proposed exports will generate economic benefits to the broader U.S. economy.

[173] *See supra* at 5; Emera App. at 4 (stating that "[t]he Facility will initially be capable of loading 0.008 Bcf per day of CNG (2.92 Bcf per year) and will be capable of expanding to load up to 0.025 Bcf per day (9.125 Bcf per year).").

Third, the record shows that CNG exports from the proposed Facility will provide economic benefits to Palm Beach County, Florida. The proposed exports will enhance the value of existing pipeline infrastructure and add to the local property tax base; generate construction jobs during development; and create a number of long-term jobs during the initial operational phase.

Fourth, we agree with Emera that the proposed exports are likely to foster good trade relations with and benefit development within the Bahamas. Exports of CNG to the Bahamas represent a feasible technological solution for a small market that cannot be economically served by shipments of LNG aboard ocean-going tankers. The simplified loading and unloading requirements of CNG and the proven nature of CNG technology in the transportation sector are additional technological factors supporting a grant of the Application. For these reasons, Emera's proposed exports are consistent with U.S. policy under the Caribbean Basin Initiative.

2. Price Impacts

The 2012 LNG Export Study projected the economic impacts of LNG exports in a range of scenarios, including scenarios that equaled and exceeded the current amount of long-term LNG exports authorized in the final non-FTA export authorizations to date, including the export of CNG authorized in this Order (equivalent to a total of 10.01 Bcf/d of natural gas). *See infra* § X.D, E. The 2012 LNG Export Study concluded that LNG exports at these levels (*e.g.*, 6 Bcf/d of natural gas and higher) would result in higher U.S. natural gas prices, but that these price changes would remain in a relatively narrow range across the scenarios studied. NERA's analysis indicates that, after five years of increasing LNG exports, wellhead natural gas price increases could range from $0.22 to $1.11 (2010$/Mcf) depending on the market-determined level of exports. However, even with these estimated price increases, NERA found that the

United States would experience net economic benefits from increased LNG exports in all cases studied. *See supra* § VIII.B.1, 8.

APGA contends that Emera relied on outdated EIA projections from AEO 2011. This is the same set of projections used in the LNG Export Study, and was the most recent, final set of projections available at the time. We reject APGA's arguments concerning this purportedly old data, as well as its insistence that more recent data would illustrate that the proposed exports are contrary to the public interest. As discussed above, the AEO 2015 projections from EIA indicate domestic supply and demand conditions that are more favorable, not less favorable, to exports. Specifically, the most recent outlook in the AEO 2015 Reference Case for 2035 reflects LNG exports equivalent to 9.0 Bcf/d of natural gas, net natural gas pipeline exports of 5.2 Bcf/d, and market price $0.39/MMBtu below the AEO 2011 Reference Case price, in constant 2012 dollars. It should be noted that, for 2035, the AEO 2011 Reference Case forecast 0.5 Bcf/d of net imports of natural gas plus LNG. *See supra* § VIII.A. Accordingly, we reject APGA's arguments and find that, as to the impact of these LNG exports on domestic gas prices, APGA has not overcome the statutory presumption that the requested authorization is consistent with the public interest.

3. Significance of the 2012 LNG Export Study

For the reasons discussed above, DOE/FE commissioned the 2012 LNG Export Study and invited the submission of responsive comments. DOE/FE has analyzed this material and determined that the 2012 LNG Export Study provides substantial support for granting Emera's Application. The conclusion of the 2012 LNG Export Study is that the United States will experience net economic benefits from issuance of authorizations to export domestically produced LNG—a finding that also applies to the export of CNG.

We have evaluated the initial and reply comments submitted in response to the 2012 LNG Export Study. Various commenters have criticized the data used as inputs to the 2012 LNG Export Study and numerous aspects of the models, assumptions, and design of the Study. However, EIA's most recent projections, set forth in AEO 2015, continue to show market conditions that will accommodate increased exports of natural gas. When compared to the AEO 2013 Reference Case, 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. Accordingly, we find that the 2012 LNG Export Study is fundamentally sound and supports the proposition that the proposed authorization will not be inconsistent with the public interest. In this regard, we reject APGA's contention that the findings in the 2012 LNG Export Study are not reliable.

4. Benefits of International Trade

We have not limited our review to the contents of the 2012 LNG Export Study and the current data from AEO 2015 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."[174]

We have also considered the international consequences of our decision. We review applications to export LNG and CNG 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

[174] National Export Initiative, 75 Fed. Reg. 12,433 (Mar. 16, 2010).

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 and CNG supplies, and increase the volumes of LNG and CNG 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 2012 LNG Export Study.

C. Environmental Issues

In reviewing the potential environmental impacts of Emera's proposal to export CNG, DOE/FE has considered its obligations under NEPA and its separate obligation under NGA section 3(a) to ensure that the proposal is not inconsistent with the public interest. We have also reviewed APGA's Protest. APGA did not raise specific environmental concerns about Emera's proposed exports or otherwise contest DOE's findings in the Draft EA. Further, DOE determined in the FONSI that granting Emera's Application to export CNG in a volume up to 0.008 Bcf/d of natural gas from its proposed Facility would not have a significant effect on the human environment.

1. Issuance of Environmental Assessment and Finding of No Significant Impact

The issuance of the Final EA and the FONSI for Emera's Application—both being issued concurrently with this Order—support a determination that no further environmental review of Emera's Application is necessary. Other factors supporting this determination include: (i) the relatively small volume authorized for export, and (ii) the fact that no parties in the proceeding have raised environmental concerns associated with Emera's proposed exports. In light of these

considerations, we find that no environmental conditions need to be imposed on this authorization.

2. 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.[175] Nevertheless, a decision by DOE/FE to authorize exports to non-FTA nations could accelerate that development by some increment. For this reason, 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

[175] Addendum at 2.

regulations for hydraulically fractured wells that are expected to yield significant emissions reductions.[176] In 2013, EPA updated those regulations to include storage tanks,[177] 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.[178] 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."[179] Specifically, as part of the Administration's efforts to address climate change, EPA has initiated 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.[180] EPA recently issued the proposed rule, with a final rule expected to follow in 2016.[181]

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 discussed herein, but would have little more than a modest, incremental impact on the environmental issues raised by commenters to the 2012 LNG Export Study. For these reasons, we conclude that the environmental concerns

[176] 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).
[177] 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).
[178] 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* § IX.C.
[179] 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.
[180] 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-climateaction-plan-anno-1.
[181] *See* U.S. Environmental Protection Agency, Oil and Natural Gas Sector: Emission Standards for New and Modified Sources, Proposed Rule, 80 Fed. Reg. 56,593 (Sept. 18, 2015).

associated with natural gas production do not establish that exports of natural gas to non-FTA nations are inconsistent with the public interest.

D. Other Considerations

Our decision is not premised on an uncritical acceptance of the general conclusion of the 2012 LNG Export Study of net economic benefits from exports of LNG and CNG. Both the 2012 LNG Export Study and many public comments identify significant uncertainties and even potential negative impacts from such 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 and CNG export projects will ever be realized because of the time, difficulty, and expense of commercializing, financing, and constructing such projects, as well as the uncertainties inherent in the global market demand for LNG and CNG.

More generally, DOE/FE continues to subscribe to the principle set forth in our 1984 Policy Guidelines[182] that, under most circumstances, the market is the most efficient means of allocating natural gas supplies. However, we recognize that 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.[183] Given these possibilities, DOE/FE recognizes the need to monitor market developments closely as the impact of successive authorizations of LNG exports unfolds.

[182] 49 Fed. Reg. at 6684.

[183] Some commenters on the 2012 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

E. Conclusion

We have reviewed the evidence in the record and have not found an adequate basis to conclude that Emera's proposed exports of CNG to non-FTA countries will be inconsistent with the public interest. We find that APGA, the only protestor in this proceeding, has failed to overcome the statutory presumption that the requested export authorization is consistent with the public interest. For that reason, we are authorizing Emera'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 decision-making 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 10.01 Bcf/d of natural gas, or 3.65 trillion cubic feet per year, for the 10 final authorizations issued to date— Sabine Pass Liquefaction, LLC (2.2 Bcf/d),[184] Carib Energy (USA) LLC (0.04 Bcf/d),[185] Cameron LNG, LLC (1.7 Bcf/d),[186] FLEX I (1.4 Bcf/d),[187] FLEX II (0.4 Bcf/d),[188] Dominion Cove Point LNG,

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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 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. § 717o).

[184] *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).

[185] *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).

[186] *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).

[187] *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).

LP (0.77 Bcf/d),[189] Cheniere Marketing, LLC and Corpus Christi Liquefaction, LLC (2.1 Bcf/d),[190] Sabine Pass Liquefaction, LLC Expansion Project (1.38 Bcf/d),[191] American LNG (0.008 Bcf/d),[192] and this Order (0.008 Bcf/d). This total export volume is within the range of scenarios analyzed in the 2012 EIA and NERA studies. 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, APGA's submission does not undermine the reasonableness of the findings in the 2012 LNG Export Study.

DOE/FE will continue taking a measured approach in reviewing the other pending applications to export natural gas. 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

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

[189] *Dominion Cove Point LNG, LP*, DOE/FE Order No. 3331-A, FE Docket No. 11-128-LNG, Final Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas from the Cove Point LNG Terminal in Calvert County, Maryland, to Non-Free Trade Agreement Nations (May 7, 2015).

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

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

[192] *American LNG Marketing LLC*, DOE/FE Order No. 3690, FE Docket No. 14-209-LNG, Final Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas in ISO Containers Loaded at the Proposed Hialeah Facility near Medley, Florida, and Exported by Vessel to Non-Free Trade Agreement Nations (Aug. 7, 2015).

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 2012 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 and CNG 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 developments that could tend to undermine the public interest in grants of successive applications for exports of domestically produced LNG and CNG and, as previously stated, to attach terms and conditions to the authorization in this proceeding and to succeeding LNG and CNG 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. Emera must abide by each term and condition or face rescission of its authorization or other appropriate sanction.

A. Term of the Authorization

Emera requests a 20-year term for the authorization commencing from the date export operations begin. This term is consistent with our practice in the final and conditional non-FTA export authorizations issued to date.[193] In imposing this condition, we are mindful that CNG export facilities are capital intensive and that, to obtain financing for such projects, there must be

[193] *See, e.g.*, *Freeport LNG Expansion, L.P., et al.*, DOE/FE Order No. 3357-B, at 100-01.

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. Accordingly, the 20-year term will begin on the date when Emera commences commercial export of domestically sourced CNG from the Facility, but not before.

B. Commencement of Operations Within Seven Years

Emera requested this authorization to commence on the earlier of the date of first export or five years from the date of the issuance of this Order. Consistent with the final and conditional non-FTA authorizations issued to date, DOE/FE will add as a condition of the authorization that Emera must commence commercial CNG 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. 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.[194] 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.

[194] 10 C.F.R. § 590.405.

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 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.[195]

D. Contract Provisions for the Sale or Transfer of CNG to be Exported

DOE/FE's regulations require applicants to supply transaction-specific factual information "to the extent practicable."[196] 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.[197]

DOE/FE will require that Emera file or cause to be filed with DOE/FE any relevant long-term commercial agreements, including sale and purchase agreements, pursuant to which Emera exports CNG.

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

[195] 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).
[196] 10 C.F.R. § 590.202(b).
[197] *Id*. § 590.202(e).

"relevant long-term commercial agreement" would include a sale and purchase agreement with a minimum term of two years pursuant to which Emera exports CNG from the Facility.

In addition, DOE/FE finds that section 590.202(c) of DOE/FE's regulations[198] requires that Emera file all long-term contracts associated with the long-term supply of natural gas to the Facility within 30 days of their execution.

DOE/FE recognizes that some information in Emera's long-term commercial agreements associated with the export of CNG, and/or long-term contracts associated with the long-term supply of natural gas to the Facility, may be commercially sensitive. DOE/FE therefore will provide Emera the option to file unredacted contracts, or in the alternative (A) Emera may file 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 that future contracts for the sale or transfer of CNG exported pursuant to this Order shall include an acknowledgement of these requirements.

E. Export Quantity

We are not granting the Application in the full export quantity requested by Emera (0.025 Bcf/d of natural gas), and instead are granting the requested authorization only to the extent of the initial capacity of Emera's proposed natural gas compression and loading Facility (0.008

[198] *Id*. § 590.202(c).

Bcf/d of natural gas) as stated in the Application.[199] As we have previously observed, DOE/FE's policy is not to authorize exports that exceed the capacity of the LNG export terminal associated with the export application.[200] The same policy applies to facilities used to compress natural gas for export. Consequently, this Order authorizes the export of CNG up to the equivalent of 0.008 Bcf/d of natural gas (2.92 Bcf/yr).

F. Combined FTA and Non-FTA Export Authorization Volumes

Emera is currently authorized by DOE/FE Order No. 3447 to export domestically produced CNG to FTA countries in a volume equivalent to approximately 0.025 Bcf/d of natural gas (9.125 Bcf/yr). For the reasons explained above, however, the authorization issued in this Order will be limited to exports in a volume equivalent to 0.008 Bcf/d of natural gas (2.92 Bcf/yr). Because the source of CNG proposed for export for both export authorizations is from the same Facility, Emera may not treat the volumes authorized for export in the two proceedings as additive to one another.

XII. FINDINGS

On the basis of the findings and conclusions set forth above, 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 Emera's Application should be granted subject to the Terms and Conditions set forth herein. The following Ordering Paragraphs reflect current DOE/FE practice.

[199] *See supra* at 5.
[200] *See, e.g.*, Dominion Cove Point LNG, LP, DOE/FE Order No. 3331-A, at 106 (Para. H, Export Quantity).

XIII. ORDER

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

A. Emera CNG, LLC is authorized to export domestically produced CNG by vessel from its proposed CNG compression and loading Facility to be located within the Port of Palm Beach, in Riviera Beach, Florida, in an amount up to the equivalent of 2.92 Bcf/yr of natural gas. This authorization is 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 (October 19, 2022). Emera is authorized to export this CNG solely on its own behalf, pursuant to one or more long-term contracts (a contract greater than two years).

B. Emera must commence export operations using the planned Facility no later than seven years from the date of issuance of this Order.

C. The CNG export quantity authorized in this Order is equivalent to 2.92 Bcf/yr of natural gas. This quantity is not additive to the export volume in Emera's FTA authorization in this docket, set forth in DOE/FE Order No. 3447.

D. This CNG may be exported to any country which presently has, or in the future develops, the capacity to import CNG transported on ocean-going carriers or other waterborne vessels, provided that the country does not have a FTA with the United States requiring the national treatment for trade in natural gas, and with which trade is not prohibited by U.S. law or policy.

E. Emera 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 U. S. Department of the Treasury and the U.S. Department of Transportation. Failure to comply with these requirements could result in rescission of this authorization and/or other civil or criminal remedies.

F. (i) Emera shall file with the Office of Regulation and International Engagement, Division of Natural Gas Regulation, a non-redacted copy of all executed long-term contracts associated with the long-term export of CNG from the Facility. The non-redacted copies may be filed under seal and must be filed within 30 days of their execution. Additionally, if Emera 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, Emera shall also 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, Emera shall state why the redacted or non-disclosed information should be exempted from public disclosure.

(ii) Emera shall file, or cause others to file, with the Office of Regulation and International Engagement, Division of Natural Gas Regulation, a non-redacted copy of all executed long-term contracts associated with the long-term supply of natural gas to the Facility. The non-redacted copies may be filed under seal and must be filed within 30 days of their execution. Additionally, if Emera 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, Emera shall also 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, Emera shall state why the redacted or non-disclosed information should be exempted from public disclosure.

G. Emera shall include the following provision in any agreement or other contract for the sale or transfer of CNG exported pursuant to this Order:

> Customer or purchaser acknowledges and agrees that it will resell or transfer CNG purchased hereunder for delivery only to countries identified in Ordering Paragraph D of DOE/FE Order No. 3727, issued October 19, 2015, in FE Docket No. 13-157-CNG, and/or to purchasers that have agreed in writing to limit their direct or indirect resale or transfer of such CNG to such countries. Customer or purchaser further commits to cause a report to be provided to Emera CNG, LLC that identifies the country (or countries) into which the exported CNG or natural gas was actually delivered and/or received for end use, and to include in any resale contract for such CNG the necessary conditions to insure that Emera CNG, LLC is made aware of all such countries.

H. Within two weeks after the first export of domestically produced CNG by Emera occurs from the Facility, Emera shall provide written notification of the date that the first export of CNG authorized in Ordering Paragraph A above occurred.

I. Emera shall file with the Office of Regulation and International Engagement, Division of Natural Gas Regulation, on a semi-annual basis, written reports describing the status of the proposed Facility. The reports shall be filed on or by April 1 and October 1 of each year, and shall include information on the status of the proposed Facility, the date the Facility is expected to commence first exports of CNG, and the status of the long-term contracts associated with the long-term export of CNG and any related long-term supply contracts.

J. Prior to any change in control of the authorization holder, Emera must comply with DOE/FE Procedures for Change in Control Affecting Applications and Authorizations to Import or Export Natural Gas.[201] 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 Emera, 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

[201] *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. 65,541 (Nov. 5, 2014).

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.[202]

K. Monthly Reports: With respect to the CNG exports authorized by this Order, Emera shall file with the Office of Regulation and International Engagement, Division of Natural Gas Regulation, within 30 days following the last day of each calendar month, a report indicating whether exports of CNG 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 CNG have occurred, the report must give the following details of each CNG cargo: (1) the name(s) of the authorized exporter registered with DOE/FE; (2) the date of departure from the U.S. export port or terminal; (3) the country (or countries) into which the exported CNG or natural gas was actually delivered and/or received for end use; (4) the name of the supplier/seller; (5) the volume in thousand cubic feet (Mcf); (6) the CNG container loading facility and location; (7) the mode(s) of transport from the CNG container loading facility to the U.S. export port or terminal; (8) the name of the U.S. export port or terminal; (9) the price at the point of export in U.S. dollars per million British thermal units (MMBtu); (10) the name of the ocean going vessel; (11) the name(s) of the purchaser(s); and (12) the duration of the supply agreement.

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

I. 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.

[202] *See id*. at 65,542.

J. The motion to intervene in this proceeding submitted by the American Public Gas Association (APGA) is granted.

K. Emera's Request for Separate Treatment is both moot and denied by operation of law. 10 C.F.R. § 590.302(c).

L. APGA's request for DOE/FE to suspend consideration of Emera's Application is both moot and denied by operation of law. 10 C.F.R. § 590.302(c).

Issued in Washington, D.C., on October 19, 2015.

Christopher A. Smith
Assistant Secretary
Office of Fossil Energy