

UNITED STATES OF AMERICA  
DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY

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SABINE PASS LIQUEFACTION, LLC )  
 ) FE DOCKET NO. 15-63-LNG  
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OPINION AND ORDER DENYING REQUEST FOR REHEARING  
OF ORDER GRANTING LONG-TERM, MULTI-CONTRACT AUTHORIZATION  
TO EXPORT LIQUEFIED NATURAL GAS BY VESSEL  
FROM THE SABINE PASS LNG TERMINAL  
LOCATED IN CAMERON PARISH, LOUISIANA,  
TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO. 3792-A

OCTOBER 20, 2016

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## **FREQUENTLY USED ACRONYMS**

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

## I. INTRODUCTION

On March 11, 2016, the Department of Energy's (DOE or the Department) Office of Fossil Energy (DOE/FE) issued DOE/FE Order No. 3792<sup>1</sup> (Order or Order No. 3792) to Sabine Pass Liquefaction, LLC (SPL or Sabine Pass)<sup>2</sup> under section 3 of the Natural Gas Act (NGA).<sup>3</sup> In that Opinion and Order, DOE/FE granted SPL's application filed on April 20, 2015 (Application),<sup>4</sup> in which SPL requested long-term, multi-contract authorization to export domestically produced liquefied natural gas (LNG) by vessel to nations with which the United States has not entered into a free trade agreement requiring national treatment for trade in natural gas, and with which trade is not prohibited by U.S. law or policy (non-FTA countries).<sup>5</sup>

Order No. 3792 authorizes SPL to export LNG to non-FTA countries in a volume equivalent to approximately 203 billion cubic feet per year (Bcf/yr) of natural gas, or 0.56 Bcf per day (Bcf/d), for a term of 20 years (Design Increase).<sup>6</sup> SPL's exports will originate from Trains 1, 2, 3, and 4 of the Sabine Pass Liquefaction Project (Liquefaction Project).<sup>7</sup> SPL and its

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<sup>1</sup> *Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 3792, FE Docket No. 15-63-LNG, Final Opinion & Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Sabine Pass LNG Terminal Located in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations (Mar. 11, 2016) [hereinafter SPL Order].

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

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

<sup>4</sup> Sabine Pass Liquefaction, LLC, FE Docket No. 15-63-LNG, Application for Long-Term Authorizations to Export Liquefied Natural Gas to Non-Free Trade Agreement Nations (Apr. 20, 2015) [hereinafter SPL App.].

<sup>5</sup> NGA section 3(a), 15 U.S.C. § 717b(a). 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 (FTA countries). FTAs with Israel and Costa Rica do not require national treatment for trade in natural gas.

<sup>6</sup> DOE/FE authorized SPL to export the LNG on its own behalf and as an agent for other entities that hold title to the LNG, after registering each such entity with DOE/FE. Order No. 3792 contains numerous other terms and conditions. See SPL Order at 191-204.

<sup>7</sup> In separate orders not at issue here, DOE/FE has authorized SPL to export LNG from Trains 5 and 6 of the Liquefaction Project in a volume equivalent to 503.3 Bcf/yr of natural gas. See *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

affiliate, Sabine Pass LNG, L.P., are constructing the Liquefaction Project at the existing Sabine Pass LNG Terminal in Cameron Parish, Louisiana (Sabine Pass LNG Terminal).

Earlier, in 2012, the Federal Energy Regulatory Commission (FERC or the Commission) authorized SPL and Sabine Pass LNG, L.P. (collectively, Sabine Pass) to site, construct, and operate Trains 1-4 of the Liquefaction Project with a maximum LNG production capacity of up to 803 Bcf/yr, or approximately 2.2 Bcf/d, of natural gas.<sup>8</sup> The following year, SPL and Sabine Pass LNG, L.P. filed a new application with FERC, seeking to implement certain design changes that would increase the combined maximum LNG production capacity of Trains 1-4 from 2.2 Bcf/d to 2.76 Bcf/d—an increase of 0.56 Bcf/d, or 203 Bcf/yr, of natural gas.<sup>9</sup> These design changes, Sabine Pass explained, would “remove bottlenecks and result in more LNG production using the same power provided by the turbines.”<sup>10</sup> On February 20, 2014, FERC issued its 2014 Order amending the 2012 FERC Order and approving this design increase.<sup>11</sup>

DOE/FE has issued two non-FTA orders authorizing the export of LNG from Trains 1-4 of the Liquefaction Project. First, in DOE/FE Order No. 2961-A, DOE authorized SPL to export LNG from Trains 1-4 to non-FTA countries in the same volume as the 2012 FERC Order—

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Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Sabine Pass LNG Terminal Located in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations (June 26, 2015). In DOE/FE Order No. 3669-A, issued on May 26, 2016, DOE/FE denied Sierra Club’s request for rehearing of that order. Sierra Club subsequently petitioned for review of these orders in D.C. Circuit Case No. 16-1252, which is pending.

<sup>8</sup> See *Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.*, 139 FERC ¶ 61,039 (2012) [hereinafter 2012 FERC Order], *reh’g denied*, 140 FERC ¶ 61,076 (2012); *Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.*, 144 FERC ¶ 61,099 (2013).

<sup>9</sup> *Sabine Pass Liquefaction, LLC*, 146 FERC ¶ 61,117, at P 1 [hereinafter 2014 FERC Order], *reh’g denied*, 148 FERC ¶ 61,200 (2014), *aff’d sub nom. Sierra Club v. FERC*, 2016 WL 3525562, Case No. 14-1249 (D.C. Cir. June 28, 2016).

<sup>10</sup> 2014 FERC Order at P 4.

<sup>11</sup> See *id.* at P 1.

equivalent to 803 Bcf/yr of natural gas.<sup>12</sup> Second, in the Order at issue in this proceeding (Order No. 3792), DOE/FE granted SPL's request to export an additional 203 Bcf/yr of natural gas from Trains 1-4 to non-FTA countries, consistent with the FERC-approved design increase. Together, DOE/FE Order Nos. 2961-A and 3792 align SPL's non-FTA export volumes for Trains 1-4 with the combined LNG capacity for those trains, as approved by FERC (a total of 1,006 Bcf/yr of natural gas).<sup>13</sup> These and other LNG export authorizations held by SPL for the Liquefaction Project are described in Order No. 3792.<sup>14</sup>

On April 11, 2016, Sierra Club timely filed a Request for Rehearing of Order No. 3792.<sup>15</sup> For the reasons set forth below, DOE/FE denies Sierra Club's Request for Rehearing, and affirms the findings and conclusions in the Order.

## **II. PROCEDURAL BACKGROUND**

### **A. Environmental Review Procedures**

#### **1. FERC's Environmental Assessments and Final Orders**

When an applicant seeks authority both to export LNG to non-FTA countries and to construct a LNG terminal for that purpose, DOE and FERC work together to avoid duplication of effort in the environmental review required under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 *et seq.* In such cases, FERC is the "lead agency" and DOE/FE is the "cooperating agency" within the meaning of the regulations of the Council on Environmental Quality (CEQ) that implement NEPA.<sup>16</sup> FERC's lead agency role was codified

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<sup>12</sup> *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).

<sup>13</sup> SPL App. at 2 n.5.

<sup>14</sup> See SPL Order at 2-3, 16-18.

<sup>15</sup> Sierra Club, Request for Rehearing, FE Docket No. 15-63-LNG (Apr. 11, 2016) [hereinafter Rehearing Request].

<sup>16</sup> The CEQ regulations implementing NEPA define a "cooperating agency" as "any Federal agency other than a lead agency which has jurisdiction by law or special expertise" with respect to any proposed action for which a

by section 313 of the Energy Policy Act of 2005 (Pub. L. 109-58 (Aug. 8, 2005)), which amended section 15 of the NGA (15 U.S.C. § 717n).<sup>17</sup> The present case follows that framework.

**2012 FERC Proceeding.** As relevant to this proceeding, DOE participated as a cooperating agency in FERC's preparation of the environmental assessment (EA) for Trains 1-4 of the Liquefaction Project pursuant to NEPA.<sup>18</sup> The EA was placed into the public record on December 27, 2011 (2011 EA).<sup>19</sup> The 2011 EA recommended that FERC subject any approval of the Liquefaction Project to 53 environmental mitigation measures.<sup>20</sup> FERC staff concluded that, upon adoption of these 53 measures, the approval of the Liquefaction Project would not constitute a major federal action significantly affecting the quality of the human environment, and therefore FERC staff recommended a finding of no significant impact.<sup>21</sup>

Based on the analysis in the EA, FERC issued its 2012 Order authorizing Sabine Pass to site, construct, and operate Trains 1-4 of the Project.<sup>22</sup> FERC's authorization was based on Sabine Pass's compliance with 55 environmental conditions—the 53 mitigation measures recommended in the EA, plus two conditions added by FERC—which were imposed as conditions of the authorization.<sup>23</sup>

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NEPA analysis is prepared. 40 C.F.R. § 1508.5. The selection and responsibilities of a cooperating agency are described in 40 C.F.R. § 1501.6. DOE's regulations state that it will perform its NEPA responsibilities in accordance with the CEQ regulations. 10 C.F.R. §§ 1021.101, 1021.103.

<sup>17</sup> See 15 U.S.C. § 717n(b)(1).

<sup>18</sup> 2012 FERC Order at P 33.

<sup>19</sup> See *id.*; see also Environmental Assessment for the Sabine Pass Liquefaction Project, Sabine Pass Liquefaction, LLC, and Sabine Pass LNG, L.P., FERC Docket No. CP11-72-000 (Dec. 2011) [hereinafter 2011 EA].

<sup>20</sup> See 2011 EA at 4-1 to 4-9.

<sup>21</sup> See *id.* at 4-1.

<sup>22</sup> See 2012 FERC Order, *supra* note 8.

<sup>23</sup> 2012 FERC Order at P 118 & Appendix D. In 2013, FERC issued an order to Sabine Pass authorizing certain modifications to the authorized facilities and an accelerated construction of the Liquefaction Project, but that order did not change the Project's maximum LNG production capacity approved in the 2012 FERC Order. See *supra* note 8.

**2014 FERC Design Increase Proceeding.** On January 24, 2014, FERC issued a second EA for Trains 1-4 of the Liquefaction Project, which considered Sabine Pass’s application (or “Amendment”) to increase the combined maximum LNG capacity of Trains 1-4 from approximately 2.2 Bcf/day to 2.76 Bcf/day of natural gas (2014 EA).<sup>24</sup> In the 2014 EA, FERC staff considered comments made by Sierra Club opposing the design increase, but recommended approval of Sabine Pass’s application.<sup>25</sup> FERC staff determined that the proposed design changes to Trains 1-4 would not require either the construction of new facilities or the modification of the previously authorized Liquefaction Project, and thus would not constitute a major federal action significantly affecting the quality of the human environment.<sup>26</sup>

Based on the analysis in the 2014 EA, FERC issued its 2014 Order authorizing Sabine Pass’s requested design increase for Trains 1-4 of the Project.<sup>27</sup> In so doing, FERC amended the approved LNG production capacity for Trains 1-4, but affirmed that, “[i]n all other respects, the authorizations granted in the 2012 Order ... remain in full force and effect.”<sup>28</sup>

Sierra Club filed a timely request for rehearing of the 2014 FERC Order, and FERC denied that request on September 18, 2014. Sierra Club subsequently petitioned for review of FERC’s 2014 Order and FERC’s related rehearing order in the United States Court of Appeals for the District of Columbia Circuit. On June 28, 2016, the Court dismissed Sierra Club’s petition for review in part and denied it in part.<sup>29</sup>

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<sup>24</sup> Environmental Assessment for the Sabine Pass Liquefaction Project, Sabine Pass Liquefaction, LLC, and Sabine Pass LNG, L.P., FERC Docket No. CP14-12-000 (Jan. 2014) [hereinafter 2014 EA]. The preparation of the 2014 EA was an amendment to the 2011 EA, and did not involve cooperating agencies.

<sup>25</sup> See 2014 EA at 4-7.

<sup>26</sup> See *id.* at 7.

<sup>27</sup> See 2014 FERC Order, *supra* note 9.

<sup>28</sup> *Id.* (Ordering Para. (B)).

<sup>29</sup> *Sierra Club v. FERC*, 2016 WL 3525562, Case No. 14-1249 (D.C. Cir. June 28, 2016), *supra* note 9.



## 2. DOE's Environmental Documents and Order

In connection with this and other LNG export proceedings, on June 4, 2014, DOE/FE provided notice in the *Federal Register* of two separate documents that proposed to evaluate different environmental aspects of the LNG production and export chain. First, DOE/FE announced that it had conducted a review of existing literature on potential environmental aspects associated with unconventional gas production in the lower-48 states. DOE/FE published its draft report for public review and comment, entitled *Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States*.<sup>30</sup> 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.<sup>31</sup>

Second, DOE/FE commissioned the National Energy Technology Laboratory (NETL), a DOE applied research laboratory, to conduct an analysis estimating the life cycle greenhouse gas (GHG) emissions for LNG exported from the United States, regasified, and combusted for electric generation in Europe or Asia. The report compared the life-cycle GHG emissions of U.S.-exported LNG to other sources of natural gas available in Europe and Asia, as well as those of regionally-sourced coal. On May 29, 2014, DOE/FE published NETL's report entitled, *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (referred to as the LCA GHG Report),<sup>32</sup> as well as a 200-page supporting document entitled, *Life*

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<sup>30</sup> U.S. Dep't of Energy, Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States, 79 Fed. Reg. 32,258 (June 4, 2014) [hereinafter Draft Addendum]. DOE/FE announced the availability of the Draft Addendum on its website on May 29, 2014.

<sup>31</sup> U.S. Dep't of Energy, Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States, 79 Fed. Reg. 48,132 (Aug. 15, 2014) [hereinafter Addendum].

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

*Cycle Analysis of Natural Gas Extraction and Power Generation*.<sup>33</sup> DOE/FE received public comments on the LCA GHG Report and the supporting document, and provided its response to those comments in the Final Order.

DOE/FE issued Order No. 3792 on March 11, 2016. In that Order, DOE/FE: (i) independently reviewed FERC's NEPA analysis and other outstanding environmental issues, including public comments received on the Addendum and LCA GHG Report; (ii) considered the environmental information that had been developed and the related arguments of the commenters and parties, and found that it had not been demonstrated that SPL's requested authorization was inconsistent with the public interest; and (iii) granted SPL's Application for the Design Increase subject to further conditions, including the 55 environmental conditions adopted in the FERC 2012 and 2014 Orders.<sup>34</sup>

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

Sierra Club filed its Rehearing Request on April 11, 2016, seeking rehearing of DOE/FE Order No. 3792. On April 26, 2016, SPL filed a Motion for Leave to Answer and Answer to Sierra Club's Request for Rehearing.<sup>35</sup> On May 10, 2016, DOE/FE issued an order granting both Sierra Club's Rehearing Request and SPL's Motion for Leave to Answer for the limited purpose of further consideration.<sup>36</sup> We address Sierra Club's and SPL's arguments below.

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<sup>33</sup> See U.S. Dep't of Energy, Nat'l Energy Tech. Lab., *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (May 29, 2014), available at: <http://energy.gov/fe/life-cycle-greenhouse-gas-perspective-exporting-liquefied-natural-gas-united-states>; see also U.S. Dep't of Energy, Nat'l Energy Tech. Lab., *Life Cycle Analysis of Natural Gas Extraction and Power Generation* (May 29, 2014), available at: <http://www.netl.doe.gov/research/energy-analysis/search-publications/vuedetails?id=779>. The LCA GHG Report and the supporting document are incorporated herein by reference.

<sup>34</sup> See SPL Order (*Sabine Pass Liquefaction, LLC*, DOE/FE Order No. 3792), at 11-13.

<sup>35</sup> *Sabine Pass Liquefaction, LLC*, Motion for Leave to File Answer and Answer to Sierra Club's Request for Rehearing, FE Docket No. 15-63-LNG (Apr. 26, 2016) [hereinafter SPL Answer].

<sup>36</sup> *Sabine Pass Liquefaction, LLC*, Order Granting Request for Rehearing and Motion for Leave to Answer for the Purpose of Further Consideration, FE Docket No. 15-63-LNG (May 10, 2016).

### III. DISCUSSION

#### A. The Rebuttable Presumption Derives from the Natural Gas Act

##### 1. Sierra Club's Position

Sierra Club asserts that DOE/FE erred in finding that section 3(a) of the NGA establishes a rebuttable presumption that exports of natural gas are in the public interest. Likewise, Sierra Club challenges the proposition that *Panhandle Producers & Royalty Owners Ass'n v. Economic Regulatory Administration*, 822 F.2d 1105 (D.C. Cir. 1987) (hereinafter *Panhandle Producers*) recognized a statutory presumption applicable to LNG export proceedings. Instead, Sierra Club submits the presumption addressed in *Panhandle Producers* applies only to import proceedings and was derived from DOE Policy Guidelines adopted in 1984, rather than the language of the NGA.<sup>37</sup>

Sierra Club further asserts that DOE cannot presume that “a project with adverse environmental impacts” is consistent with the public interest.<sup>38</sup> Sierra Club contends that it provided record evidence that affirmatively demonstrates that SPL's Application is inconsistent with the public interest but that—even if DOE/FE were to determine that Sierra Club had not made this showing—DOE/FE must take a “hard look” at the environmental impacts of the Liquefaction Project design increase under NEPA and determine whether these impacts are consistent with the public interest under the NGA.<sup>39</sup>

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<sup>37</sup> According to Sierra Club, the U.S. Court of Appeals for the District of Columbia Circuit in *Panhandle Producers* reviewed certain presumptions regarding natural gas imports set forth in DOE's *New Policy Guidelines and Delegation Orders from Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Imported Natural Gas*, 49 Fed. Reg. 6684 (Feb. 22, 1984) [hereinafter 1984 Policy Guidelines]. Sierra Club asserts that the “two specific rebuttable presumptions” arising from the 1984 Policy Guidelines are: (i) if the terms of a natural gas import contract are flexible enough, the natural gas will be delivered only if it is competitive; and (ii) if the imported gas is competitive, it will fill a domestic need. Rehearing Request at 2-3 (citing *Panhandle Producers*, 822 F.2d at 1111). Sierra Club further contends *Panhandle Producers* did not reach the question of whether any presumptions regarding imports or exports were compelled by the NGA. *Id.* at 3.

<sup>38</sup> *Id.* at 2-3 (and section heading).

<sup>39</sup> *Id.* at 2.

## 2. SPL's Answer

SPL disputes Sierra Club's assertion that, in authorizing SPL's exports, no presumption applies under the Natural Gas Act. SPL first contends that the plain statutory text is sufficient to show that a presumption applies here. Next, SPL reiterates that "section 3 sets out a general presumption favoring such authorization, by language which requires approval of an application unless there is an express finding that the proposed activity would not be consistent with the public interest."<sup>40</sup> According to SPL, the *Panhandle Producers* case discussed by Sierra Club also makes clear that "§3 [of the Natural Gas Act] requires an affirmative showing of inconsistency with the public interest to deny an application."<sup>41</sup> Finally, SPL disputes that NEPA nullifies the NGA section 3 presumption. SPL states that, because NEPA's mandate is "essentially procedural," NEPA does not mandate substantive results, such as conditioning the public interest inquiry under NGA section 3 on any particular environmental finding.<sup>42</sup> Nor, SPL maintains, is NEPA a suitable vehicle for airing grievances about substantive agency policies because NEPA was not intended to resolve fundamental policy disputes.<sup>43</sup>

## 3. DOE/FE Analysis

The rebuttable presumption comes from the language of NGA section 3(a), which requires the Department to issue both export and import authorizations "unless, after opportunity for a hearing, it finds that the proposed exportation or importation will not be consistent with the public interest."<sup>44</sup> DOE interprets these words to mean that, for the Department to deny an application, it must make an affirmative finding based on record evidence that the proposed

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<sup>40</sup> SPL Answer at 5 (quoting *W. Va. Pub. Servs. Comm'n v. U.S. Dep't of Energy*, 681 F.2d 847, 856 (D.C. Cir. 1982)).

<sup>41</sup> *Id.* (quoting *Panhandle Producers*, 822 F.2d at 1111).

<sup>42</sup> *Id.* at 6 (quoting *Grunewald v. Jarvis*, 776 F.3d 893, 903 (D.C. Cir. 2015) (internal quotation omitted)).

<sup>43</sup> *See id.* (citation omitted).

<sup>44</sup> 15 U.S.C. § 717b(a) (emphasis added).

import or export is inconsistent with the public interest. The Department refers to this as a rebuttable presumption because, absent evidence demonstrating that a proposed export or import is inconsistent with the public interest, the Department must grant the requested authorization. Sierra Club claims that the court in *Panhandle Producers* “did not reach the question of whether any presumptions regarding imports or exports were compelled by the Natural Gas Act.”<sup>45</sup> But, as SPL points out, the court in fact stated that “§ 3 [of the NGA] requires an affirmative showing of inconsistency with the public interest to *deny* an application.”<sup>46</sup>

The rebuttable presumption in section 3(a) may affect the Department’s ultimate judgment whether to grant or deny an application, but it does not affect the Department’s obligations under NEPA. NEPA places an independent obligation on the Department to present information relating to the environmental impacts that may result from its decisions and to take a “hard look” at those impacts.<sup>47</sup> The rebuttable presumption has no bearing on these independent NEPA obligations and did not affect the Department’s performance of those obligations in this proceeding.

As the record demonstrates, the Department took the “hard look” at SPL’s export proposal required by NEPA. The Department participated as a cooperating agency in FERC’s environmental review, independently reviewed the EA prepared by FERC, and adopted the 55 environmental conditions imposed by FERC in the 2012 and 2014 FERC Orders.<sup>48</sup> In fulfilling its responsibilities under NEPA, the Department applied no presumptions regarding the potential environmental impacts associated with SPL’s proposed exports, as the record shows. We

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<sup>45</sup> Rehearing Request at 3.

<sup>46</sup> *Panhandle Producers*, 822 F.2d at 1111 (emphasis in original); *see also id.* at 1112 (describing the court’s earlier decision in *West Virginia Pub. Serv. Comm. v. DOE*, 681 F.2d 847, 856 (D.C. Cir. 1982), as having “explicitly found that the statute created a presumption in favor of authorization.”).

<sup>47</sup> 42 U.S.C. § 4332.

<sup>48</sup> *See* SPL Order at 199 (Ordering Para. H).

therefore reject Sierra Club’s arguments concerning DOE/FE’s interpretation of the NGA as it relates to the rebuttable presumption.

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

**1. Sierra Club’s Position**

Sierra Club asserts that DOE/FE’s environmental review failed to comply with NEPA because FERC’s EA, which DOE/FE adopted, did not take a “hard look” at DOE/FE’s proposed authorization of exports—specifically, the indirect and cumulative impacts of LNG exports.<sup>49</sup>

Sierra Club first argues that DOE violated NEPA by relying on FERC’s EA, rather than a “full Environmental Impact Statement” (EIS), for the proposed Design Increase.<sup>50</sup> According to Sierra Club, DOE’s regulations provide that an authorization “involving major operational changes (such as a major increase in the quantity of liquefied natural gas imported or exported)’ normally require a complete Environmental Impact Statement.”<sup>51</sup> Sierra Club contends that Order No. 3792 does not discuss this regulation or DOE’s departure from it. Nor, according to Sierra Club, has DOE “explained how a 25% increase in operations, exporting an additional 0.56 bcf/d, is not a ‘major increase in the quantity of liquefied natural gas exported.’”<sup>52</sup> More broadly, Sierra Club asserts that DOE can avoid a full EIS only where DOE can determine with confidence that the impacts associated with a proposed project will not be significant. Yet, in Sierra Club’s view, DOE “has provided no basis for definitively concluding that these impacts [associated with the Design Increase] will *not* be significant.”<sup>53</sup>

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<sup>49</sup> Rehearing Request 4.

<sup>50</sup> *Id.* at 5

<sup>51</sup> *Id.* at 21 (quoting 10 C.F.R. Part 1021, Subpart D, Appx. D, D9).

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

Sierra Club further asserts that the Environmental Addendum and the LCA GHG Report are not substitutes for NEPA review, because they contradict one another, do not specify impacts associated with SPL's Design Increase, and thereby fail to inform the public and provide a basis for public comment.<sup>54</sup> Sierra Club maintains that, whether or not FERC took a hard look in the EA, DOE/FE was obligated to take a hard look at the environmental impacts of natural gas production activities that would be induced by LNG exports—and specifically the impacts caused by SPL's Project.<sup>55</sup> According to Sierra Club, induced production is a reasonably foreseeable consequence of increased demand for natural gas due to LNG exports.<sup>56</sup>

Sierra Club offers the National Energy Modeling System (NEMS) developed by the U.S. Energy Information Administration (EIA) as a methodology DOE/FE could have used to determine where, in what quantity, and under what circumstances exports would induce additional gas production.<sup>57</sup> Sierra Club contends the NEMS model underlying the Department's 2012 LNG Export Study predicted how production would respond to exports.<sup>58</sup> Sierra Club asserts that because NEMS is built on "play-level" modeling, EIA must have already developed forecasts of where production would increase in response to exports. Sierra Club maintains that, if EIA has not already undertaken this type of modeling, or if EIA's modeling to date is insufficient to identify the impacts of SPL's proposed exports, NEPA requires DOE to

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<sup>54</sup> See *id.* at 4.

<sup>55</sup> See Rehearing Request at 9.

<sup>56</sup> See *id.* at 5-7.

<sup>57</sup> See *id.* at 10.

<sup>58</sup> In 2011, the Department engaged the U.S. Energy Information Administration (EIA) and NERA Economic Consulting to conduct a two-part study of the economic impacts of LNG exports, collectively called the 2012 LNG Export Study. In relevant part, EIA published its study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, in January 2012, available at [http://www.energy.gov/sites/prod/files/2013/04/f0/fe\\_eia\\_lng.pdf](http://www.energy.gov/sites/prod/files/2013/04/f0/fe_eia_lng.pdf) [hereinafter 2012 EIA Study]. Using the NEMS model, EIA examined the impact of two DOE/FE-prescribed levels of assumed natural gas exports (at 6 Bcf/d and 12 Bcf/d) under numerous scenarios and cases based on EIA's 2011 projections. Both the 2012 EIA and NERA studies are discussed in detail in the SPL Order (§§ I, V, VIII).

undertake or commission such modeling.<sup>59</sup> In Sierra Club's view, the geographic information provided by NEMS and other models provides an adequate basis for discussing many of the impacts of induced natural gas production.<sup>60</sup>

Sierra Club argues that the environmental impacts of these additional natural gas production activities include increased generation of ozone precursors (*e.g.*, volatile organic compounds (VOCs) and hazardous air pollutants) and methane releases, resulting in additional GHG emissions into the atmosphere. Sierra Club contends that, once DOE determined the amount of additional natural gas production that would occur in specific shale plays (*e.g.*, the nearby Eagle Ford shale play), DOE could estimate the amount of VOC and nitrogen oxide (NO<sub>x</sub>) emissions that would be emitted by that regional production and thereby estimate impacts on regional ozone levels.<sup>61</sup>

Sierra Club further contends that the NEPA analysis should have examined environmental impacts that do not depend on geographic location, particularly climate impacts such as greenhouse gas (GHG) emissions from induced production.<sup>62</sup> Sierra Club maintains that the analysis of GHGs in the Addendum and other documents "falls far short" of the hard look required by NEPA, and that DOE erred when it found the impacts from the proposed exports and induced production in particular are beyond the scope of NEPA because it did not have direct regulatory authority over emissions and other effects of induced production.<sup>63</sup> Sierra Club contends that, at a minimum, DOE/FE should have estimated the amount of additional GHGs that would be emitted by the induced production and discussed their impact in the context of the

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<sup>59</sup> See Rehearing Request at 11.

<sup>60</sup> See *id.*

<sup>61</sup> *Id.* at 11-12.

<sup>62</sup> See *id.* at 12.

<sup>63</sup> See *id.*



United States' ability to meet emission reduction targets, the social cost of GHG emissions, and any other appropriate metric.<sup>64</sup>

Additionally, Sierra Club argues that DOE/FE's NEPA analysis was flawed because DOE did not examine the environmental impacts of switching from natural gas to coal in the generation of electricity, which Sierra Club contends could be induced by natural gas exports.<sup>65</sup> Sierra Club maintains that such fuel switching would be indirectly and cumulatively caused by the proposed LNG exports. According to Sierra Club, these impacts were "reasonably foreseeable," having been discussed in both EIA's 2012 Study and EIA's 2014 Study (which Sierra Club refers to as the "EIA Updated Export Study" or "EIA's October 2014 update").<sup>66</sup>

Specifically, citing page 5 and Table B2 of the 2014 EIA Study, Sierra Club asserts that "[EIA] showed that exports would be likely to increase electric sector GHG emissions even under an 'accelerated coal [and nuclear] retirement' [ACNR] scenario, which EIA included as a proxy for increased regulation of coal-fired power plants."<sup>67</sup> Sierra Club argues that the EIA Study found that the Accelerated Coal and Nuclear Retirement scenario would result in "a smaller—but still significant— increase in coal use, and a correspondingly greater increase in natural gas production."<sup>68</sup> Sierra Club maintains that DOE failed to take a "hard look" at these impacts of the Accelerated Coal and Nuclear Retirement scenario, as required by NEPA.

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<sup>64</sup> See *id.* at 14.

<sup>65</sup> See Rehearing Request at 19-20.

<sup>66</sup> See *id.* at 19. EIA's 2014 Study, *Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets*, was published in October 2014. It served as an update of EIA's 2012 Study of LNG export scenarios (see *supra* note 58) and used baseline cases from EIA's 2014 *Annual Energy Outlook* (AEO 2014). See U.S. Energy Information Administration, *Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets* (Oct. 2014), available at: <https://www.eia.gov/analysis/requests/fe/pdf/lng.pdf>.

<sup>67</sup> Rehearing Request at 19.

<sup>68</sup> *Id.*

Sierra Club further maintains that the reason given by DOE/FE in Order No. 3792 for not analyzing gas-to-coal fuel switching—that new and proposed federal rules would limit the use of coal for electric generation—violated NEPA because DOE/FE did not provide “any estimate of the *extent* to which these new or proposed rules would ... limit this switching.”<sup>69</sup> Sierra Club asserts that, in the “absence of any explanation of the extent to which these rules will prevent this modeled impact, it is arbitrary for DOE to conclude that this impact may be ignored entirely.”<sup>70</sup> According to Sierra Club, DOE/FE further erred by not considering the potentially higher prices for domestic natural gas that would result if the new regulations do reduce coal-to-gas fuel switching. Sierra Club contends that regulations that limit fuel switching would increase both natural gas prices and natural gas production in response to exports at a higher level than EIA predicted.<sup>71</sup>

Finally, Sierra Club argues that Order No. 3792 does not distinguish between the indirect and cumulative impacts of the approved and pending LNG export applications, including SPL’s exports in this proceeding.<sup>72</sup> Sierra Club maintains that DOE/FE should have assessed the “cumulative impacts of drilling induced by all other pending and foreseeable export proposals” as part of its cumulative impacts analysis.<sup>73</sup>

## **2. SPL’s Answer**

SPL disputes Sierra Club’s argument that DOE/FE should have issued its own NEPA document for the Liquefaction Project Design Increase. SPL states that DOE reviewed the entire record compiled during FERC’s review, as well as DOE’s own record in this proceeding, and

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<sup>69</sup> *Id.*

<sup>70</sup> *Id.*

<sup>71</sup> *See id.* at 20.

<sup>72</sup> *See id.* at 21.

<sup>73</sup> Rehearing Request at 20.

concluded that preparing an EIS was not necessary. On that basis, SPL maintains that DOE properly adopted the FERC EA and issued a FONSI under NEPA.<sup>74</sup>

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

This lengthy and speculative chain of causation between an order under NGA Section 3 and a potential net increase in worldwide emissions depends on an activity—domestic natural gas production—which cannot be foreseen and analyzed, is too speculative, and over which the NGA gives DOE/FE and FERC no jurisdiction by congressional design.<sup>78</sup>

Instead, SPL argues that natural gas exploration, production, and gathering, and the facilities used for these activities, are subject to extensive regulation by state and local agencies, as well as increasingly by EPA.<sup>79</sup> SPL maintains that DOE/FE and FERC should not be deemed to have “caused”—and therefore to be responsible under NEPA for considering—effects that may occur regardless of their actions, and over which Congress did not intend them to have any control.<sup>80</sup>

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<sup>74</sup> SPL Answer at 6.

<sup>75</sup> *See id.* at 7.

<sup>76</sup> *Id.* (citation omitted).

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

<sup>78</sup> *Id.* at 15 (internal quotation and citation omitted).

<sup>79</sup> SPL Answer at 15-16.

<sup>80</sup> *See id.* at 16 (citations omitted).

SPL further contends that NEPA did not require preparation of either the Addendum or the LCA GHG Report.<sup>81</sup> SPL maintains that neither document was intended to be an element of the NEPA review process for the Liquefaction Expansion Design Increase. Pointing to language from the Order, SPL states that the Environmental Addendum and LCA GHG Report provide useful generalized analyses, but do not attempt to provide specific, quantifiable information for a particular LNG project.<sup>82</sup> SPL further argues that “the mere fact that DOE/FE commissions a projection of LNG exports’ hypothetical effects does not imbue those effects with reasonable foreseeability such that they are cognizable under NEPA.”<sup>83</sup>

### **3. DOE/FE Analysis**

#### **a. FERC’s Issuance of An Environmental Assessment**

We disagree with Sierra Club that DOE/FE failed to comply with NEPA in adopting the 2014 EA for the Liquefaction Project Design Project and issuing a FONSI on the basis of that EA. In urging DOE to conduct an EIS instead of an EA, Sierra Club argues that the authorized Design Increase equates to an additional 0.56 Bcf/d of natural gas, or a 25 percent increase in operations, which Sierra Club characterizes as a “major increase” in the quantity of LNG being exported from Trains 1-4.<sup>84</sup> Sierra Club claims that an EIS is required because “DOE has provided no basis for definitively concluding that these impacts [associated with the Design Increase] will *not* be significant.”<sup>85</sup>

In fact, as discussed above, the Design Increase represents “the final, optimized design of the Liquefaction Project [Trains 1-4] and requires *no additional construction or modification*

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<sup>81</sup> *See id.* at 19.

<sup>82</sup> *See id.*

<sup>83</sup> *Id.*

<sup>84</sup> Rehearing Request at 21.

<sup>85</sup> *See id.*

*of previously authorized facilities.*”<sup>86</sup> In the 2012 Order, FERC authorized the equipment for Trains 1-4, and determined that the Liquefaction Project met the public interest standard of NGA section 3.<sup>87</sup> The additional export volume approved in FERC’s 2014 Order derives solely from “more precise information ... concerning equipment specifications,” as well as “certain design optimizations that would result in higher LNG production.”<sup>88</sup>

As noted above (*supra* at 2), the 2014 EA observed that the requested design changes to Trains 1-4 would increase efficiency and provide a wider range of conditions that allow more effective use of the power available, as compared with the project reviewed in the 2011 EA. Specifically, “previously approved design optimizations will remove bottlenecks and result in more LNG production using the same power provided by the turbines”<sup>89</sup>—meaning “there would be no increase in fuel gas usage” associated with Trains 1-4.<sup>90</sup> For these reasons, the 2014 EA concluded that the Design Increase: (i) would be in compliance with applicable air emissions and other regulatory requirements,<sup>91</sup> (ii) would not affect numerous identified environmental resources,<sup>92</sup> and (iii) “would add no impacts to other past, present, or reasonably foreseeable projects in the project region.”<sup>93</sup> Consequently, there is no evidence to support Sierra Club’s assertion that the environmental effects of the Design Increase will be “significant.” We agree with FERC’s contrary assessment following several years of agency proceedings culminating in both the 2011 and 2014 EAs.

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<sup>86</sup> 2014 EA at 2-3 (emphasis added).

<sup>87</sup> *See id.* at 7.

<sup>88</sup> *Id.* at 3.

<sup>89</sup> *Id.*

<sup>90</sup> *Id.* at 4.

<sup>91</sup> *See id.* at 7.

<sup>92</sup> *See* 2014 EA at 6.

<sup>93</sup> *Id.* at 7.

In sum, under applicable CEQ regulations (*e.g.*, 40 C.F.R. §§ 1501.4, 1501.7, 1508.13), FERC correctly declined to conduct an EIS for the Design Increase. DOE/FE independently reviewed and adopted the 2014 EA, and properly issued a FONSI on the basis of the 2014 EA and the 55 environmental conditions imposed on SPL in FERC’s 2012 Order and reaffirmed in its 2014 Order. Insofar as Sierra Club is suggesting that the EA was required to assess the environmental impacts associated with the induced natural gas production attributable to the Design Increase, we reject this argument for the reasons set forth below.

### **b. Induced Natural Gas Production**

The CEQ regulations implementing NEPA require that agencies consider the “indirect effects” of proposed actions. “Indirect effects,” the regulations provide, “are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.”<sup>94</sup> Courts have articulated two principles useful in interpreting this provision. The first is that NEPA requires “a reasonably close causal relationship” between the environmental effect and the alleged cause.<sup>95</sup> The Supreme Court has stated that “a ‘but for’ causal relationship is insufficient to make an agency responsible for a particular effect under NEPA and the relevant regulations.”<sup>96</sup> Rather, in considering the strength of the causal relationship required by NEPA, the Supreme Court has “analogized . . . to the ‘familiar doctrine of proximate cause from tort law,’” instructing courts to “‘look to the underlying policies or legislative intent in order to draw a manageable line between those causal changes that may make an actor responsible for an effect and those that do not.’”<sup>97</sup> The second principle is that “inherent in NEPA and its implementing

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<sup>94</sup> 40 C.F.R. § 1508.8(b); *see also* 10 C.F.R. § 1021.200 (adopting CEQ’s regulations for the Department).

<sup>95</sup> *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983).

<sup>96</sup> *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 767 (2004) [hereinafter *Public Citizen*].

<sup>97</sup> *Id.* (quoting *Metro. Edison Co.*, 460 U.S. at 774 n.7).

regulations is a ‘rule of reason.’”<sup>98</sup> With respect to indirect effects, the rule of reason counsels that agencies are not required to address remote or speculative consequences, where insufficient information is available to permit meaningful consideration.<sup>99</sup>

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

The Department does not dispute the economic logic that authorizing exports of natural gas to non-FTA countries could, all else equal, exert upward pressure on domestic natural gas prices as foreign purchasers compete with domestic purchasers. Nor does the Department

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<sup>98</sup> *Id.* (citation omitted).

<sup>99</sup> *See, e.g., N. Plains Res. Council v. Surface Transp. Bd.*, 668 F.3d 1067, 1078 (9th Cir. 2011) (“Each project is different, and the agency is required to rationally explain its decision in the context of project-specific effects.”); *Hammond v Norton*, 370 F. Supp. 2d 226, 241 (D.D.C. 2005) (“The setting of the objectives and the range of alternatives to be considered by an agency are governed by a ‘rule of reason.’ All that NEPA requires is that the agency weigh all reasonable alternatives and come to a fully-informed decision.”); *Hoosier Envtl. Council v. U.S. Army Corps of Engineers*, 105 F. Supp. 2d 953, 974-975 (S.D. Ind. 2000) (upholding issuance of a permit to a casino riverboat, in part, because associated indirect effects were “tenuous and speculative” and therefore excluded from NEPA analysis under the “rule of reason”).

dispute that higher natural gas prices could lead to increased natural gas production at the national level, among other potential economic consequences (including decreased domestic consumption of natural gas, increased pipeline imports of natural gas from Canada, and increased use of competing resources). Indeed, EIA's 2012 Study modeled the effects that exporting natural gas at levels of 6 and 12 Bcf/d at "rapid" and "slow" ramp-up scenarios could have on the energy sector.<sup>100</sup> EIA projected that "[u]nder Reference case conditions, about 63 percent, on average, of the increase in exports in each of the four scenarios is accounted for by increased production [of natural gas], with most of the remainder from decreased consumption [of natural gas] from 2015 to 2035."<sup>101</sup> EIA further projected that, of the increased production, over 90% would come from unconventional sources, such as shale gas, tight gas, and coalbed methane.<sup>102</sup>

Although natural gas exports may increase domestic production *at the margin*, we reject the conclusion that the environmental impacts of such marginal production are "reasonably foreseeable" within the meaning of the CEQ's regulations and the applicable case law. To the contrary, it would be impossible to identify with any confidence the marginal production at the wellhead or local level that would be induced by SPL's exports from the Design Increase over the period of its non-FTA authorization. Natural gas will be produced in substantial quantities across the United States regardless of how the Department rules on SPL's Application. As the Department observed in the Order:

There is ... fundamental uncertainty as to where any additional production would occur and in what quantity. As the Addendum illustrates, nearly all of the environmental issues presented by unconventional natural gas production are local in nature, affecting local water resources, local air quality, and local land use patterns,

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<sup>100</sup> See 2012 EIA Study, *supra* note 58, at 1; SPL Order at 21.

<sup>101</sup> 2012 EIA Study at 10.

<sup>102</sup> *Id.* at 11 (cited in SPL Order at 122 n.154).



all under the auspices of state and local regulatory authority. As DOE explained in *Sabine Pass*, DOE/FE Order No. 2961-A, without knowing where, in what quantity, and under what circumstances additional gas production will arise, the environmental impacts resulting from production activity induced by LNG exports to non-FTA countries are not ‘reasonably foreseeable’ within the meaning of the CEQ’s NEPA regulations.<sup>103</sup>

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

[T]here is uncertainty as to the aggregate quantity of natural gas that ultimately may be exported to non-FTA countries. Receiving a non-FTA authorization from DOE/FE does not guarantee that a particular facility would be financed and built; nor does it guarantee that, if built, market conditions would continue to favor export once the facility is operational. To illustrate the point, of the more than 40 applications to build new LNG import facilities that were submitted to federal agencies between 2000 and 2010, only eight new facilities were built and those facilities have seen declining use in the past decade.<sup>104</sup>

Sierra Club emphasizes the potential for economic modeling tools, such as EIA’s NEMS model, to render the environmental impacts of export-induced production reasonably foreseeable. But where, as here, it is fundamentally uncertain how natural gas production at the local level will respond to price changes at the national level, an environmental analysis attempting to quantify local impacts would be more misleading than informative.<sup>105</sup> Economic modeling results are a product of the parameters that are entered into the model. In this context, the key parameter that would be used as a modeling input is the price elasticity of natural gas production, estimated at a sufficiently local level so as to analyze how the production would

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<sup>103</sup> SPL Order at 174-75 (citations omitted).

<sup>104</sup> *Id.* at 174.

<sup>105</sup> See *Mayo Found. v. Surface Transp. Bd.*, 472 F.3d 545, 555-56 (8th Cir. 2006) (rejecting Sierra Club’s argument that the Surface Transportation Board must use the NEMS model as the basis for analyzing local-level environmental impacts).

impact specific natural resources and human health. But, due to the limitations of estimating geology at the local level—as well as the uncertainties of predicting local regulation, land use patterns, and the development of supporting infrastructure—estimating the price elasticity of natural gas supply at the local level is much more speculative than doing so at the national level where local idiosyncrasies are averaged out.

Sierra Club’s argument concerning “play level” modeling also does not persuade us that the environmental impacts of induced production are reasonably foreseeable. The term “plays” refers to subsurface geologic formations containing substantial quantities of natural gas and may be used in reference to shale gas<sup>106</sup> or tight gas.<sup>107</sup> The shale plays, to which we believe Sierra Club is referring, overlap and stretch for thousands of square miles below diverse surface environments.<sup>108</sup> While the size of the shale plays makes them more reliable units for generating projections from economic models than smaller units such as counties, their size also makes them less useful units for analyzing impacts to environmental resources such as air,<sup>109</sup> water,<sup>110</sup> or land.<sup>111</sup> An economic model that estimated induced production across each shale play would

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<sup>106</sup> Addendum at 6, Fig. 2 (Approximate Locations of Current Producing Gas Shales and Prospective Shales).

<sup>107</sup> *See id.* at 7, Fig. 3 (Location of Currently Active Areas for Tight Sand Development and Production).

<sup>108</sup> *See id.* at 54, Table 13 (Attributes of Major Shale Gas Plays in the United States) (estimating the size of seven major shale plays ranging from 5,000 square miles for the Barnett Shale to 95,000 square miles for the Marcellus Shale). Each of the active shale basins is different and has a unique set of exploration criteria and operational challenges. *See id.* at 6.

<sup>109</sup> Air pollutants largely concentrate in the local area in which they are emitted. Without knowing where incremental natural gas production will occur within a particular shale play, the impacts to air quality of such production cannot be well understood. For example, with respect to ozone—the only air pollutant Sierra Club describes as amenable to regional discussion—the Addendum presents a map that overlays ozone non-attainment zones with the shale basins. *See* Addendum at 29, Fig. 8 (National Map Showing Ozone Nonattainment Areas Superimposed on Major Shale Gas Basins). The non-attainment zones appear near urban areas and bear little recognizable relationship to the subsurface geology. Without knowing where in relation to existing ozone concentrations the incremental production would occur, the play-level modeling Sierra Club urges would not enable DOE/FE to characterize the environmental and human health impacts posed by such production.

<sup>110</sup> *See* Addendum at 10-19 (describing potential impacts to water quantity and quality, and concluding that “specific impacts to water resources cannot be predicted even on a regional level”).

<sup>111</sup> Given the geographic expanse of the shale plays, characterizing the land use impacts of new, incremental wells would not be possible without knowing where those new wells would be located. On this point, Sierra Club suggests that DOE/FE simply could have estimated how many wells in each play would be necessary to meet

provide no information about where any incremental production would arise within those shale plays and would not render the environmental impacts of such production reasonably foreseeable in a manner that would facilitate meaningful analysis.

Such an analysis would also be without limit. Because the price elasticity of natural gas production is likely to be positive in every producing region in the country and because there is a robust interstate pipeline system in the United States, it is likely that upward pressure on natural gas prices nationally could encourage at least some additional production in every producing region in the lower-48 states. The logic of Sierra Club’s argument, therefore, would compel the Department, before acting on an application to export natural gas, to undertake an environmental impact statement or environmental assessment that examines separately the environmental impacts of natural gas production in every producing region in the country. Were such a requirement law, it would impose an unreasonable and unrealistic burden on the Department’s ability to act on the LNG export applications before it. And the weight of this burden would be misplaced: Unlike state and local regulators, or other federal agencies such as EPA and the U.S. Department of the Interior, the Department of Energy lacks any authority to regulate the environmental effects of natural gas production, much less to address issues identified at the local, regional, or play level.

In sum, there is no “reasonably close causal relationship” between any particular environmental impacts of induced natural gas production and the Department’s decision in this case.<sup>112</sup> The causal chain linking the Department’s decision to environmental impacts resulting from induced natural gas production is probabilistic and attenuated—not close and proximate as

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projected export demand. Absent an understanding of what land would be affected, however, an attempt to estimate the total number of wells would not have meaningfully informed our decision.

<sup>112</sup> *Metro. Edison Co.*, 460 U.S. at 774.

the Supreme Court has stated must be evident to bring the effects within the scope of NEPA review.

Nevertheless, even though the environmental impacts of induced natural gas production are not “reasonably foreseeable,” the Department has taken all reasonable steps to ensure that its public interest review was informed by a consideration of the general environmental impacts of natural gas production. On June 4, 2014, DOE/FE issued the draft Addendum, which, as noted above, presented a discussion of environmental issues associated with unconventional gas production in the lower-48 states based on DOE’s review of existing literature, regulations, and best management practices. The Addendum focused on the environmental impacts of unconventional natural gas production in the United States because of the projections by EIA in its 2012 Study that over 90% of incremental production resulting from exports would come from unconventional sources (i.e. shale gas, tight gas, and coalbed methane). The Addendum contained chapters separately considering water resources, air quality, greenhouse gases, induced seismicity, and land use impacts.<sup>113</sup> After a 45-day comment period, the Department received 40,745 comments on the Addendum in 18 separate submissions, including comments from Sierra Club and its members. On August 15, 2014, the Department issued a final version of the Addendum, with textual changes resulting from the comments and a comment response chapter addressing each discrete issue raised in the comments. Although the Department has consistently maintained that an analysis of the environmental impacts of induced natural gas production falls outside the scope of what NEPA requires, the Department nonetheless observed NEPA’s procedural requirements in publishing and taking comments on the Addendum.

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<sup>113</sup> See SPL Order at 121-30 (summarizing the Addendum’s findings).

In its Rehearing Request, Sierra Club argues that the Addendum fails to satisfy the NEPA obligation it believes the Department has with respect to induced natural gas production. First, Sierra Club claims that the Addendum cannot be used for NEPA compliance because the Addendum and NETL reports ... reach different conclusions regarding [1] the potency of methane as a greenhouse gas and [2] the amount of air pollution emitted by natural gas production.”<sup>114</sup> On the former point, the Department’s reasoning for selecting the global warming potential (GWP) for methane used in the LCA GHG Report is explained below in Section III.C.2. The claim that the Addendum reached a “different conclusion[]” than the LCA GHG Report regarding the GWP for methane<sup>115</sup> mischaracterizes the Addendum’s objective. The Addendum did not seek to resolve scientific uncertainty regarding the heat-trapping effects of methane. Rather, the Addendum sought to explain what was known on this subject in order to inform this proceeding. To that end, the Addendum explained that it had included the carbon dioxide equivalency factor for methane used in the 2007 Intergovernmental Panel on Climate Change’s (IPCC) report in Table 7 “to maintain consistency with the EPA’s Inventory reports and to allow usage of EPA’s estimate for total greenhouse gas emissions from all sources,” but it also described the values from the most recent IPCC reports (then in draft) as well as those of other scholars.<sup>116</sup> Finally, there was no inconsistency in the conclusions regarding air pollution emissions for the reasons explained herein.

Second, Sierra Club claims that the Addendum is inadequate because it does not “consider the effects of the particular proposal under consideration.”<sup>117</sup> But, to the extent that SPL’s proposal leads to additional unconventional natural gas production in the United States,

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<sup>114</sup> Rehearing Request at 5.

<sup>115</sup> *Id.*

<sup>116</sup> Addendum at 87 (DOE Response), 36.

<sup>117</sup> Rehearing Request at 9.

then surely the Addendum does inform DOE/FE's consideration of the effects of the proposal in its description of how unconventional gas production impacts various resource areas and, where relevant, how those impacts vary geographically. The Addendum did not attempt, however, to quantify the environmental impacts associated with SPL's proposed exports or to apportion any potential environmental impacts across the many production areas currently active across the United States. For the reasons above, we believe that the speculative nature of such an effort would have made it of dubious value to our public interest review.

### **c. Increased Use of Coal**

Sierra Club argues that the Department must examine the possible increased use of coal in electric power generation that may result from the Department's decision in this case. Sierra Club's argument focuses primarily on EIA's 2012 Study, which (according to Sierra Club) projected that the increased price of natural gas resulting from exports of LNG leads to additional use of coal because coal competes with natural gas on price as a fuel for electric power generation.<sup>118</sup>

The causal relationship between the Department's decision in this proceeding and the level of coal generation in the United States is even more attenuated than its relationship to induced natural gas production. In effect, Sierra Club is arguing that any time a federal agency takes an action that will affect the supply or demand of a commodity, it must examine the impacts of producing or consuming that commodity, as well as the impacts of producing or consuming the *substitute* commodities with which it competes. What Sierra Club is proposing goes far beyond what the Supreme Court described must be a "manageable line" defining the scope of review required by NEPA.<sup>119</sup>

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<sup>118</sup> *See id.* at 19-20.

<sup>119</sup> *Public Citizen.*, 541 U.S. at 767 (quotation and citation omitted).

Sierra Club points to EIA’s 2014 Study, *Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets*,<sup>120</sup> which was commissioned by DOE/FE and published in October 2014. EIA’s 2014 Study assessed how specified scenarios of increased natural gas exports could affect domestic energy markets. At DOE’s request, the 2014 Study served as an update of EIA’s January 2012 study of LNG export scenarios and used baseline cases from EIA’s 2014 *Annual Energy Outlook* (AEO 2014).<sup>121</sup> As noted above, Sierra Club contends that the EIA 2014 Study “showed that exports would be likely to increase electric sector GHG emissions under an ‘accelerated coal [and nuclear] retirement’ scenario, which EIA included as a proxy for increased regulation of coal-fired power plants.”<sup>122</sup> Based on the assumptions made in the 2014 Study, EIA projected that exports would cause a smaller, but still significant, increase in coal use, and a correspondingly greater increase in natural gas production.

Although EIA’s 2012 Study found that additional natural gas production would supply most of the natural gas needed to support added LNG exports, EIA in the 2012 Study modeled the effects of higher natural gas prices on energy consumption in the United States in the years 2015 through 2035, and found several additional results. In particular, EIA found that “under Reference case conditions, decreased natural gas consumption as a result of added exports are countered proportionately by increased coal consumption (72 percent), increased liquid fuel consumption (8 percent), other increased consumption, such as from renewable generation sources (9 percent), and decreases in total consumption (11 percent).”<sup>123</sup> Further, EIA

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<sup>120</sup> U.S. Energy Information Administration, *Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets* (Oct. 2014), *supra* note 66.

<sup>121</sup> Each Annual Energy Outlook (AEO) presents EIA’s long-term projections of energy supply, demand, and prices. It is based on results from EIA’s National Energy Modeling System model.

<sup>122</sup> Rehearing Request at 19.

<sup>123</sup> 2012 EIA Study at 18.

determined that, in the earlier years of the 2015 to 2035 period, “the amount of natural gas to coal switching is greater,” with “coal play[ing] a more dominant role in replacing the decreased levels of natural gas consumption, which also tend to be greater in the earlier years.”<sup>124</sup>

Likewise, EIA found that “[s]witching from natural gas to coal is less significant in later years, partially as a result of a greater proportion of switching into renewable generation.”<sup>125</sup>

EIA ultimately projected that, for LNG export levels from 6 to 12 Bcf/d of natural gas and under Reference case conditions, aggregate carbon dioxide emissions would increase above a base case with no exports by between 643 and 1,227 million metric tons (0.5 to 1.0 percent) over the period from 2015 to 2035.<sup>126</sup> It is worth noting, however, that a substantial portion of these projected emissions came from consumption of natural gas in the liquefaction process, rather than from increased use of coal. The liquefaction of natural gas is captured in the LCA GHG Report’s estimate of the life cycle GHG emissions of U.S.-exported LNG, discussed herein.

In the EIA 2014 Study, EIA briefly described each of the scenarios analyzed, including the Accelerated Coal and Nuclear Retirement scenario discussed by Sierra Club.<sup>127</sup> EIA, however, did not state that the Accelerated Coal and Nuclear Scenario was intended to be a proxy for the impacts of new and proposed regulations affecting coal usage, such as the U.S. Environmental Protection Agency’s (EPA) Clean Power Plan finalized in 2015.<sup>128</sup> As discussed below, the Clean Power Plan imposes limits on GHG emissions from existing coal-fired power

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<sup>124</sup> *Id.*

<sup>125</sup> *Id.*

<sup>126</sup> *Id.* at 19.

<sup>127</sup> See EIA Study at 5 (describing “[t]he Accelerated Coal and Nuclear Retirements (ACNR) case, in which higher costs for running existing coal and nuclear plants result in accelerated capacity retirements, resulting in more reliance on natural gas to fuel electricity generation than in the Reference case.”).

<sup>128</sup> U.S. Env’tl. Protection Agency, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,662 (Oct. 23, 2015) (effective Dec. 22, 2015) [hereinafter Clean Power Plan]. The U.S. Supreme Court has issued a stay of the effectiveness of this rule pending review. See *Chamber of Commerce, et al. v. EPA, et al.*, Order in Pending Case, 577 U.S. \_\_\_\_ (2016).



plants. Once implemented, the Clean Power Plan will influence not only coal plant retirement decisions, but also dispatch decisions; that is, how often coal-fired power plants will run and at what output levels. The GHG limitations from the Clean Power Plan, and therefore the marginal impacts of natural gas price increases on GHG emissions, would not necessarily be captured in a scenario such as EIA's Accelerated Coal and Nuclear Retirement scenario that simply assumes a particular quantity of coal retirements.

We further note that EIA's 2014 Study assumed the regulations in effect at the time the AEO 2014 was prepared. Therefore, EIA's analysis included the impacts that EPA's Mercury and Air Toxics Standard<sup>129</sup> but not EPA's Transport Rule<sup>130</sup> as it had been vacated at the time. EIA's analysis in 2014 also captured the Clean Air Interstate Rule, which sets limits on regional sulfur dioxide and mono-nitrogen oxides (SO<sub>2</sub> and NO<sub>x</sub>). There are, however, other rules that were not final at the time of AEO 2014, including two then-proposed rules from EPA to reduce the extent to which the increased use of coal would compensate for reduced use of natural gas. These rules—including the Clean Power Plan described above—were finalized in the fall of 2015, and impose limits on GHG emissions from both new and existing coal-fired power plants.<sup>131</sup> In particular, these rules have the potential to mitigate significantly any increased emissions from the U.S. electric power sector that would otherwise result from increased use of coal, and perhaps to negate those increased emissions entirely. Therefore, on the record before us, we cannot conclude that exports of natural gas would be likely to cause a significant increase

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<sup>129</sup> U.S. Env'tl. Prot. Agency, National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial- Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units; Final Rule, 77 Fed. Reg. 9,304 (Feb. 16, 2012).

<sup>130</sup> U.S. Env'tl. Prot. Agency, Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals; Final Rule, 76 Fed. Reg. 48,208 (Aug. 8, 2011).

<sup>131</sup> U.S. Env'tl. Protection Agency, Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,510 (Oct. 23, 2015); Clean Power Plan, 80 Fed. Reg. 64,662, *supra* note 128.

in U.S. GHG emissions through their effect on natural gas prices and the use of coal for electric generation.

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

#### **1. Methane Leakage Rate**

##### **a. Sierra Club's Position**

Sierra Club charges that DOE/FE has not adequately justified the methane leakage rate implied by the LCA GHG Study as compared to higher leakage rates estimated by other life cycle analyses.<sup>132</sup> Sierra Club states that the 1.2 percent leakage rate estimate attributed to NETL in the SPL Order is lower than the “expected” cradle-to-liquefaction leakage rates provided by NETL in the LCA GHG Report—1.3 percent for conventional onshore production and 1.4 percent for shale gas production.<sup>133</sup> Sierra Club points out that, in the Addendum, NETL refers to five major studies that account for the GHG emissions from upstream natural gas, including three (Howarth, Burnham, and Weber)<sup>134</sup> that either provide or imply an estimate of methane leakage rates. Sierra Club claims that all of these studies estimate much higher methane leakage than does NETL, and states that “[w]hile NETL provided a basis for disagreeing with the highest of these estimates, [the Howarth study], nothing in the record explains why NETL’s estimate is superior to Burnham and Weber.”<sup>135</sup>

According to Sierra Club, DOE/FE correctly noted in the Order that the boundary conditions applied in the Burnham study differed from those in the LCA GHG Report, in that

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<sup>132</sup> Rehearing Request at 15.

<sup>133</sup> *Id.*

<sup>134</sup> See, e.g., Burnham, Andrew, *et al.* Life-cycle greenhouse gas emissions of shale gas, natural gas, coal, and petroleum. *Environmental Science & Technology* 46.2 (2011): 619-627 [hereinafter Burnham study]; Weber, Christopher L., and Christopher Clavin. Life cycle carbon footprint of shale gas: Review of evidence and implications. *Environmental science & technology* 46.11 (2012): 5688-5695 [hereinafter Weber study].

<sup>135</sup> Rehearing Request at 15.

NETL reviewed “cradle-through-transmission” whereas Burnham included the additional step of distribution. Sierra Club maintains that the vast difference in methane emission estimates cannot be explained by the difference in boundary conditions or by other differences between NETL and the Burnham study. According to Sierra Club, Burnham estimated that 0.28 percent of methane produced was emitted during distribution, and that subtracting this 0.28 percent from Burnham’s total estimate leaves a cradle-through-transmission leak rate of 2.47 percent for conventional onshore gas and 1.73 percent for unconventional gas.<sup>136</sup>

Sierra Club also addresses the statement in the Order that the Weber study made no mention of leakage rate. Sierra Club acknowledges that the Weber study does not discuss emissions in terms of leakage rate, but contends that the emissions estimates in the Weber study imply the same leakage rate that is set out in NETL’s Unconventional Production Report and asserts that this leakage rate is explained by Bradbury 2013,<sup>137</sup> as discussed in the NETL reports. Sierra Club contends: “Because NETL already determined that the Weber team’s conclusions could be expressed as a leakage rate estimate, DOE cannot now argue that this work has no bearing on the appropriate estimate of leakage rates or, ultimately, methane emissions.”<sup>138</sup>

Sierra Club also argues that the Department should have modeled methane emissions using “top-down” rather than “bottom-up” studies. Sierra Club cites five top-down studies that it claims estimate higher methane leakage rates of generally 3 percent or more on the basis of atmospheric measurements. According to Sierra Club, the Order acknowledges that top-down studies do not generally match bottom-up calculations due to different boundaries, but Sierra

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<sup>136</sup> *See id.*

<sup>137</sup> Bradbury, J., Obeiter, M., Draucker, L., Wang, W., & Stevens, A. (2013). Clearing the Air: Reducing Upstream Greenhouse Gas Emissions from U.S. Natural Gas Systems. Retrieved March 31, 2014, from [http://www.wri.org/sites/default/files/clearing\\_the\\_air\\_full\\_version.pdf](http://www.wri.org/sites/default/files/clearing_the_air_full_version.pdf)

<sup>138</sup> Rehearing Request at 16.

Club maintains that DOE/FE did not explain why the boundaries used in bottom-up studies are more appropriate.<sup>139</sup>

Based on Brandt 2014 and other research,<sup>140</sup> Sierra Club maintains that bottom-up estimates are likely to be inaccurate. Sierra Club states that “nothing in Brandt indicates that the broader top-down estimates, such as Miller 2013, are *not* representative, and that the 3% leak rate indicated by Miller is more than double the rate used by DOE.”<sup>141</sup> Sierra Club recognizes that leakage rate is an output of, rather than an input to, NETL’s model. But Sierra Club’s maintains that NETL’s model produces an output that is so inconsistent with the outputs of other models that there is either a problem with the inputs to NETL’s model or with the model itself.<sup>142</sup> According to Sierra Club, DOE/FE did not provide a rational basis for using the NETL estimates instead of a higher methane leakage rate estimated by such top-down studies.

#### **b. DOE/FE Analysis**

The average methane leakage rate estimated in the LCA GHG Report is reasonable. Sierra Club is correct that NETL determined 1.3 percent and 1.4 percent to be the methane leakage rates for natural gas extracted using conventional extraction methods and extracted from the Marcellus Shale, respectively, as shown in Table 5-1 of the LCA GHG Report. But, as DOE/FE has explained, NETL determined that 1.2 percent is the expected “cradle-through-

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<sup>139</sup> *See id.*

<sup>140</sup> *See* Brandt, A.R., *et al.* (2014) Methane Leaks from North American Natural Gas Systems. *Science* 343(6172), pp. 733-735 [hereinafter Brandt study]. Sierra Club also notes that, on June 19, 2014, after DOE/FE had released the draft Addendum and the LCA GHG Report, a new study by researchers at Carnegie Mellon and the National Oceanic and Atmospheric Administration was published that, Sierra Club claims, concludes that the most likely methane leakage rate is between 2 percent and 4 percent. *See* Rehearing Request at 17 & n.34 (citing Stefan Scheietzke *et al.*, “Natural Gas fugitive emissions rates constrained by global atmospheric methane and ethane,” *Environmental Science & Technology* (June 19, 2014), DOI: 10.1021/es50104c)). Although Sierra Club does not explain whether this study used a top-down or bottom-up modeling approach, its assertions regarding the study nevertheless are untimely. Sierra Club did not mention the study in its comments on the LCA GHG Report submitted to DOE/FE on July 21, 2014, and DOE/FE will not consider new evidence on rehearing.

<sup>141</sup> Rehearing Request at 17.

<sup>142</sup> *Id.*

transmission” leakage rate for the *average* mix of domestic natural gas, which includes seven extraction sources. The contribution of the other five sources of domestic natural gas (offshore, associated, tight gas, Barnett Shale, and coal bed methane) lower the average methane leakage to 1.2 percent, below the 1.3 percent and 1.4 percent reported for actual gas extracted using conventional on-shore extraction and from the Marcellus Shale. This means that the extraction, processing, and transmission of 1 kg of natural gas<sup>143</sup> in the United States releases 0.012 kg of methane to the atmosphere from the average mix of natural gas produced in the United States (excluding Alaskan production). Thus, NETL’s expected value and range on methane emission rates are calculated results that capture the underlying uncertainty and variability of the natural gas system average performance. This approach results in a reasonable estimate, and we reject Sierra Club’s arguments to the contrary.

We also reject Sierra Club’s assertion that NETL’s methane leakage rate is significantly lower than those used or calculated by other bottom-up studies. The Weber study reconciled the boundaries from six studies (including work by NETL and Burnham), and demonstrated that the expected values and uncertainty ranges of NETL’s upstream natural gas GHG emissions closely match the results for most other studies.

We likewise reject Sierra Club’s argument that DOE/FE should have used a “top-down” approach to derive a methane leakage rate.<sup>144</sup> In Order No. 3792, DOE/FE responded by noting

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<sup>143</sup> As a convention to improve comparability to other studies, NETL expresses leakage rate using delivered natural gas as a denominator; that is, methane emissions per unit of delivered natural gas, not methane emissions per unit of delivered methane.

<sup>144</sup> Rehearing Request at 16-18. For purposes of this discussion, bottom-up *data* account for emissions at the device level (*e.g.*, liquid unloading equipment, compressors, etc.), and bottom-up *models* aggregate multiple processes to compose a system. In contrast, top-down *data* account for emissions from an entire system (*e.g.*, a sector or geographical region), and top-down *models* apportion system emissions to the products of the system. Currently, the bottom-up models for natural gas systems are based mostly on engineering relationships and represent long-term operating regimes, while top-down models for natural gas systems represent measurements collected for specific regions during narrow time frames. *See* SPL Order at 155-56.

that researchers are currently working to discern why top-down studies do not match bottom-up studies. DOE/FE also noted that, as research continues, scientists expect to learn more about the differences between these two types of methodologies.<sup>145</sup>

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

## **2. Global Warming Potential of Methane**

### **a. Sierra Club's Position**

Sierra Club claims that the LCA GHG Report erroneously “understates the impact of each ton of methane pollution”<sup>146</sup> and that DOE/FE should have used Global Warming Potential

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<sup>145</sup> See SPL Order at 155-56.

<sup>146</sup> Rehearing Request at 17.

(GWP)<sup>147</sup> estimates drawn from the IPCC that include climate carbon feedbacks.<sup>148</sup> Sierra Club contends these estimates would have yielded a 20 percent higher GWP. According to Sierra Club, the IPCC has stated that including the climate-carbon feedback for methane and other non-carbon dioxide greenhouse gases—in which an increase in the atmospheric temperature causes a further increase in atmospheric concentration of carbon dioxide—provides a better estimate of the metric value. Sierra Club therefore argues that DOE should have used the IPCC’s 20-year and 100-year fossil methane global warming potentials of 87 and 36, respectively.<sup>149</sup> Without providing a calculation or citation, Sierra Club asserts that using a GWP value of 36 for methane increases the life cycle GHG emissions from the scenarios by 20 percent relative to those calculated by NETL using a GWP value of 30.<sup>150</sup>

#### **b. DOE/FE Analysis**

The LCA GHG Report addresses an area of scientific study—the study of life cycle GHG emissions—that is constantly evolving. In the Report, NETL acknowledges the wide range of scenario variability, the uncertainty in the underlying modeled data, and other study limitations arising from this subject matter.<sup>151</sup> As explained below, NETL and DOE/FE made a reasoned evaluation of the scientific facts then-available concerning the potential impacts of U.S. LNG exports on global GHG emissions.

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<sup>147</sup> GWP is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide. The larger the GWP, the more that a given gas warms the Earth compared to carbon dioxide over that time period. The time period usually used for GWPs is 100 years. GWPs provide a common unit of measure, which allows analysts to add up emissions estimates of different gases (*e.g.*, to compile a national greenhouse gas inventory), and allows policy-makers to compare emissions-reductions opportunities across sectors and gases. See U.S. Evtl. Protection Agency, *Understanding Global Warming Potentials*, <http://www.epa.gov/climatechange/ghgemissions/gwps.html> (last updated Feb. 23, 2016).

<sup>148</sup> Rehearing Request at 17.

<sup>149</sup> See *id.* at 17-18 (citing Sierra Club’s GHG Comment at 12).

<sup>150</sup> See *id.* at 18.

<sup>151</sup> LCA GHG Report at 18 (Summary and Study Limitations).

NETL selected the GWP values and other parameters for its LCA GHG Report in the fall of 2013. At that time, working group papers for the IPCC's Fifth Assessment Report<sup>152</sup> were available in draft form. For the first time, those analyses produced two sets of GWP values for methane: GWP values based solely on the radiative forcing of methane and GWP values that also included an adder for climate-carbon feedbacks. Based on a perception of uncertainty underlying the climate carbon feedback adders, as well as their novelty and a lack of clear guidance from the IPCC at that time, NETL elected to use the GWP values without the climate carbon feedback adders as it had done in the past. Specifically, the LCA GHG Report uses 20- and 100-year methane GWPs of 85 and 30, respectively—as compared to the GWPs of 87 and 36 when climate carbon effects are included.<sup>153</sup>

We agree with Sierra Club that using 20- and 100-year methane GWPs of 87 and 36 is most appropriate for use today and that climate carbon feedbacks should be captured in the GWP values for methane. Using these values, however, would not have materially affected the conclusions of the LCA GHG Report. Contrary to Sierra Club's suggestion, there is no one-for-one relationship between the GWP of methane and the total life-cycle GHG impact of U.S.-exported LNG because methane is not the only type of GHG emission. Natural gas energy systems release both methane and carbon dioxide. On a life cycle basis for delivered electricity, combustion at the power plant—which produces carbon dioxide emissions—accounts for the majority of GHG emissions. The following table depicts how the life cycle GHG emissions for three key scenarios in the LCA GHG Report would change depending on whether the 100-GWP

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<sup>152</sup> IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.

<sup>153</sup> See SPL Order at 135 (referencing LCA GHG Report at 2-3).



for methane was 30 or 36. These changes were calculated by scaling the methane emissions in Figures 6-3 through 6-5 of the LCA GHG Report by a ratio of 36/30.

**Table 1: Increase in GHG Emissions by Changing 100-year CH<sub>4</sub> GWP**

Scenario	GHG Emissions (kg CO <sub>2</sub> e/MWh)		% change
	GWP <sub>CH<sub>4</sub></sub> = 30	GWP <sub>CH<sub>4</sub></sub> = 36	
Natural gas power using U.S. LNG transported to Rotterdam	629	646	2.8%
Natural gas power using Russian NG transported by pipeline to Rotterdam	612	642	4.9%
Coal power using regional coal	1,089	1,090	0.1%

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

#### **D. Consideration of Climate Impacts**

##### **1. Sierra Club’s Position**

Sierra Club claims that DOE/FE’s consideration of climate impacts in its public interest analysis was based on unsupported assumptions and failed to place these impacts in the proper context.<sup>154</sup> In the Order, DOE considered whether emissions from U.S.-exported LNG would be offset by displacement of combustion of other fossil fuels and avoidance of associated emissions.

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<sup>154</sup> Rehearing Request at 22.

Sierra Club maintains that this approach is not the proper way to assess climate impacts and that the United States' international commitments require consideration of domestic GHG emissions without consideration of displaced foreign emissions.<sup>155</sup> In addition, Sierra Club claims that DOE/FE's analysis of climate impacts focuses on the LCA GHG analysis but does not focus on SPL's specific proposal for a definite amount of natural gas.<sup>156</sup> Sierra Club asserts that this modeling effort for SPL's Design Increase would not be unreasonably burdensome or speculative.

Sierra Club also maintains the available evidence does not support DOE/FE's decision to compare the lifecycle of U.S. LNG solely to coal and other sources of gas. First, Sierra Club asserts DOE provides no basis for comparing U.S. LNG against coal and natural gas used in China rather than the aggregate GHG intensity of China's generation fleet or, even more appropriately, the average GHG intensity of additional generation capacity that China is expected to add (based on EIA data). According to Sierra Club, DOE cited China's 2013 generation capacity, which was composed of 63% coal and 4% natural gas. Sierra Club maintains that DOE ought to have also compared the lifecycle of U.S. LNG to existing renewables within China and India.<sup>157</sup>

## **2. DOE/FE Analysis**

The Department has thoroughly reviewed the GHG impacts of its decision. At the project level, the EA reiterated that the proposed Design Increase will not require any additional construction or modification to the FERC-approved Liquefaction Project.<sup>158</sup> The Addendum

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<sup>155</sup> *Id.* at 23.

<sup>156</sup> *Id.* at 14.

<sup>157</sup> *See id.* at 23 (arguing that the "[EIA] report identifies renewables hydroelectric, wind, and solar as a combined 29%" of China's generation capacity).

<sup>158</sup> 2014 EA at 7.

contains a chapter devoted to GHG emissions and includes a range of estimates from the scientific literature of the GHGs emitted by producing and transporting natural gas from unconventional resources.<sup>159</sup> Finally, the LCA GHG Report analyzes the life-cycle GHGs emitted from U.S.-exported LNG that is re-gasified and combusted for electric power generation in Europe or Asia. The LCA GHG Report compares the life-cycle GHGs of U.S.-exported LNG to those of LNG exported from other producing countries, pipeline gas delivered from Russia, and domestic coal burned in both Europe and Asia.<sup>160</sup>

It is useful to compare the life-cycle GHG emissions of U.S.-exported LNG to other forms of generation because U.S.-exported LNG has the potential to displace other fuels and thus to avoid the emissions associated with burning those fuels. The comparison cases used in the LCA GHG Report were well-chosen. When U.S.-exported LNG enters the marketplace, it will compete with LNG sourced from other countries. Therefore, the comparison of U.S.-sourced LNG to foreign-sourced LNG is clearly instructive. U.S.-exported LNG also will compete directly with pipeline deliveries from Russia in some markets, another form of “gas-on-gas” competition. Recognizing that the availability of U.S.-exported LNG may affect the electric power generation fuel mix in importing countries, the LCA GHG Report also compared U.S.-exported LNG to coal produced domestically in both Europe and Asia. This comparison is likewise instructive because, as the Department explained in the Order, coal remains a prevalent choice for electric power generation in LNG-importing countries and competes with natural gas as a source of baseload power.<sup>161</sup>

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<sup>159</sup> Addendum at 33-44.

<sup>160</sup> See SPL Order at 134 (Table 11) (referencing LCA GHG Report at 2).

<sup>161</sup> See *id.* at 185.

It is important, however, to recognize the Department's limited aims in making these comparisons. In the Order, the Department made clear that the comparisons to coal and foreign-sourced gas in the LCA GHG Report did not themselves answer the ultimate question of how U.S. LNG exports would affect the global GHG balance because U.S. LNG could compete with other resources as well. The Department explained that, given the prevalence of coal and natural gas as sources of electric generation in LNG-importing countries, the comparison nonetheless provided useful information. Looking at the record before it, the Department concluded only that it did "not see a reason to conclude that U.S. LNG exports will significantly exacerbate global GHG emissions."<sup>162</sup>

The Department also explained why it was not attempting a more precise prediction regarding global GHG impacts. The Department explained that the compounded uncertainties in estimating how the availability of U.S. LNG exports would affect the market for every potential energy source in every importing country, along with the interventions of foreign governments in those markets, would render such an analysis too speculative to inform its public interest determination.<sup>163</sup> In its Rehearing Request, Sierra Club suggests alternative comparisons the Department could have used to approach the difficult question of how U.S. LNG exports would affect the global GHG balance. For example, Sierra Club states that the Department could have analyzed how SPL's LNG exports will affect global GHG emissions. Recognizing, however, that there is a global market for LNG, SPL's exports will affect the global price of LNG, which in turn will affect energy systems in numerous countries.

Sierra Club also suggests the Department should have compared the lifecycle GHG emissions of U.S.-exported LNG to those of the average new facility in China. But Sierra Club

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<sup>162</sup> *Id.* at 186.

<sup>163</sup> *See id.*

does not explain why this would be an appropriate comparison. To the extent U.S.-exported LNG lowers the price of natural gas in a given country, that price change could affect dispatch and retirement decisions facing existing units as well as decisions of what new units to build. Moreover, even with respect to new capacity, it may not be valid to assume that natural gas would compete directly with renewables in all nations given the potential intervention of public policy and the different role these resources play in an integrated electric system.

## **E. DOE/FE Correctly Evaluated Economic Impacts in Determining That SPL’s Proposed Exports Are in the Public Interest**

### **1. Sierra Club’s Position**

Sierra Club’s economic argument is based upon the broad contention that, in granting SPL’s Application, DOE considered the “upstream” economic benefits of induced natural gas production attributable to the proposed LNG exports, but refused to consider the environmental harms that allegedly would occur as a result of induced natural gas production.<sup>164</sup> Sierra Club argues that the economic benefits from the Sabine Liquefaction Design Increase are “modest” or “incremental.”<sup>165</sup> Sierra Club cites the inability of the Design Increase Project to cure the U.S. trade deficit as evidence that the Project’s economic benefits are marginal, at best.

According to Sierra Club, SPL’s proposed exports would benefit only “limited sectors of the economy.”<sup>166</sup> Sierra Club also argues that even marginal environmental harms caused by export authorizations, such as SPL’s authorization, are “themselves, sufficient to outweigh any possible benefits of the project and thus demonstrate inconsistency with the public interest.”<sup>167</sup>

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<sup>164</sup> See, e.g., Rehearing Request at 22.

<sup>165</sup> *Id.*

<sup>166</sup> *Id.*

<sup>167</sup> *Id.*

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

## 2. DOE/FE Analysis

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

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

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

To the extent Sierra Club is claiming that price impacts will be higher now based on higher cumulative LNG export levels than originally considered, we note that the Order assesses the cumulative impacts, including this Application, of the 15 final authorizations issued at that time (then totaling 11.38 Bcf/d of natural gas) and states that this total volume is within the range of scenarios analyzed in the 2012 LNG Export Study in which NERA found that the United States would experience net economic benefits.<sup>169</sup> In each succeeding non-FTA export authorization issued since the SPL Order, we have continued to make the same assessment of cumulative impacts to ensure that each authorization is in the public interest.<sup>170</sup>

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<sup>168</sup> SPL Order at 168 (emphasis added).

<sup>169</sup> *See id.* at 188-90.

<sup>170</sup> *See, e.g., Cameron LNG, LLC*, DOE/FE Order No. 3846, FE Docket No. 15-90-LNG, Opinion and Order Granting Long-Term, Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from Trains 4 and 5 of the Cameron LNG Terminal Located in Cameron and Calcasieu Parishes, Louisiana, to Non-Free Trade Agreement Nations, at 121-25 (July 15, 2016). Additionally, as described herein and set forth in the SPL Order, "it is far from certain that all or even most of the proposed LNG export projects will ever be realized because of the time, difficulty, and expense of commercializing, financing, and constructing LNG export terminals, as well as the uncertainties inherent in the global market demand for LNG." SPL Order at 187.

Sierra Club again criticizes the 2012 LNG Export Study and the conclusions that DOE/FE draws from that Study, asserting that projected U.S. GDP benefits are slight and will not accrue to the general public. DOE/FE previously recognized these aspects of the NERA findings, but ultimately determined that the net benefits to the U.S. economy from exporting LNG were in the public interest:

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

In sum, Sierra Club's economic arguments do not alter our conclusions in the Order. Although "[b]oth the [2102] LNG Export Study and many public comments identify significant uncertainties and even potential negative impacts from LNG exports," we affirm, on balance, "that the potential negative implications of SPL's proposed exports are outweighed by the likely net economic benefits and by other non-economic or indirect benefits."<sup>172</sup> We therefore reject Sierra Club's economic arguments.

#### **IV. CONCLUSION**

We find that it has not been shown that a grant of the requested authorization is inconsistent with the public interest. We affirm our previous finding that the Application should be granted subject to the terms and conditions set forth in DOE/FE Order No. 3792.

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<sup>171</sup> SPL Order at 87-88.

<sup>172</sup> *Id.* at 187.

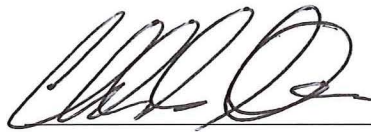
**V. ORDER**

Pursuant to sections 3 and 19 of the Natural Gas Act, and for the reasons set forth above and in DOE/FE Order No. 3792, it is ordered that:

A. Sabine Pass Liquefaction, LLC's Motion for Leave to Answer Sierra Club's Request for Rehearing is granted; and

B. Sierra Club's Request for Rehearing is denied.

Issued in Washington, D.C., on October 20, 2016.



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Christopher A. Smith  
Assistant Secretary  
Office of Fossil Energy