

UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

OFFICE OF FOSSIL ENERGY

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FREEPORT LNG EXPANSION, L.P.,	)	
FLNG LIQUEFACTION, LLC,	)	
FLNG LIQUEFACTION 2, LLC, AND	)	FE DOCKET NO. 11-161-LNG
FLNG LIQUEFACTION 3, LLC	)	

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OPINION AND ORDER DENYING REQUEST FOR REHEARING  
OF ORDERS GRANTING LONG-TERM, MULTI-CONTRACT AUTHORIZATION  
TO EXPORT LIQUEFIED NATURAL GAS BY VESSEL  
FROM THE FREEPORT LNG TERMINAL ON QUINTANA ISLAND, TEXAS,  
TO NON-FREE TRADE AGREEMENT NATIONS

DOE/FE ORDER NO.3357-C

DECEMBER 4, 2015

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## **FREQUENTLY USED ACRONYMS**

Bcf/d	Billion Cubic Feet per Day
Bcf/yr	Billion Cubic Feet per Year
CEQ	The Council on Environmental Quality
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon Dioxide
DOE	U.S. Department of Energy
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FE	Office of Fossil Energy, U.S. Department of Energy
FERC	Federal Energy Regulatory Commission
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
mtpa	Million Metric Tons per Annum
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NGA	Natural Gas Act
ROD	Record of Decision

## I. INTRODUCTION

Freeport LNG Expansion, L.P., FLNG Liquefaction, LLC, FLNG Liquefaction 2, LLC, and FLNG Liquefaction 3, LLC (collectively, FLEX) filed two applications, a year apart, with the Department of Energy's Office of Fossil Energy (DOE/FE or "the Department") seeking authorization to export liquefied natural gas (LNG) to countries with which the United States does not have a Free Trade Agreement (FTA) that requires national treatment for trade in natural gas (non-FTA countries).<sup>1</sup> In each application FLEX requested authorization to export LNG in a volume equivalent to 1.4 billion cubic feet per day (Bcf/d) of natural gas, for a total of 2.8 Bcf/d, from the same liquefaction facility. On November 14, 2014, the Department issued final orders in both dockets. In Order 3283-C, the Department granted FLEX's first application in the full volume requested: 1.4 Bcf/d.<sup>2</sup> In Order 3357-B, the Department granted FLEX's second application, but only at a volume of 0.4 Bcf/d.<sup>3</sup> The Department did not authorize the full volume because the additive volume requested in the two applications would have exceeded the known liquefaction capacity of the planned Liquefaction Project being examined in the environmental review process under the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 *et seq.*, which was 1.8 Bcf/d.<sup>4</sup> Therefore, to ensure that the total volume

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<sup>1</sup> See *respectively*, Application of Freeport LNG Expansion L.P., *et al.*, for Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries, FE Docket No. 10-161-LNG (Dec. 17, 2010) [hereinafter FLEX I App.]; and Application of Freeport LNG Expansion L.P., *et al.*, for Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries, FE Docket No. 11-161-LNG (Dec. 19, 2011) [hereinafter FLEX II App.].

<sup>2</sup> *Freeport LNG Expansion L.P., et al.*, DOE/FE Order No. 3282-C, FE Docket No. 10-161-LNG, Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Freeport LNG Terminal on Quintana Island, Texas to Non-Free Trade Agreement Nations (Nov. 14, 2014) [hereinafter FLEX I Order].

<sup>3</sup> *Freeport LNG Expansion L.P., et al.*, DOE/FE Order No. 3357-B, FE Docket No. 11-161-LNG, Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Freeport LNG Terminal on Quintana Island, Texas to Non-Free Trade Agreement Nations (Nov. 14, 2014) [hereinafter FLEX II Order or Final Order].

<sup>4</sup> See *id.* at 16.

authorized across both orders did not exceed 1.8 Bcf/d, the Department authorized 0.4 Bcf/d of the 1.4 Bcf/d that had been requested in FLEX's second application.

Sierra Club was the sole party to seek rehearing of the Department's Order 3357-B, in which the Department granted FLEX 0.4 Bcf/d of export authority to non-FTA countries. No party sought rehearing of Order 3283-C, in which the Department acted on FLEX's first application. (Sierra Club did not intervene in that proceeding and so could not have sought rehearing). Therefore, the rehearing request being considered in this Order concerns only 0.4 Bcf/d of the 1.8 Bcf/d of exports to non-FTA countries that DOE/FE has authorized FLEX to make.

## **II. PROCEDURAL BACKGROUND**

### **A. DOE/FE and FERC Proceedings**

On November 15, 2013, DOE/FE issued Order No. 3357 (FLEX II Conditional Order)<sup>5</sup> to FLEX pursuant to section 3(a) of the Natural Gas Act (NGA).<sup>6</sup> DOE/FE subsequently amended Order No. 3357 to clarify the terms of the Conditional Order.<sup>7</sup>

In the FLEX II Conditional Order, DOE/FE conditionally granted FLEX's Application<sup>8</sup> in FE Docket No. 11-161-LNG for long-term, multi-contract authority to export domestically produced liquefied natural gas (LNG) by vessel to non-FTA countries. DOE/FE conditionally authorized FLEX to export LNG in a volume equivalent to 146 billion cubic feet per year

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<sup>5</sup> *Freeport LNG Expansion L.P. and FLNG Liquefaction, LLC*, DOE/FE Order No. 3357, FE Docket No. 11-161-LNG, Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Freeport LNG Terminal on Quintana Island, Texas to Non-Free Trade Agreement Nations (Nov. 15, 2013).

<sup>6</sup> 15 U.S.C. § 717b(a). This authority is delegated to the Assistant Secretary for Fossil Energy pursuant to Re-delegation Order No. 00-002.04F (July 11, 2013).

<sup>7</sup> On November 15, 2013, DOE/FE issued Order No. 3357-A to clarify, among other things, the date the export term commences. Collectively, Order Nos. 3357 and 3357-A are referred to herein as the FLEX II Conditional Order.

<sup>8</sup> *See supra*, fn. 1.

(Bcf/yr) of natural gas (0.4 Bcf/d)<sup>9</sup> for a term of 20 years. The proposed exports will originate from the existing Freeport Terminal, located on Quintana Island, southeast of the City of Freeport in Brazoria County, Texas, from liquefaction and related facilities to be constructed by FLEX (Liquefaction Project).

The FLEX II Conditional Order addressed the record evidence and entered findings on all non-environmental issues considered under NGA section 3(a), including the economic impacts, international impacts, and security of gas supply associated with FLEX's proposed exports. Because DOE/FE must also consider environmental issues, DOE/FE conditioned its authorization on the satisfactory completion of the environmental review process and on DOE/FE's issuance of a finding of no significant impact or a record of decision (ROD) pursuant to NEPA.<sup>10</sup> DOE/FE stated that it intended to complete its NEPA review as a cooperating agency in the environmental review of the Liquefaction Project being performed by the Federal Energy Regulatory Commission (FERC) and explained that the Conditional Order "indicates ... DOE/FE's determination at this time on all but the environmental issues in this proceeding."<sup>11</sup>

FERC issued a draft Environmental Impact Statement (EIS) for the proposed Liquefaction Project and other facilities modifications on March 14, 2014,<sup>12</sup> and a final EIS on June 16, 2014.<sup>13</sup> The final EIS recommended that FERC subject any approval of FLEX's

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<sup>9</sup> This volume was a portion of the LNG export volume requested by FLEX in the Application, which was 1.4 Bcf/d of natural gas (511 Bcf/yr). DOE/FE's rationale for not granting the requested volume is set forth in the FLEX II Conditional Order. *See* FLEX II Conditional Order at 12-13, 15-17.

<sup>10</sup> *See* FLEX II Conditional Order at 165 (Ordering Para. F).

<sup>11</sup> *Id.* at 163-64 (Terms and Conditions § H) (stating that "DOE/FE's participation as a cooperating agency ... is intended to avoid duplication of effort by agencies with overlapping environmental review responsibilities, to achieve early coordination among agencies, and to concentrate public participation in a single forum.").

<sup>12</sup> *See* Freeport LNG Development, L.P., FLNG Liquefaction, LLC, FLNG Liquefaction 2, LLC, and FLNG Liquefaction 3, LLC; Notice of Availability of the Draft Environmental Impact Statement for the Proposed Phase II Modification and Liquefaction Projects, 79 Fed. Reg. 15,989 (March 24, 2014).

<sup>13</sup> *See* Freeport LNG Development, L.P., FLNG Liquefaction, LLC, FLNG Liquefaction 2, LLC, and FLNG Liquefaction 3, LLC; Notice of Availability of the Final Environmental Impact Statement for the Proposed Phase II Modification and Liquefaction Projects, 79 Fed. Reg. 35,345 (June 20, 2014). *See also* *Freeport LNG Development*,

proposed Liquefaction Project to 83 environmental conditions. On July 30, 2014, FERC issued an Order Granting Authorization under Section 3 of the Natural Gas Act (FERC Order), which authorized FLEX to site, construct, and operate the Liquefaction Project and other facilities modifications subject to the 83 environmental conditions contained in Appendix A of that FERC Order.<sup>14</sup> On October 3, 2014, after an independent review, DOE/FE adopted FERC's final EIS for the FLEX Liquefaction Project (DOE/EIS-0487), and the U.S. Environmental Protection Agency (EPA) published a notice of the adoption on October 10, 2014.<sup>15</sup>

On November 14, 2014, DOE/FE issued Order No. 3357-B (FLEX II Order or Final Order)<sup>16</sup> in which it granted final authorization for FLEX to export LNG to non-FTA countries up to the equivalent of 146 Bcf/yr of natural gas (0.4 Bcf per day (Bcf/d))<sup>17</sup> for a term of 20 years. The FLEX II Order was conditioned on FLEX's compliance with the 83 environmental conditions adopted in the FERC Order. Concurrently with the FLEX II Order, DOE/FE issued a Record of Decision (ROD) for FLEX's proposed Liquefaction Project and other related facilities modifications.<sup>18</sup>

Sierra Club has asked DOE/FE to grant rehearing of the FLEX II Conditional Order (to the extent relied upon or incorporated by reference in the FLEX II Order), the FLEX II Order,

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*L.P., et al.*, Freeport LNG Liquefaction Project, Phase II Modification Project, Final Environmental Impact Statement, FERC/EIS-0250F (June 2014) [hereinafter Final EIS].

<sup>14</sup> *Freeport LNG Development, L.P., et al.*, Order Granting Authorizations Under Section 3 of the Natural Gas Act, 148 FERC ¶ 61,076 (July 30, 2014) [hereinafter FERC Order].

<sup>15</sup> U.S. Env'tl. Prot. Agency, Environmental Impact Statements; Notice of Availability, 79 Fed. Reg. 61,303, 61,304 (Oct. 10, 2014) (providing notice that DOE/FE adopted FERC's final EIS for the FLEX Liquefaction Project).

<sup>16</sup> *See supra*, fn. 3.

<sup>17</sup> This volume was a portion of the LNG export volume requested by FLEX in the Application, which was 1.4 Bcf/d of natural gas (511 Bcf/yr). DOE/FE's rationale for not granting the requested volume is set forth in the FLEX II Conditional Order. *See* FLEX II Conditional Order at 12-13, 15-17.

<sup>18</sup> Record of Decision and Floodplain Statement of Findings for the Freeport LNG Expansion, L.P. Export Application, 79 Fed. Reg. 69101 (Nov. 20, 2014) [hereinafter ROD]. In the ROD, DOE/FE concurrently issued a Floodplain Statement of Findings, as required by 10 C.F.R. Part 1022 (Floodplain and Wetland Environmental Review Requirements).

and the ROD. Sierra Club asks DOE/FE to withdraw these actions pending further inquiry into the environmental impacts of FLEX's proposed exports or, in the alternative, to withdraw the FLEX II Conditional Order and the FLEX II Order and deny FLEX's Application.<sup>19</sup> For the reasons below, DOE/FE denies Sierra Club's Request for Rehearing, and affirms the findings and conclusions in the FLEX II Conditional Order and the FLEX II Order and the ROD for FLEX's Application.

## **B. Environmental Review Procedures**

When an applicant seeks authority both to export LNG to non-FTA countries and to construct a terminal for that purpose, DOE and FERC work together to avoid duplication of effort in the environmental review required under NEPA. 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>20</sup> FERC's lead agency role was codified by section 313 of the Energy Policy Act of 2005 (Pub. L. 109-58 (Aug. 8, 2005)), which amended section 15 of the NGA (15 U.S.C. § 717n).

The present case follows that framework. On January 5, 2011, FERC granted FLEX's request to commence the pre-filing review process. Shortly thereafter, FERC issued a Notice of Intent to Prepare an Environmental Impact Statement of the Liquefaction Project.<sup>21</sup> The pre-

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<sup>19</sup> Sierra Club, Request for Rehearing, FE Docket No. 11-161-LNG (Dec. 15, 2014) [hereinafter Rehearing Request].

<sup>20</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 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 has issued regulations stating that it will perform its NEPA responsibilities in accordance with the CEQ regulations. 10 C.F.R. §§ 1021.101 & 103.

<sup>21</sup> See Freeport LNG Development, L.P., Freeport LNG Expansion, L.P., FLNG Liquefaction LLC; Supplemental Notice of Intent to Prepare an Environmental Impact Statement for the Planned Liquefaction Project, Request for Comments on Environmental Issues, and Notice of Public Scoping Meeting, 77 Fed. Reg. 43,589 (Jul. 25, 2012).



filing proceeding involved a public scoping process to determine the issues requiring environmental review under NEPA.<sup>22</sup>

On August 31, 2012, FLEX began the second part of FERC's approval process by filing its formal Application in FERC Docket No. CP12-509-000 for authorization to site, construct, and operate the Liquefaction Project under NGA section 3.<sup>23</sup>

FERC issued its final EIS on June 16, 2014.<sup>24</sup> On July 30, 2014, FERC issued its Order granting FLEX's requested authorization to modify previously authorized LNG facilities to facilitate the import and export of LNG at FLEX's Quintana Island terminal (the Phase II Modification Project) and granted authorization to site, construct, and operate the proposed Liquefaction Project.<sup>25</sup>

FERC addressed Sierra Club's claims that the EIS failed to consider the cumulative environmental impacts from all proposed export terminals in the United States, including the effect of increased gas prices, finding no merit in the argument.<sup>26</sup> FERC also addressed Sierra Club's argument that the EIS was defective because it did not examine induced natural gas production associated with the Project.

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<sup>22</sup> The Conditional Order, as supplemented by the FLEX II Order, provides the history of the FLEX Terminal and describes the proposed Liquefaction Project. These orders also set forth the procedural history of FLEX's proceedings before DOE/FE and FERC, including arguments made by Sierra Club in each proceeding.

<sup>23</sup> In addition to its request for authorization to site, construct, and operate the Liquefaction Project, on December 9, 2011, in Docket No. CP12-29-000, FLEX also requested an amendment to its authorization to expand existing LNG import facilities previously granted by FERC on September 26, 2006, in Docket No. CP05-361-000 (the Phase II Modification Project). The modifications to existing facilities in the Phase II Modification Project would facilitate the import and export of LNG at the existing Quintana Island terminal. FERC combined its environmental analyses of the two requests in its Final Environmental Impact Statement.

<sup>24</sup> *Freeport LNG Development, L.P. FLNG Liquefaction, FLNG Liquefaction 2, LLC FLNG Liquefaction 3, LLC*; Notice of Availability of the Final Environmental Impact Statement for the Proposed Phase II Modification and Liquefaction Projects, 79 Fed. Reg. 35,345 (June 20, 2014).

<sup>25</sup> FERC Order, *supra* note 15.

<sup>26</sup> *See id.* at 20.

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* (Draft Addendum).<sup>27</sup> DOE/FE received comments on the Draft Addendum and, on August 15, 2014, issued the final Addendum (Addendum) with its response to the public comments contained in Appendix B.<sup>28</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* (LCA GHG Report)<sup>29</sup> as well as a 200-page supporting document entitled, *Life Cycle Analysis of*

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<sup>27</sup> Dep't of Energy, Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas From the United States, 79 Fed. Reg. 32,258 (June 4, 2014). DOE/FE announced the availability of the Draft Addendum on its website on May 29, 2014.

<sup>28</sup> 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).

<sup>29</sup> 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. The LCA GHG Report and supporting documents are incorporated herein by reference.

*Natural Gas Extraction and Power Generation.*<sup>30</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 its Final Opinion and Order on November 14, 2014.<sup>31</sup> In the Final 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;<sup>32</sup> (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 FLEX’s requested authorization was inconsistent with the public interest;<sup>33</sup> and (iii) granted FLEX’s Application subject to further conditions, including the 83 environmental conditions adopted in the FERC Order.<sup>34</sup>

### **C. Sierra Club’s Request for Rehearing of DOE’s Orders and FLEX’s Answer**

Sierra Club filed its Rehearing Request on December 15, 2014.<sup>35</sup> On December 19, 2014, FLEX filed a “Motion for Leave to Answer to Sierra Club’s Request for Rehearing”<sup>36</sup> and on December 22, 2014, DOE/FE issued an Order granting Sierra Club’s Request for Rehearing

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<sup>30</sup> See 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 Dep’t of Energy, Nat’l Energy Tech. Lab., *Life Cycle Analysis of Natural Gas Extraction and Power Generation* (May 29, 2014), available at: <http://energy.gov/fe/LCA-GHG-Report> (link to “NETL Natural Gas LCA Model and Analysis”).

<sup>31</sup> See FLEX II Order, *supra* note 3.

<sup>32</sup> See *id.* at 55-85.

<sup>33</sup> See *id.* at 106.

<sup>34</sup> See *id.* at 109.

<sup>35</sup> See Rehearing Request, *supra* note 15.

<sup>36</sup> FLEX, Motion for Leave to Answer to Sierra Club’s Request for Rehearing, FE Docket No. 11-161-LNG (Dec. 19, 2014). FLEX’s Motion will be granted because it provides additional relevant argument pertinent to our review of the record.

and FLEX's Motion for Leave to Answer solely for purposes of further consideration.<sup>37</sup> On January 15, 2015, FLEX filed an "Answer to Sierra Club's Request for Rehearing."<sup>38</sup>

### 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) (*Panhandle Producers*) recognized a statutory presumption applicable to LNG export proceedings. Instead, Sierra Club submits that the presumption addressed in *Panhandle Producers* applied only to import proceedings and was derived from DOE Policy Guidelines adopted in 1984 rather than the language of the NGA.<sup>39</sup> Sierra Club further states that it provided record evidence and argument that affirmatively demonstrated that the Application is inconsistent with the public interest and that even if DOE/FE were to determine that Sierra Club had not made this showing, DOE/FE must take a

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<sup>37</sup> See Order Granting Request for Rehearing and Motion for Leave to Answer for the Purpose of Further Consideration, FE Docket No. 11-161-LNG (Dec. 22, 2014). This Order prevented both Sierra Club's and FLEX's motions from being deemed denied by operation of law pursuant to 10 C.F.R. §§ 590.504 and 590.302 (c), respectively.

<sup>38</sup> See FLEX Answer to Sierra Club's Request for Rehearing, DOE/FE Docket No. 11-161-LNG (Jan. 15, 2015) [hereinafter FLEX Answer].

<sup>39</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 that *Panhandle Producers* did not reach the question of whether any presumptions regarding imports or exports were compelled by the NGA. *Id.* at 3.

“hard look” at the environmental impacts of the project to determine whether they are consistent with the public interest<sup>40</sup>

## 2. FLEX’s Answer

FLEX asserts that Sierra Club is mistaken in arguing both that Section 3 of the Natural Gas Act does not create a rebuttable presumption in natural gas export proceedings, and that DOE/FE failed to undertake its own inquiry into the environmental impacts of its actions.<sup>41</sup> FLEX cites the Final Opinion and Order in which DOE/FE explained that Section 3 of the Natural Gas Act creates a rebuttable presumption that a proposed export of natural gas is in the public interest and that DOE must approve such a proposal “unless opponents of the application overcome the presumption by making an affirmative showing of inconsistency with the public interest.”<sup>42</sup>

FLEX disputes Sierra Club’s claim that DOE/FE relied on the rebuttable presumption to avoid undertaking its own inquiry to consider the environmental impacts of its actions.<sup>43</sup> FLEX notes that DOE/FE acknowledged in its ROD that it “must...consider environmental issues” and that DOE/FE considered environmental issues as one of a range of factors in making its public interest determination.<sup>44</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

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<sup>40</sup> See *id.* at 3.

<sup>41</sup> See FLEX Answer at 6.

<sup>42</sup> See *id.* (citing Final Opinion and Order at 9).

<sup>43</sup> See *id.* (citing Sierra Club Request for Rehearing at 3).

<sup>44</sup> See *id.* FLEX notes that DOE’s Conditional Order approving FLEX’s Application was “explicitly conditioned on the satisfactory completion of FLEX’s environmental review process under NEPA, and on DOE/FE’s issuance of a finding of no significant impact or a record of decision.” *Id.*

public interest.” 15 U.S.C. § 717b(a) (emphasis added). DOE interprets these words to mean that, for the Department to deny an application, it must make an affirmative finding based on record evidence that the proposed import or export is inconsistent with the public interest. The Department refers to this as a rebuttable presumption because, absent evidence demonstrating that a proposed export or import is inconsistent with the public interest, the Department must grant the requested authorization. Sierra Club claims that the court in *Panhandle Producers* “did not reach the question of whether any presumptions regarding imports or exports were compelled by the Natural Gas Act.”<sup>45</sup> But in fact the court stated that “§ 3 [of the NGA] requires an affirmative showing of inconsistency with the public interest to *deny* an application.”<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 FLEX’s export proposal required by NEPA. The Department participated as a cooperating agency in FERC’s environmental review. The Department independently reviewed the EIS prepared by FERC and adopted all 83 environmental conditions recommended by FERC staff and adopted by the

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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.

Commission. In fulfilling its responsibilities under NEPA, the Department applied no presumptions regarding the potential environmental impacts associated with FLEX's proposed exports, as the record shows. We therefore reject Sierra Club's arguments concerning DOE/FE's interpretation of the NGA as it relates to the rebuttable presumption.

## **B. DOE/FE's Analysis of Indirect and Cumulative Environmental Impacts Satisfied the National Environmental Policy Act**

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

Sierra Club asserts that DOE/FE's environmental review failed to comply with NEPA because FERC's EIS, which DOE/FE adopted, did not take a "hard look" at the indirect and cumulative impacts of LNG exports. Sierra Club asserts that the Environmental Addendum and the National Energy Technology Laboratory (NETL) Reports are not substitutes for NEPA review, because they contradict one another, do not specify impacts of this project and thereby fail to inform the public and provide a basis for public comment.<sup>48</sup> Sierra Club also asserts that, whether or not FERC did so, DOE/FE should have taken a hard look at the environmental impacts of natural gas production activities that would be induced by LNG exports. Sierra Club states that induced production is a reasonably foreseeable consequence of increased demand for natural gas due to LNG exports. 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. According to Sierra Club, the NEMS model underlying the Department's 2012 LNG Export Study predicted how production would respond

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<sup>48</sup> See Rehearing Request at 4-5.

to exports.<sup>49</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. According to Sierra Club, the specific environmental impacts of these additional natural gas production activities include increased generation of ozone precursors (*e.g.*, volatile organic chemicals and hazardous air pollutants) and methane releases resulting in additional GHG emissions into the atmosphere. Sierra Club also contends that DOE/FE’s NEPA analysis was flawed because it 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.

## 2. FLEX’s Answer

FLEX notes that DOE explained that the Environmental Addendum was not required by NEPA.<sup>50</sup> Rather, the Environmental Addendum and the NETL Reports were provided above and beyond NEPA requirements. FLEX also maintains that Sierra Club failed to establish a reasonably close causal relationship between induced production and the Liquefaction Project as would be necessary to conclude that induced production is reasonably foreseeable.<sup>51</sup> FLEX submits that both DOE and FERC reasonably concluded that insufficient facts exist to consider the timing, location, and scope of future gas production activities. FLEX also challenges Sierra Club’s assertion that the NEMS modeling methodology supports meaningful discussion of

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<sup>49</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. In relevant part, EIA published its study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, in January 2012 [hereinafter EIA 2012 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 Conditional Order (§§ I, VI, VIII).

<sup>50</sup> FLEX Answer at 6.

<sup>51</sup> *See id.* at 7.



induced production.<sup>52</sup> NEMS could not provide DOE with information of sufficient specificity to warrant consideration of it in a NEPA review.<sup>53</sup> For example, according to FLEX, NEMS could not predict the location or amounts of additional gas production for a single export facility when that facility has pipeline connections to the nationwide grid.

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

#### **a. Induced Natural Gas Production**

The CEQ regulations implementing NEPA require that agencies consider the “indirect effects” of proposed actions. “Indirect effects,” the regulations provide, “are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” 40 C.F.R. § 1508.8(b); 10 C.F.R. § 1021.200 (adopting CEQ’s regulations for the Department). 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>54</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>55</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>56</sup> The second principle is that “inherent in NEPA and its implementing

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<sup>52</sup> *See id.* at 8-9.

<sup>53</sup> *See id.*

<sup>54</sup> *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U. S. 766, 774 (1983).

<sup>55</sup> *Dep’t of Transp. v. Public Citizen*, 541 U.S. 752, 767 (2004).

<sup>56</sup> *Id.* (quoting *Metropolitan Edison Co.*, 460 U.S. at 774).

regulations is a ‘rule of reason.’”<sup>57</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>58</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 FLEX to export LNG to non-FTA countries. The causal relationship Sierra Club posits is an economic one. Sierra Club argues that a decision to authorize exports of natural gas from the United States to non-FTA countries may increase the price of natural gas in the United States, and therefore concludes the Department must examine the consequences of that potential price increase, including increased domestic production of natural gas and increased consumption of coal, which competes with natural gas as a fuel for electric generation. We do not read Sierra Club’s petition to argue that the Department must examine the environmental impacts of producing the very molecules of natural gas that will be exported by FLEX. 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 FLEX 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>57</sup> *Id.* at 767.

<sup>58</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 Env’t. 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 "high" and "slow" ramp-up scenarios could have on the energy sector.<sup>59</sup> EIA projected that "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>60</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>61</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 FLEX's exports 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 FLEX's Application. As the Department observed in the Final Order:

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

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<sup>59</sup> See LNG Export Study – Related Documents, available at <http://energy.gov/fe/services/natural-gas-regulation/lng-export-study> (EIA 2012 Study). See Conditional Order at 24-26.

<sup>60</sup> U.S. Energy Information Administration, *Effect of Increased Natural Gas Exports on Domestic Energy Markets*, at 10 (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 EIA Study].

<sup>61</sup> See Final Order at 85.

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>62</sup>

Further, insofar as FLEX’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>63</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>64</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>62</sup> Final Opinion and Order at 85.

<sup>63</sup> *Id.* (citing *See FLEX II Conditional Order* at 100 n.161)).

<sup>64</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, and 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>65</sup> or tight gas.<sup>66</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>67</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>68</sup> water,<sup>69</sup> or land.<sup>70</sup> An economic model that estimated induced production across each shale play would provide no information about where any incremental production would arise within those shale

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<sup>65</sup> Addendum at 6, Fig. 2 (Approximate Locations of Current Producing Gas Shales and Prospective Shales).

<sup>66</sup> *See id.* at 7, Fig. 3 (Location of Currently Active Areas for Tight Sand Development and Production).

<sup>67</sup> *See id.* at 54, Table 13 (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).

<sup>68</sup> Air pollutants largely concentrate in the local area in which they are emitted. Without knowing where within a shale play incremental production will occur, 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. Addendum at 29, Fig. 8. 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>69</sup> *See* Addendum at 10-19 (describing water impacts and concluding that “specific impacts to water resources cannot be predicted even on a regional level”).

<sup>70</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 could have simply estimated how many wells in each play would be necessary to meet projected export demand. Absent an understanding of what land would be affected, however, an attempt to estimate the total number of wells would not have meaningfully informed our decision.

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 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 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. The causal chain linking the Department's decision to environmental impacts resulting from induced natural gas production is probabilistic and attenuated, not close and proximate as the Supreme Court has stated must be evident to bring the effects within the scope of NEPA review.

Nevertheless, even though the environmental impacts of induced natural gas production are not "reasonably foreseeable," the Department has taken all reasonable steps to ensure that its

public interest review was informed by a consideration of the general environmental impacts of natural gas production. On June 4, 2014, DOE/FE issued the draft Addendum, which, as noted above, presented a discussion of environmental issues associated with unconventional gas production in the lower-48 states based on DOE's review of existing literature, regulations, and best management practices. The Addendum focused on the environmental impacts of unconventional natural gas production in the United States because of the projections by EIA in its 2012 Study that over 90% of incremental production resulting from exports would come from unconventional sources (i.e. shale gas, tight gas, and coalbed methane). The Addendum contained chapters separately considering water resources, air quality, greenhouse gases, induced seismicity, and land use impacts.<sup>71</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.

In its Rehearing Request, Sierra Club offers three reasons why it believes 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 information in the Addendum contradicts information in other documents in the Department's record. Sierra Club states that the EIS prepared by FERC claims that it is not reasonably foreseeable whether exports will increase gas

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<sup>71</sup> See Final Order at 36-45 (summarizing the Addendum's findings).

production,<sup>72</sup> but that DOE expresses a contrary view regarding the relationship between exports and production by relying on EIA's conclusion that production will increase to supply exports, reducing the potential for exports to compete with domestic gas consumers.<sup>73</sup> According to Sierra Club, the Environmental Addendum also adopts EIA's conclusion that exporting LNG will increase domestic production of natural gas. In fact, there is no inconsistency.

Projections by EIA that domestic production will increase in response to exports do not make the location or amounts of additional gas, or its impacts, reasonably foreseeable. This is the same conclusion that the Department reached in the Addendum,<sup>74</sup> and that FERC staff reached in the EIS.<sup>75</sup>

Second, 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>76</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 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

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<sup>72</sup> See Rehearing Request at 5 (*citing* EIS at 4-240 to 4-241).

<sup>73</sup> See *id.*

<sup>74</sup> See Addendum at 2.

<sup>75</sup> See EIS at 4-240 to 4-241

<sup>76</sup> Rehearing Request at 4-5.



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>77</sup> Finally, there was no inconsistency in the conclusions regarding air pollution emissions for the reasons explained in section III.C.1 of this Order.

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

#### **b. Increased Use of Coal**

Sierra Club argues that the Department must examine the possible increased use of coal in electric power generation that may result from the Department's decision in this case. Sierra Club's argument centers on EIA's 2012 Study, which (according to Sierra Club) projected that the increased price of natural gas resulting from exports of LNG leads to additional use of coal because coal competes with natural gas on price as a fuel for electric power generation.<sup>78</sup>

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<sup>77</sup> Addendum at 36, 87.

<sup>78</sup> See Rehearing Request at 18-19.

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.

We also believe that certain assumptions underlying EIA’s projections in its 2012 Study—specifically, the estimated increase in coal consumption arising from higher natural gas prices—are now out of date. As we observed in the Final Order, EIA’s projections assume continuation of the regulations in force at the time of its analysis. EIA prepared the 2012 Study before several EPA rulemakings had been finalized. Most significantly, on August 3, 2015, EPA finalized rules under the Clean Air Act that will impose limits on GHG emissions from both new and existing coal-fired power plants.<sup>79</sup>

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<sup>79</sup> U.S. Environmental Protection Agency, Standards of Performance for Greenhouse Gas Emissions from New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units, *available at* <http://www3.epa.gov/airquality/cpp/cps-final-rule.pdf>; U.S. Environmental Protection Agency, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, *available at* <http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf>.

## **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>80</sup> Sierra Club also states that the 1.2 percent leakage rate estimate attributed to NETL in Order No. 3357-B 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>81</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) 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, Howarth, nothing in the record explains why NETL’s estimate is superior to Burnham and Weber.”<sup>82</sup>

According to Sierra Club, DOE/FE in Order 3357-B correctly noted that the boundary conditions applied in the Burnham study differed from those in the NETL study in that NETL reviewed “cradle-through-transmission” whereas Burnham also 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. Burnham estimated that 0.28 percent of methane produced was emitted

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<sup>80</sup> See Rehearing Request at 15.

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

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

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>83</sup>

Sierra Club also addresses the statement in Order 3357-B 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 2014, 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>84</sup>

Sierra Club also argues that the Department should have modeled methane emissions using “top-down” rather than “bottom-up” studies. On rehearing, 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. Order 3357-B, according to Sierra Club, acknowledges that top-down studies do not generally match bottom-up calculations due to different boundaries, but Sierra Club maintains that DOE/FE gave no explanation as to why the boundaries used in bottom-up studies are more appropriate.<sup>85</sup>

Based on Brandt 2014 and other research,<sup>86</sup> Sierra Club maintains that bottom-up estimates are likely to be inaccurate. Sierra Club states that nothing in Brandt indicates that the

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<sup>83</sup> *See id.*

<sup>84</sup> *See id.* at 15-16.

<sup>85</sup> *See id.* at 16.

<sup>86</sup> 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

broader top-down estimates, such as Miller 2013, are not representative. The 3 percent leakage rate indicated by Miller is more than double the rate used by DOE. 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>87</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.<sup>88</sup>

#### **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-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,

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(NOAA) was published that, Sierra Club claims, concludes that the most likely methane leakage rate is between 2 percent and 4 percent. Rehearing Request at 16-17 n.36 (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>87</sup> See Rehearing Request at 17.

<sup>88</sup> See *id.* at 15.

processing, and transmission of 1 kg of natural gas<sup>89</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. Weber *et al.*<sup>90</sup> 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"<sup>91</sup> approach to derive a methane leakage rate. In the Final Order, DOE/FE responded by noting that researchers are currently working to discern why top-down studies do not match bottom-up studies.<sup>92</sup> DOE/FE also noted that, as research continues, scientists expect to learn more about the differences between these two types of methodologies.

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<sup>89</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>90</sup> 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. Final Order at 69.

<sup>91</sup> Rehearing Request at 16. For the 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 Final Order at 80.

<sup>92</sup> See Final Order at 80.

With that caveat in mind, based on the scientific studies available at the time the analysis in this proceeding was performed, our judgment is that 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 Final 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>93</sup> and that DOE/FE should have used Global Warming Potential (or GWP)<sup>94</sup> estimates drawn from the IPCC that include climate carbon feedbacks.<sup>95</sup> Sierra Club contends these estimates would have yielded a 20 percent higher GWP. According to Sierra

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<sup>93</sup> Rehearing Request at 17.

<sup>94</sup> Global Warming Potential (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. Environmental Protection Agency, *Understanding Global Warming Potentials*, <http://www.epa.gov/climatechange/ghgemissions/gwps.html>.

<sup>95</sup> Rehearing Request at 17.

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>96</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.

#### **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>97</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.

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>98</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

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<sup>96</sup> *Id.*

<sup>97</sup> LCA GHG Report at 18 (“Summary and Study Limitations”).

<sup>98</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.



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.

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 (Table 2) depicts how the life cycle GHG emissions for three key scenarios in the LCA GHG Report would change depending on whether the 100-GWP for methane was 30 or 36. These changes were calculated by scaling the methane emissions in Figures 6-3 through 6-5 of the LCA GHG Report by a ratio of 36/30.

**Table 2: 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%, the estimate for Russian gas increases more, by 4.9%, and the estimate for use of regional coal increases by 0.1%. This change in the GWP estimate would not have made a material difference to the conclusions of the LCA GHG Report and does not warrant re-opening this proceeding to update the LCA GHG Report.

**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>99</sup> In the Final Order, DOE considered whether emissions from U.S.-exported LNG would be offset by displacement of combustion of other fossil fuels and avoidance of associated emissions. Sierra Club maintains that this approach is not the proper way to assess climate

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<sup>99</sup> See Rehearing Request at 20.

impacts and that the United States' international commitments require consideration of domestic GHG emissions without consideration of displaced foreign emissions.<sup>100</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 "the simpler problem" represented by FLEX's specific proposal with the majority of output contracted to Japanese buyers.<sup>101</sup> Sierra Club asserts that this modeling effort for FLEX's Liquefaction Project would not be unreasonably burdensome or speculative.

Sierra Club also maintains that 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 that DOE provides no basis for comparing U.S. LNG against coal and natural gas used in China rather than the aggregate GHG intensity of China's generation fleet or, even more appropriately, the average GHG intensity of additional generation capacity that China is expected to add (based on EIA data). According to Sierra Club, DOE cited China's 2012 generation capacity, which was composed of 66 percent coal and 3 percent natural gas. Sierra Club maintains that it would have been reasonable to assume that U.S. LNG would be more likely to compete against sources of new capacity rather than existing sources, and states that the new capacity will be more than 50 percent renewables and, therefore, will have a significantly lower GHG intensity than DOE's estimate even under a 100-year GWP.<sup>102</sup>

Second, in the case of Japan, Sierra Club states that DOE did not forecast future Japanese generation even though this information is available. Sierra Club contends that DOE/FE has an obligation to seek out the environmental effects of the proposed project. However, Sierra Club states that the data of the International Energy Agency on which EIA relied indicates that the

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<sup>100</sup> *See id.* at 20-21.

<sup>101</sup> Rehearing Request at 21.

<sup>102</sup> *See id.*

GHG intensity of Japan's aggregate mix is very near NETL's estimate of the intensity of U.S. LNG. Therefore, Sierra Club maintains that correcting any of the errors in NETL's assessment would likely lead to the conclusion that U.S. LNG has higher life-cycle emissions than the energy that U.S. LNG would likely displace in Japan.<sup>103</sup>

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

The Department has thoroughly reviewed the GHG impacts of its decision. At the project level, the EIS describes direct GHG emissions resulting from the construction and operation of the FLEX Terminal, including the liquefaction process.<sup>104</sup> The Addendum contains a chapter devoted to GHG emissions and includes a range of estimates from the scientific literature of the GHGs emitted by producing and transporting natural gas from unconventional resources.<sup>105</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>106</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. Sierra Club argues that the Department should have focused on the emissions solely within the United States because of the importance of the United States' international emissions reductions commitments. On the record before us, however, Sierra Club has provided no basis to support its contention that FLEX's

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<sup>103</sup> See *id.* at 21-22.

<sup>104</sup> Final EIS at 4-204 to 4-224.

<sup>105</sup> See Addendum at 33-44.

<sup>106</sup> See Final Order at 90-94.

proposed exports, or U.S. LNG exports in general, will have a material effect on the ability of the United States to fulfill economy-wide emissions reductions targets.

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 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 Final 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>107</sup>

It is important, however, to recognize the Department’s limited aims in making these comparisons. In the Final 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.<sup>108</sup> 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>109</sup>

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<sup>107</sup> *See id.* at 93.

<sup>108</sup> *See id.* at 92.

<sup>109</sup> *Id.* at 94.

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>110</sup> In its rehearing petition, Sierra Club suggests alternative comparisons the Department could have used to approach the difficult question of how U.S. LNG exports would affect the global GHG balance. For one, Sierra Club states that the Department could have analyzed FLEX’s specific LNG export proposal. With the majority of FLEX’s proposed output of LNG contracted to Japanese buyers, Sierra Club suggests that DOE should have focused solely on Japan, which Sierra Club characterizes as a “simpler problem.”<sup>111</sup> We disagree. Focusing solely on Japan is a “simpler problem” only because it ignores that there is a global market for LNG. Even if *all* U.S.-exported LNG went to Japan, those exports would affect the global price of LNG, which in turn would affect energy systems in numerous countries, not only Japan.

Sierra Club also suggests that the Department should have compared the lifecycle GHG emissions of U.S.-exported LNG to those of the average new facility in China. But Sierra Club does not explain why this would be an appropriate comparison. To the extent that 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

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<sup>110</sup> *See id.* at 93.

<sup>111</sup> Rehearing Request at 21.

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.

#### **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 the Final Order.

#### **V. ORDER**

Pursuant to sections 3 and 19 of the Natural Gas Act, and for the reasons set forth above and in Order Nos. 3357, 3357-B, and the ROD, it is ordered that:

- A. FLEX's Motion for Leave to Answer to Sierra Club's Request for Rehearing is granted.
- B. Sierra Club's Request for Rehearing is denied.

Issued in Washington, D.C., on December 4, 2015.



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Office of Fossil Energy