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**UNITED STATES OF AMERICA  
DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY**

**IN THE MATTER OF** )  
 ) **DOCKET NO.**  
**Cameron LNG, LLC** ) **11-162-LNG**  
 )

**Request for Rehearing**

Pursuant to Section 19(a) of the Natural Gas Act, 15 U.S.C. § 717r(a), and 10 C.F.R. § 590.501, the Sierra Club hereby requests rehearing of the Department of Energy Office of Fossil Energy’s “Final Opinion and Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Cameron LNG Terminal in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations” (“Order”), DOE/FE Order No. 3391-A, issued September 10, 2014, 2014, in the above-captioned matter, as well two related actions: the Record of Decision for the Cameron LNG, LLC Export Application published at 79 Fed. Reg. 55443 (Sept. 16, 2014) and (to the extent it is relied upon or incorporated by reference within 3391-A) the “Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas By Vessel from The Cameron LNG Terminal in Cameron Parish, Louisiana, to Non-Free Trade Agreement Nations,” DOE/FE Order No. 3391, issued February 11, 2014.

Sierra Club asks that these actions be withdrawn and pending further inquiry into the environmental impacts of the proposed exports, or in the alternative, that the order be withdrawn and the underlying application be denied.

All communications regarding this motion should be addressed to and served upon Nathan Matthews, Staff Attorney, and Natalie Spiegel, Legal Assistant, at Sierra Club, 85 2<sup>nd</sup> St., Second Floor, San Francisco, California 94105.

## I. Statement of the Issues

### A. The Natural Gas Act Does Not Compel DOE/FE To Presume that Exports Will Not Have Environmental Impacts Inconsistent With the Public Interest

Section 3 of the Natural Gas Act provides:

[N]o person shall export any natural gas from the United States to a foreign country or import any natural gas from a foreign country without first having secured an order of [DOE/FE] authorizing it do so. [DOE/FE] shall issue such order upon application unless, after opportunity for hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.

15 U.S.C. § 717b(a).

DOE errs in concluding that “*This provision* creates a rebuttable presumption that a proposed export of natural gas is in the public interest,” and that “DOE/FE *must* grant such an application unless opponents of the application overcome that presumption by making an affirmative showing of inconsistency with the public interest.” 3391-A at 8 (emphases added). As a threshold matter, it is undisputed that NEPA separately and independently obliges DOE/FE to affirmatively investigate the environmental impacts of LNG exports. Even as to the Natural Gas Act itself, however, any presumptions rest on agency guidance which is silent as to environmental impacts. Yet the “public interest” protected by the statute includes environmental concerns. *Nat’l Ass’n for the Advancement of Colored People v. Federal Power Commission*, 425 U.S. 662, 670 n.4, n.6 (1976). Accordingly, under both the Natural Gas Act and NEPA, DOE must independently and affirmatively investigate the environmental impacts of proposed export, and weigh the consistency of environmental impacts in its public interest determination.

DOE primarily relies on the D.C. Circuit’s decision in *Panhandle Producers and Royalty Owners Ass’n v. Economic Regulatory Administration*, 822 F.2d 1105 (D.C. Cir. 1987). That case did not reach the question of whether the *statute* created a presumption that exports were in the public interest. Instead, it merely held that the import policy guidelines were, in pertinent part, a permissible interpretation of the statute. *Id.* at 1111. The policy guidelines at issue in *Panhandle Producers*, and which DOE cites here,<sup>1</sup> are the *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. 6684-01 (Feb. 22, 1984). As summarized by *Panhandle Producers*, these guidelines created two specific rebuttable presumptions regarding natural gas imports: “that if the contract

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<sup>1</sup> Order 3391-A at 9.

terms are flexible enough the gas will be delivered only if it is competitive; and that if the imported gas is competitive it will fill a [domestic] need.” *Panhandle Producers*, 822 F.2d at 1111. *Panhandle Producers* determined that these presumptions were a permissible interpretation of the statute, but did not reach the question of whether any presumptions regarding imports or exports were compelled by the Natural Gas Act. *Id.* Even these presumptions are “highly flexible,” rebuttable, and do not preclude assertion of other factors. *Id.* at 1113.

The import policy guidance is therefore inapplicable to assessment of the environmental impacts of exports.<sup>2</sup> The import policy guidance provides no support for a presumption that exports will not have environmental impacts inconsistent with the public interest. Even if the import policy statement purported to adopt such a presumption, DOE/FE would be prohibited from blindly relying on it: *Panhandle Producers* explicitly stated the import policy guidance, which was not subject to notice and comment rulemaking, does not bind DOE/FE. *Id.* at 1110 (citing *Brock v. Cathedral Bluffs Shale Oil Co.*, 796 F.2d 533, 539 (D.C. Cir. 1986)).

As we explain below, Sierra Club has provided evidence and argument that does, in fact, “affirmative show[.]” that the application is “inconsisten[t] with the public interest.” Order 3391-A at 8. Nonetheless, even if DOE were to determine that Sierra Club has failed to meet the burden DOE/FE describes in the order, the Natural Gas Act would give DOE/FE the authority and obligation to take its own steps to cure the deficiencies in DOE/FE’s environmental analysis and to deny the application.

## **B. DOE Violated NEPA by Approving the Project Without an EIS Considering the Indirect and Cumulative Effects of LNG Exports**

DOE/FE has obligations under NEPA that are distinct from DOE/FE’s Natural Gas Act obligations. NEPA requires federal agencies to consider and disclose the “environmental impacts” of proposed agency action, and prescribes a particular set of procedures to be used to effectuate this process. 42 U.S.C. § 4332(C)(i).

Here, DOE/FE purports to meet its NEPA obligations by adopting the Environmental Impact Statement (“EIS”) prepared by the Federal Energy Regulatory Commission (“FERC”). Order 3391-A at 4, 79 Fed. Reg. 55444 (Sept. 16, 2014) (citing 40 C.F.R. § 1506.3). CEQ regulations permit such adoption only where DOE/FE independently ensures that the adopted statement satisfies DOE/FE’s NEPA obligations regarding the proposed DOE/FE action. 40 C.F.R. § 1506.3(c). As we explain below, FERC’s EIS fails to take a hard look at DOE/FE’s

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<sup>2</sup> Separate from environmental impacts, we note that exports differ from imports in key ways: while a domestic buyer’s willingness to pay international rates for foreign gas demonstrates a domestic need for the gas, DOE has not offered any basis for presuming that a foreign buyer’s willingness to pay international rates for domestic gas demonstrates that there is not a domestic need for the gas.

proposed authorization of exports. Because DOE/FE failed to cure the deficiencies in the EIS or supplementing the EIS to address the effects of DOE/FE action, DOE/FE's approval of the application violates NEPA.

## **1. The Environmental Addendum and NETL Reports Are Not A Substitute for NEPA Review**

As a threshold NEPA issue, the Environmental Addendum, and the three NETL reports DOE/Fe released alongside it, are not a substitute for NEPA review. Putting aside deficiencies in the scope and content of these documents, procedurally, they cannot fulfill DOE's NEPA obligations.

As summarized by one circuit court:

By requiring the consideration of environmental factors in the course of agency decisionmaking on major federal actions, NEPA serves two purposes: First, it ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts. Second, it guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision. In other words, by requiring agencies to take a "hard look" at how the choices before them affect the environment, and then to place their data and conclusions before the public, NEPA upon democratic processes to ensure—as the first appellate court to construe the statute in detail put it—that "the most intelligent, optimally beneficial decision will ultimately be made."

*Oregon Natural Desert Ass'n v. Bureau of Land Mgmt.*, 625 F.3d 1092, 1099-100 (9th Cir. 2010) (internal citations and some internal quotation marks removed).

Clear presentation of agency conclusions is essential to NEPA's purpose. Here, however, the Environmental Addendum, NETL reports, EIS, and Order 3391-A fail to present DOE's conclusions, and in fact contradict each other in many regards. The EIS concludes, as FERC summarizes elsewhere, that "induced production is not caused by the Liquefaction Project,"<sup>3</sup> whereas the Environmental Addendum adopts EIA's conclusion that exporting LNG will increase domestic production of natural gas.<sup>4</sup> Similarly, as Sierra Club explained in comments on the Addendum and NETL reports, these reports reach different conclusions regarding the

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<sup>3</sup> 147 FERC ¶ 61,230, para. 68 (citing EIS at L-96-97).

<sup>4</sup> Environmental Addendum at 1, 4-5.

potency of methane as a greenhouse gas and the amount of air pollution emitted by natural gas production. While NEPA permits an EIS to incorporate supporting materials by reference, the EIS here was released months before, and does not refer to, the Addendum or NETL reports. As such, there is no document that explains DOE's ultimate conclusions regarding issues on which individual documents disagree. NEPA requires more than a mere presentation of data—it requires agencies to present their interpretation and synthesis of that data, and this presentation must be made within the procedural framework that provides for public notice and comment prior to final agency decisionmaking.

Separate from the problems relating to inconsistencies in this data and DOE/FE's failure to present this information in accordance with the process required by NEPA, these additional materials cannot substitute for NEPA analysis because they provide not discussion of the impacts caused by Cameron's particular project.

## **2. DOE/FE Violated NEPA By Authorizing Exports Without Taking A Hard Look at Effects of Induced Gas Production**

DOE “observe[s] that more natural gas is likely to be produced domestically if LNG exports are authorized than if they are prohibited.” Order 3391 at 88. “DOE believes,” as it must, that exporting LNG from the U.S. will induce additional natural gas production.<sup>5</sup> This belief is central to DOE's economic and other public interest findings: if production did not increase in response to LNG exports, then the gas exported would, ultimately, have to come from reductions in existing domestic demand or matching natural gas imports, both of which would lead to much more severe price increases and which would undermine DOE's conclusion that there was not a domestic need for the gas exported. The Environmental Addendum summarizes EIA's January 2012 predictions on the domestic energy market's response to exports: “across all cases, an average of 63 percent of increased export volumes would be accounted for by increased domestic production. Of that 63 percent, EIA projected that 93 percent would come from unconventional sources (72 percent shale gas, 13 percent tight gas, and 8 percent coalbed methane [CBM]) (EIA 2012).”<sup>6</sup> The link between exports and additional gas production is simple: exports expand the demand for natural gas, will raise prices and provide an incentive and outlet for additional gas production.

This type of market effect falls squarely within the purview of NEPA's indirect and cumulative effects analyses. Indirect effects are “caused by the action” but

are later in time or farther removed in distance [than direct effects], but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced

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<sup>5</sup> DOE Addendum at 1.

<sup>6</sup> DOE Addendum at 5

changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems.

40 C.F.R. § 1508.8(b). NEPA must also take a hard look at cumulative impacts. Cumulative impacts are not causally related to the action. Instead, they are:

the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.7. Numerous courts have held that market-based effects such as increased gas production (marketed supply) in response to the demand created by exports are indirect and cumulative effects within the meaning of these regulations. *See, e.g., High Country Conservation Advocates v. United States Forest Serv.*, \_\_\_ F. Supp. \_\_\_, No. 13-CV-01723-RBJ, 2014 WL 2922751, \*14 (D. Colo. June 27, 2014) (NEPA review of project that would provide roads enabling additional coal mining must consider effects of increased coal combustion); *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-50 (8th Cir. 2003) (environmental effects of increased coal consumption due to construction of a new rail line to reach coal mines was reasonably foreseeable and required evaluation under NEPA).

Nonetheless, despite DOE's conclusion that "more natural gas is likely to be produced domestically if LNG exports are authorized than if they are prohibited," Order 3391 at 88, DOE wrongly determined that "NEPA does not require the review to include induced upstream natural gas production." Order 3391-A at 73. DOE offered two arguments for this exclusion, both resting on claims of uncertainty: DOE claims that it is uncertain whether, if authorized, exports would in fact occur,<sup>7</sup> and that, even if exports do occur, it is uncertain "where, in what quantity, and under what circumstances" the production induced by these exports will occur. Both of these arguments are contrary to the applicable law and the facts in the record here. The additional arguments regarding induced production contained in FERC's EIS, which DOE adopts but does not specifically discuss, are similarly flawed and inapplicable.

***a) Exporting LNG Is Not A Speculative or Unforeseeable Consequence of An Export Authorization***

DOE's initial argument for excluding induced production from NEPA review is that "Fundamental uncertainties constrain the ability to predict what, if any, domestic natural gas

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<sup>7</sup> Addendum at 1, Order 3391-A at 74.

production would be induced by granting any specific authorization or authorizations to export LNG to non-FTA countries,”<sup>8</sup> and that “there is uncertainty as to the aggregate quantity of natural gas that ultimately may be exported to non-FTA countries.” 3391-A at 74. This uncertainty does not provide a basis for excluding the effects of natural gas exports from NEPA review.

As a matter of law, because Cameron seeks authorization to export 1.7 bcf/d of natural gas, NEPA requires DOE to take a hard look at the effects of exporting 1.7 bcf/d of natural gas. These exports are not an effect of the proposed action: they are the action itself. As such, it would be nonsensical to require further certainty as to whether exports will occur before evaluating the effects that exports (if they do occur) will have. Although in certain contexts effects may be so uncertain that they can be omitted from analysis as not “reasonably foreseeable,” this arises only under regulations delineating the scope of the indirect and cumulative effects assessments.<sup>9</sup> Exports, however, are the action itself, or at minimum a direct effect of the action, and not an indirect or cumulative effect. DOE has not identified any authority allowing an agency to avoid discussion of the effects of a proposed action on the ground that it was uncertain whether the action itself would be undertaken.

Even if DOE wrongly determines that it is appropriate to impose some foreseeability inquiry regarding whether exports will occur, the proposed exports are plainly foreseeable for purposes of NEPA. DOE states that “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.” 3391-A at 74 (emphases added). DOE purports to “illustrate” the uncertainty regarding exports by stating that “of the more than 40 applications to build new LNG import facilities that were submitted to federal agencies between 2000 and 2010, only 8 new facilities were built and those facilities have seen declining use in the past decade.” *Id.* DOE does not explain, however, how these observations have any relevance to DOE’s current NEPA obligations.

DOE asserts that it cannot “guarantee” that exports will occur, but even if DOE were to affirmatively determine that, if it granted Cameron’s request for export authorization, those exports would in fact unlikely to occur, those exports would still be “reasonably foreseeable.” Reasonable foreseeability extends far beyond the events that are most likely, or even likely, to occur. *See, e.g., Davis v. Coleman*, 521 F.2d 661, 676 (9th Cir. 1975), *Sierra Club v. Watkins*, 808 F. Supp. 852, 868 (D.D.C. 1991). Courts routinely require NEPA analysis of even effects that acknowledged to be unlikely to occur. For example, courts have required consideration of the possibility of a terrorist attack on a proposed project, explaining that “in considering the policy goals of NEPA and the rule of reasonableness that governs its application, the possibility of terrorist attack is not so ‘remote and highly speculative’ as to be beyond NEPA’s

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<sup>8</sup> Environmental Addendum at 1.

<sup>9</sup> 40 C.F.R. §§ 1508.7, 1508.8(b).

requirements.” *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm’n*, 449 F.3d 1016, 1031 (9th Cir. 2006). An agency may only exclude analysis of an event and its consequences from NEPA review when the event “is so ‘remote and speculative’ as to reduce the effective probability of its occurrence to zero.” *New York v. Nuclear Regulatory Comm’n*, 681 F.3d 471, 482 (D.C. Cir. 2012). Here, the actions Cameron has taken—entering contracts for the entire volume of proposed exports, expending considerable resources in planning the project and securing necessary permits, etc.—demonstrate that the exports for which Cameron seeks authorization are anything but remote and speculative.

Similarly, authorities interpreting the obligation to discuss “cumulative effects” explain that uncertainty is only a ground for excluding an effect from NEPA review when the effect is so uncertain that it is not susceptible to “meaningful discussion” at the time of the analysis. *Habitat Educ. Ctr. v. U.S. Forest Serv.*, 609 F.3d 897, 902 (7th Cir. 2010). Cameron’s proposed LNG exports, of course, are a specific and concrete proposal that is far removed from the type of inchoate possibility *Habitat Education Center* determined to be beyond the scope of meaningful discussion.

Thus, NEPA would require DOE to take a hard look at the consequences that would follow from exports even if DOE had determined that exports are unlikely to occur. Of course, in actual fact, DOE has reached the opposite conclusion. As Sierra Club explained in commenting on the Environmental Addendum:

As DOE acknowledges, the Energy Information Administration’s (“EIA”) 2014 Annual Energy Outlook predicts that, in the “Reference case,” the U.S. will become a net exporter of LNG, with net exports increasing by 9.6 bcf/d by 2030 and continuing at that rate through 2040. DOE does not criticize this forecast, nor does DOE argue that, if DOE authorizes this level of exports or more, this level of exports is not likely to occur.<sup>10</sup>

Although many NERA scenarios predicted lower levels of exports, the 2014 Annual Energy Outlook is significantly more recent and is prepared by an impartial federal agency rather than a private consultant with ties to extractive industry.<sup>11</sup> In addition, certain assumptions in the NERA study lead it to systemically underestimate the market conditions in which exports could occur, as we explained previously and reiterate below. Because DOE’s action here brings the total volume of exports to have received final authorization to export to non-FTA countries to

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<sup>10</sup> Gas Production Comment at 5 (footnotes omitted) (citing Environmental Addendum at 42, EIA 2014 Annual Energy Outlook, MT-22 (predicting a net increase of 3.5 trillion cubic feet per year)).

<sup>11</sup> See Sierra Club Initial Comment on NERA Study at 53-56, Sierra Club Reply Comment on NERA Study at 20.



3.94, well below EIA's estimate of likely total exports, it is likely that DOE's authorization here will increase the amount of gas actually exported.<sup>12</sup>

Insofar as DOE is concerned that it is uncertain what quantity of LNG would be exported in "aggregate" if DOE granted a number of export authorizations, that issue may narrow the scope of DOE's cumulative impacts inquiry.<sup>13</sup> It is irrelevant, however, to DOE's separate obligation to consider the effects of the particular proposal under consideration. Here, DOE *Cameron's* individual proposal to export 1.7 bcf/d to non-FTA countries.

***b) DOE Has Not Shown that Uncertainty Regarding Location and Manner of Induced Production Precludes Meaningful Analysis of Induced Production's Environmental Impacts***

DOE's remaining argument for excluding the effects of induced gas production from NEPA review is that "There is also fundamental uncertainty as to where any additional production would occur and in what quantity," and that "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 CEQ's NEPA regulations." 3391-A at 74; *see also id.* at 37. Available tools to provide this missing information at a level sufficient to inform a meaningful discussion of these impacts, but DOE has failed to use, or even acknowledge, these tools. Indeed, DOE could have provided a general, but nonetheless meaningful, discussion of these impacts even absent any additional information regarding the location, *etc.*, of induced gas production, and DOE's failure to do further violates NEPA.

The mere existence of some uncertainty does not prevent an effect from being "reasonably foreseeable." "Reasonable forecasting and speculation is . . . implicit in NEPA, and [courts] must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'" *Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973). In the undertaking this "reasonable forecasting," agencies have an affirmative obligation to conduct or commission research when necessary for an understanding of the effects of proposed action. *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1248 (9th Cir. 1984) (collecting cases); *see also State of Alaska v. Andrus*, 580 F.2d 465, 473 (D.C. Cir. 1978) ("NEPA does, unquestionably, impose on agencies an affirmative obligation to seek out information concerning the environmental consequences of proposed federal actions. Indeed, this is one of NEPA's most important functions."), *vacated on other grounds in part sub nom. W. Oil & Gas Ass'n v. Alaska*, 439 U.S. 922 (1978). When information is necessary, the agency must obtain it unless "the overall costs of obtaining it are . . . exorbitant." 40 C.F.R. § 1502.22(a).

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<sup>12</sup> We note that no evidence in the record indicates that FTA countries present a potential market for the volume of exports forecast by EIA.

<sup>13</sup> As we discuss below, however, DOE's own statements demonstrate that even as to aggregate exports, uncertainty is not so great as to preclude meaningful review.

Here, available tools allow DOE to predict “where, in what quantity, and under what circumstances” exports will induce additional gas production. Nothing in the EIS or in DOE’s orders explains why these tools are unavailable or inadequate. One tool that is apparently capable of answering these questions is EIA’s National Energy Modeling System, which Sierra Club has repeatedly described. Indeed, NEMS might have already provided these answers. The NEMS modeling underlying EIA’s January 2012 LNG Export Study predicted the ways in which production would respond to exports. Because NEMS is built on a “play-level model that projects the crude oil and natural gas supply from the lower 48,”<sup>14</sup> it appears that EIA must have already developed forecasts of where production would increase in response to exports, notwithstanding the fact that the final EIA LNG Export Study did not present these predictions. If EIA has not already undertaken this type of modeling, or if the modeling EIA has done so far is insufficient to identify the impacts of Cameron’s proposed exports, NEPA requires DOE to undertake or commission such modeling.

NEMS forecasts, like all forecasts, necessarily include some uncertainty. Nonetheless, DOE has already concluded that NEMS forecasts are certain enough to support meaningful discussion—including, in this proceeding, the NEMS-derived forecasts underlying EIA’s LNG Export Study. Because these forecasts have been determined to be sufficient to support analysis of price impacts, they are also sufficient to support analysis of environmental impacts. *See Scientists’ Inst. for Pub. Info., Inc. v. Atomic Energy Comm’n*, 481 F.2d 1079, 1097 (D.C. Cir. 1973).

Although NEMS models production at the play level, rather than at the siting of individual wells, this level of geographic specificity is sufficient to inform a meaningful discussion of impacts. Indeed, for many impacts, the effects will be felt at the regional level, so it is unclear whether further geographic specificity would significantly improve discussion of those impacts.

For example, gas production emits ozone forming pollution, particularly volatile organic chemicals and hazardous air pollutants. Ozone is largely a regional problem, and is primarily addressed at the state or regional level in other contexts.<sup>15</sup> Once DOE estimates the amount of gas production that will be added in a play or region, several tools allow DOE to predict the amount of ozone precursors that will be emitted by that regional production. Sierra Club illustrated one such method in its comment on the draft EIS: using estimates of methane leak rates as a surrogate for the amount of raw natural gas that leaks, together with EPA estimates of the amount of VOC contained in natural gas, Sierra Club provided estimates of the amount of VOCs that would be emitted by production induced by Cameron’s exports.<sup>16</sup> NETL provides another method of estimating these impacts, illustrated by NETL’s bottom-up estimate of NOx

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<sup>14</sup> EIA, Documentation of the Oil and Gas Supply Module, 2-2 (2011), available at [http://www.eia.gov/FTP/ROOT/modeldoc/m063\(2011\).pdf](http://www.eia.gov/FTP/ROOT/modeldoc/m063(2011).pdf)

<sup>15</sup> *See, e.g.*, EPA, Cross-State Air Pollution Rule (CSAPR), <http://www.epa.gov/crossstaterule/>.

<sup>16</sup> Env. Comment on DEIS at 39-40.

emissions.<sup>17</sup> NETL estimates that the cradle to transmission NOx emissions for natural gas used in combined cycle power plants are roughly 0.6 kilograms of NOx per megawatt hour generated, with roughly 0.5 kilograms specifically from production rather than transport.<sup>18</sup> Using NETL's assumption of a combined cycle power plant efficiency of 46% and EIA's estimate of a natural gas heat content of 1025 British thermal units per cubic foot,<sup>19</sup> NETL indicates that production and transmission of natural gas emits 87 metric tons of NOx per bcf of gas. Thus, once DOE/FE determined the amount of additional production that would occur in the Haynesville Shale Play, for example, DOE could estimate the amount of VOC and NOx emissions that would be emitted by this production in that region. This emissions estimate would provide a basis for meaningful discussion regarding impacts on regional ozone levels.

Numerous other impacts are amenable to regional discussion, especially because, as DOE recognizes, the harm caused by these impacts occurs primarily as a result of the cumulative impacts of multiple wells throughout a region, rather than as a result of individual wells. This discussion can be informed by EIA's modeling of the type, in addition to region, of additional production. For example, EIA has already predicted that 63% of demand created exports, on average, will be supplied by new production, and that 72% of this new production will come from shale gas. Because Cameron's 1.7 bcf/d of exports will represent 1.87 bcf/d of demand when gas consumed by the liquefaction process is considered, the EIA figures indicate that Cameron's project will 0.85 bcf/d of shale gas production.<sup>20</sup> This is 309 bcf of production per year, or 6,180 bcf during the 20-year authorization period. Once DOE has estimated the share of this production that will be added in a region, such as a particular shale play, DOE can estimate the number of wells required, using NETL's estimates of expected ultimate recovery for shale gas wells (3 to 3.5 bcf per well). This information provides a basis for estimating the water demand export-induced production will place on the region (either using DOE's estimates of the national average of water use<sup>21</sup> or, when available, region-specific information regarding water consumption), and thus the region's ability to tolerate this additional water demand. Similarly, DOE can use the estimate of the number of additional shale wells that will be required in each region to estimate the total acreage that will be directly or indirectly disturbed by this additional production, using data regarding the number of wells per pad and size of each well pad.

Even if DOE concludes that, despite the availability of NEMS and other models, it is impossible to predict where gas production induced by exports will occur, DOE can nonetheless meaningfully discuss some of the environmental impacts of induced production. In particular, as DOE has recognized, effects of greenhouse gas emissions generally do not depend on the geographic location of the emissions, so discussion of the climate impact of gas production

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<sup>17</sup> NETL Gas LCA at 52-54.

<sup>18</sup> *Id.* at Figure 4-19, "Life Cycle NOx Emissions for Natural Gas Power Using Domestic Natural Gas Mix."

<sup>19</sup> <http://www.eia.gov/tools/faqs/faq.cfm?id=45&t=8>

<sup>20</sup> *I.e.*,  $1.7 * 1.1 * 0.63 * 0.72$

<sup>21</sup> Environmental Addendum at 10-12.

induced by exports does not depend on the location of that production.<sup>22</sup> Yet the EIS does not address the greenhouse gas emissions of induced gas production. The analysis of climate impacts contained in the Addendum and other documents falls far short of the hard look NEPA requires, as we explain below. Even for non-climate impacts, even if regional discussion proves (contrary to the available evidence) to be impossible, DOE must inform itself and the public of the aggregate impacts of Cameron’s proposed exports, such as the nationwide total of land that will be disrupted by induced drilling.

***c) FERC’s Other Reasons for Excluding Induced Production from Analysis***

The EIS and FERC Order offered several additional arguments as to why induced production was beyond the scope of FERC’s NEPA analysis. DOE has not explicitly addressed these remaining and flawed arguments. Insofar as DOE nonetheless implicitly adopts them by virtue of its acceptance of the EIS, we briefly discuss their deficiencies here.

FERC contended that, separate from uncertainty regarding where production induced by exports would occur, it was uncertain whether exports would induce production at all, and that this separate uncertainty meant that the effects of induced production were not reasonably foreseeable. As we note above, DOE has explicitly rejected this premise. DOE has agreed that exports will induce gas production, and adopted EIA’s predictions in this regard.

FERC then contended that DOE had not delegated to FERC authority to consider effects of exports per se, rather than effects of construction, siting, and operation of export facilities. This argument is flawed, but it also plainly has no applicability to the question of whether DOE must consider the effect of production induced by exports.

Finally, FERC contended that induced production was beyond the scope of NEPA analysis because FERC did not have direct regulatory authority over exports and other government entities did. This reflects a fundamental misunderstanding of NEPA. For example, the Ninth Circuit has explicitly held that NEPA requires agencies to analyze the effects of their actions even when the agency does not have permitting authority over those effects, explaining that “while it is the development’s impact on jurisdictional waters that determines the scope of the [Army Corps of Engineers’] *permitting authority*, it is the impact of the permit on the environment at large that determines the Corps’ NEPA responsibility.” *Save Our Sonoran v. Flowers*, 408 F.3d 1113, 1122 (9th Cir. 2005) (emphasis added). Similarly, the Surface Transportation Board has been required to consider impacts railroad construction would have on coal combustion and coal mining without regard for the Board’s lack of authority to directly

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<sup>22</sup> DOE, Draft Addendum to Environmental Review Documents Concerning Exports of Natural Gas from The US, 2 (May 29, 2014), available at [http://energy.gov/sites/prod/files/2014/05/f16/Addendum\\_0.pdf](http://energy.gov/sites/prod/files/2014/05/f16/Addendum_0.pdf); see also DOE, Final Addendum to Environmental Review Documents Concerning Exports of Natural Gas from The US, 2 (August 2014), available at <http://energy.gov/sites/prod/files/2014/08/f18/Addendum.pdf>.

regulate these issues. *Mid States*, 345 F.3d at 545-51; *see also N. Plains Res. Council*, 668 F.3d at 1081-82. Still other cases have required NEPA analyses of proposed casino projects to include impacts of increases in vehicle traffic the projects would induce. *See Mich. Gambling Opposition v. Kempthorne*, 525 F.3d 23, 29-30 (D.C. Cir. 2008).

### **3. DOE/FE Fails To Support Its Conclusions Regarding The Climate Impact of Natural Gas Production**

DOE has failed to take a hard look at the climate impacts of the production that would be induced by proposed exports. The EIS does not quantify the greenhouse gas emissions that will be emitted by this production, despite the availability of tools to do so—including tools summarized and provided by DOE and NETL here. As DOE acknowledges, climate impacts are global, rather than occurring “on a local or regional level.”<sup>23</sup> Accordingly, DOE’s sole justification for excluding climate impacts of induced production from the NEPA analysis is DOE’s contention that it is uncertain whether exports will actually occur. For the reasons stated above, this argument does not justify excluding effects of production caused by exports from NEPA analysis.

In curing this deficiency, DOE cannot merely rely on the final Order’s general conclusions regarding the greenhouse gas impacts of natural gas production, including shale gas production. DOE has failed to support its conclusions regarding both the amount of greenhouse gases emitted by the production and transportation process and, with regard to methane, the impact of each pound of gas emitted. Evidence in the record demonstrates that DOE’s conclusions on these issues are too low. Once DOE has identified the amount of greenhouse gases that will be emitted by this production, DOE must assess the impact of these emissions, as we explained in our comment on the Environmental Addendum and NETL reports. We further note that NETL’s export lifecycle analysis, and DOE’s summary thereof in the final Order, is not a substitute for NEPA review of the climate impacts of upstream production.<sup>24</sup>

First, DOE not provided a basis for using its estimated methane leak rate instead of the much higher leak rates estimated by other life cycle analyses NETL discusses or by the atmospheric studies summarized by Sierra Club. In Order 3391-A, DOE attributes a 1.2% estimate to NETL. This figure is lower than the “expected” “cradle-to-liquefaction” leak rates NETL provided in the Export LCA, which were 1.3% for conventional onshore production and 1.4% for shale gas production.<sup>25</sup> More fundamentally, DOE has not provided a rational basis for

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<sup>23</sup> Environmental Addendum at 2.

<sup>24</sup> Order 3391-A at 71 (“We agree that the LCA GHG Report does not fulfill any NEPA requirements in this proceeding, nor has DOE/FE made any suggestion to that effect. The LCA GHG Report addresses foreign GHG emissions and thus goes beyond the scope of what must be reviewed under NEPA.”).

<sup>25</sup> Export LCA at 6. Because EIA estimates that the majority of new production that will be caused by exports will be shale gas production, the shale gas leak rate is the most appropriate of NETL’s values. Given that NETL appears

using any of the NETL estimates instead of the other, higher estimates summarized by NETL itself or the still higher estimates indicated by the growing body of atmospheric studies.

NETL determined that “there [were] five major studies that account for the GHG emissions from upstream natural gas” and that three of these studies either provided or implied an estimate of “leakage rates from upstream natural gas.”<sup>26</sup> These three studies were led by Howarth, Burnham, and Weber. All of these studies estimate much higher methane leakage than does NETL. While 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. Order 3391-A argues that Burnham’s estimate differs from NETL because of a difference in boundary conditions: NETL extends cradle through transmission, whereas Burnham adds the additional step of distribution. While DOE is correct that the studies differ in this regard, this difference does not explain the vast difference in estimates. Burnham estimated that 0.28% of methane produced was emitted during distribution.<sup>27</sup> Subtracting distribution out of Burnham’s lifecycle estimates therefore indicates a cradle-through-transmission leak rate of 2.47% for conventional onshore gas and 1.73% for unconventional gas.<sup>28</sup> Remaining differences between NETL and Burnham that NETL identifies do not support or explain NETL’s lower ultimate conclusion, as Sierra Club previously explained and as DOE has not disputed.<sup>29</sup> As to Weber, DOE’s sole comment is the confusing assertion that “We have reviewed Weber et al.’s work and do not see any mention of leakage rate.” Order 3391-A at 69. Although the cited paper does not discuss emissions in terms of leakage rate, the emissions estimates therein imply a leakage rate, *as was expressed by the NETL Unconventional Production Report itself*.<sup>30</sup> The derivation of this leak rate from Weber’s estimates is explained by Bradbury 2013, as discussed in the NETL reports. 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.

Sierra Club further summarized five “top down” studies that estimated still higher leak rates on the basis of atmospheric measurements—generally 3% or more.<sup>31</sup> Order 3391-A acknowledges that top-down studies generally do not match bottom-up calculations, and identifies one factor—inconsistent boundaries—that DOE contends “partly explain[s]” the differences between bottom up and top down estimates.<sup>32</sup> However, DOE offers no explanation as to why, for an assessment of the climate impacts of LNG exports, the boundaries used in the

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to estimate minor—perhaps negligible—methane emissions from liquefaction, Export LCA at Figure 6-3, it appears that the cradle-through-transmission leak rate and the cradle-to-liquefaction leak rates should be identical.

<sup>26</sup> Unconventional Production Report at 52 and Exhibit 2-8; *see also* Sierra Club Climate Comment at 8.

<sup>27</sup> Burnham, et al. (2011), Supporting Information, at 2, *available at* [http://pubs.acs.org/doi/suppl/10.1021/es201942m/suppl\\_file/es201942m\\_si\\_001.pdf](http://pubs.acs.org/doi/suppl/10.1021/es201942m/suppl_file/es201942m_si_001.pdf)

<sup>28</sup> *I.e.*, 0.28% lower than the values provided in Unconventional Production Report Exhibit 2-8.

<sup>29</sup> Climate Comment at 8.

<sup>30</sup> Unconventional Production Report at Exhibit 2-8.

<sup>31</sup> Climate Comment at 9-10.

<sup>32</sup> Order 3391-A at 69.

bottom up studies are more appropriate than the boundaries used in top down studies. Moreover, as DOE implicitly concedes, differences in boundaries cannot *fully* explain the differences between bottom up and top down studies. Studies have identified other likely explanations, all of which indicate that bottom up estimates are likely to be inaccurate. Brandt 2014, which NETL repeatedly discusses, concludes that “official inventories,” which are bottom-up, “consistently underestimate actual CH<sub>4</sub> emissions, with [natural gas] and oil sectors as important contributors.”<sup>33</sup> Brandt provides several likely explanations for the flaws in bottom-up inventories. Evidence indicates that there are “a small number of ‘superemitters’”<sup>34</sup> with emissions that are much higher than anticipated by the “model[s] . . . based on engineering relationships and emission factors”<sup>35</sup> that inform the bottom-up estimates. In addition, Brandt notes that “there are reasons to suspect sampling bias in [emission factors]” and that “activity and device counts used in inventories are contradictory, incomplete, and of unknown representativeness.”<sup>36</sup> Other research supports Brandt’s conclusions regarding unrepresentativeness (whether due to sampling bias or other factors) of the inputs used for bottom-up estimates. For example, Sierra Club discussed how Allen 2013 sampled sites that would be expected to have some of the *lowest* emissions and found emissions equivalent to EPA and NETL’s estimates of the industry-wide *average* emissions.<sup>37</sup> While Brandt concludes that the particular emission rates estimated by regional atmospheric studies are unlikely to be representative of nationwide emissions, nothing in Brandt indicates that the broader top down estimates, such as Miller 2013, are *not* representative, and the 3% leak rate indicated by Miller is more than double the rate used by DOE. After the draft Environmental Addendum was released, yet another peer reviewed paper has supported this estimate. This paper, by researchers at Carnegie Mellon and the National Ocean and Atmospheric Administration, concludes that the most likely methane leak rate is between 2 and 4 percent.<sup>38</sup>

As a final note on emission quantities, DOE’s observation “that leakage rate is not an input to NETL’s life cycle model” misunderstands Sierra Club’s argument.<sup>39</sup> Sierra Club recognizes that leakage rate is an output of, rather than an input to, NETL’s model. However, the fact that NETL’s model produces an output that is so inconsistent with the outputs of the other models cited by NETL and atmospheric studies cited by Sierra Club is strong evidence that there is a problem with either the inputs to NETL’s model or with the model itself.<sup>40</sup>

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<sup>33</sup> Brandt 2014 at 733.

<sup>34</sup> *Id.*

<sup>35</sup> Order 3391-A at 69.

<sup>36</sup> Brandt 2014 at 734.

<sup>37</sup> Climate Comment at 7-8. This research provides yet another indication that the NETL leakage rate estimate is too low. DOE has not responded to this comment.

<sup>38</sup> 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/es501204c, (see pages 22 to 23 of “Just Accepted” manuscript)

<sup>39</sup> Order 3391-A at 69.

<sup>40</sup> Another DOE observation not applicable to Sierra Club’s arguments is DOE’s discussion of the difference between leaks and losses. In DOE’s terminology, leaks are methane actually emitted to the atmosphere, whereas

Separate from the problems regarding DOE's discussion of the amount of methane and other climate pollutants emitted by natural gas production and transmission, DOE understates the impact of each ton of methane pollution. As Sierra Club explained in comments on the Environmental Addendum and related NETL reports:

DOE errs . . . by using the IPCC estimates that do not incorporate climate-carbon cycle feedbacks. A climate carbon feedback involving changes in the properties of the land and ocean carbon cycle in response to climate change. For example, changes to ocean temperature and circulation could affect the CO<sub>2</sub> balance between the oceans and the atmosphere. The IPCC explains that "it is likely that including the climate-carbon feedback for non-CO<sub>2</sub> gases as well as for CO<sub>2</sub> provides a better estimate of the metric value than including it only for CO<sub>2</sub>." As DOE has properly recognized the IPCC report as reflecting the scientific consensus on methane's potency, DOE should use the estimates that the IPCC states to be more accurate. Thus, DOE should use 20-year and 100-year fossil methane global warming potentials of 87 and 36, respectively.

Sierra Club GHG Comment at 12 (footnotes omitted). Neither Order 3391-A nor DOE's response to comments regarding the Environmental Addendum and related materials addressed Sierra Club's comment on this issue. Using the "better" estimate of methane's global warming potential increases the 100-year GWP by 20% relative to the value used in the NETL Export LCA and Order 3391-A (*i.e.*, 30).

We reiterate that these problems regarding DOE's discussion of the climate impacts of natural gas production in general are separate from the more fundamental NEPA violation: DOE's failure to take a hard look at the climate impacts of Cameron's proposal. This hard look must include a quantification of the greenhouse gases that would be emitted by the production induced by Cameron's proposed exports. We further reiterate that NETL's export lifecycle analysis, and DOE's summary thereof in the final Order, is not a substitute for NEPA review of the climate impacts of upstream production. Although DOE has asserted that, *if* U.S. LNG exports displace coal or other sources of natural gas, the net effect on global greenhouse gas emissions may be neutral or positive, DOE has not argued that this possibility is in any way pertinent to the question of whether the climate impact of induced production must be assessed in the NEPA process. On the evidence available here, any such argument would be flawed. While it is relatively certain that exports will induce significant natural gas production, and the available evidence supports informed predictions regarding the greenhouse gas emissions of this

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losses include methane that is combusted during the lifecycle prior to end use (in a flare, compressor, etc.). Order 3391-A at 66-67. Sierra Club's comment, and the studies Sierra Club cites (Allen, Burnham, Weber, and the various atmospheric studies), do not run afoul of this distinction, and in pertinent part, specifically concern leaks.



production, any potentially mitigating reductions in foreign fossil fuel combustion are highly uncertain, as DOE acknowledges.

#### **4. DOE Violated NEPA by Excluding from Its Analysis The Environmental Impacts of Changes in Electricity Generation, Including Increases in Greenhouse Gas Emissions, Caused by Domestic Gas Price Increases**

DOE further erred by refusing to consider indirect and cumulative effects on emissions from electricity generation. EIA's January 2012 LNG Export Study provided detailed forecasts of the way gas consumers would respond to LNG exports. A key finding of this study was that electricity producers are particularly price sensitive and would respond to export-driven gas price increases by switching to coal fired power generation. EIA modeled the effect this shift would have on nationwide greenhouse gas emissions. Because this effect has, in fact, already been foreseen by EIA and discussed in detail, it is plainly a reasonably foreseeable consequence of Cameron's proposed exports, which required discussion in the EIS.

DOE nonetheless approved the project without taking a hard look at this impact that NEPA requires. DOE's justification for this omission is that federal rules (new and proposed) limit "the extent to which the U.S. coal fleet would compensate for reduced use of natural gas."<sup>41</sup> DOE has not, however, provided any estimate of the *extent* to which these new or proposed rules would in fact limit this switching. Given the complete 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. On the other hand, if these rules *do* limit gas-to-coal switching in response to exports, DOE's statement that the rules would limit the extent to which coal would compensate for reduced gas use puts the cart before the horse: if coal is unavailable, it is unclear whether there will be any reduced use of natural gas at all. That is, EIA predicted that the electricity generation sector would reduce its natural gas in large part use *because* this sector had the flexibility to switch to coal. Removing that flexibility does not mean that the electricity generation sector will simply reduce its demand by the same amount but seek other replacements. Instead, limiting the fuel switching ability of the electricity sector decreases the price sensitivity of this sector, and thus shifts the entire domestic demand curve for natural gas upward. This elevated demand curve will therefore intersect the supply curve at a different point than the ones predicted in EIA's forecasts, meaning that both gas prices and gas production will increase in response to exports at a higher level than EIA predicted. DOE cannot contend that EIA's predictions regarding price and supply impacts remain valid in one context—such as assessing the price impacts of exports—but not in another—such as assessing exports' impacts on electricity generation and associated emissions. *See Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1097 (D.C. Cir. 1973) (forecasts sufficient to support analysis economic impacts are also sufficient to support analysis of environmental impacts).

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<sup>41</sup> Order 3391-A at 79.

DOE separately notes that “a substantial portion of these projected emissions came from consumption of natural gas in the liquefaction process, rather than from increased use of coal. The liquefaction of natural gas is captured in the LCA GHG Report’s estimate of the life cycle GHG emissions of U.S.-exported LNG, discussed below (Section IX).”<sup>42</sup> DOE has explicitly stated that the life cycle analysis plays no role in its NEPA evaluation.

### **C. DOE Violated the Natural Gas Act by Failing to Adequately Weigh Environmental Impacts In the Public Interest Analysis**

Although DOE did not discuss the greenhouse gas emissions of the project in its NEPA analysis, DOE did discuss climate impacts in the Natural Gas Act public interest analysis. This discussion violated the Natural Gas Act, however, because it relied on unsupported assumptions regarding these impacts and failed to place them in proper context.

DOE’s discussion of climate impacts focuses on the life cycle analysis. As we explained above, DOE understates the greenhouse gas emissions of U.S. natural gas production. This error extends to the estimate of the overall life cycle impact of U.S. LNG.

Separate from this error, DOE entirely excludes climate impacts from its public interest weighing, based solely on the possibility that emissions associated with production, export, and consumption of U.S. LNG will be offset by displacement of combustion of other fossil fuels and avoidance of associated emissions.

As we explained in our comments on the Environmental Addendum and NETL studies, this is an improper frame for assessing climate impacts. U.S.’s international commitments require consideration of domestic greenhouse gas emissions, without consideration of displacement of foreign emissions. DOE has not responded to this argument.

Even within DOE’s frame, DOE has not attempted to model the extent to which Cameron’s proposed LNG exports will, in fact, displace other fossil fuels. Because Cameron is a specific proposal, for 12 mtpa, with two thirds of this output contracted to Japanese buyers, modeling the effect of Cameron’s exports presents a simpler problem than the abstract problem of modeling the effects of U.S. DOE has not shown that modeling the impacts of providing Japan with this additional supply of LNG would be unreasonably burdensome or speculative.

Even if DOE declines to undertake additional modeling, the available evidence does not support DOE’s decision to compare the lifecycle of U.S. LNG solely to coal and other sources of gas. In arguing that the comparison with coal and natural gas is appropriate, DOE first cites China, where DOE states that 2012 generation capacity was composed of 66% coal and 3% natural gas. DOE provides no basis for comparing U.S. LNG against these two particular fuels

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<sup>42</sup> Order 3391 at 78.

rather than the aggregate greenhouse gas intensity of China's generation fleet. An even more appropriate comparison would be to compare U.S. LNG with the average greenhouse gas intensity of the additional capacity that China is expected to add. The same EIA source that DOE cites for the composition of China's current fleet predicts the composition of China's 2040 fleet as well. Because of the massive growth anticipated in China, it is reasonable to assume that U.S. LNG would be more likely to compete against these sources of new capacity rather than existing sources. This added capacity, however, is more than 50% renewables. Thus, the greenhouse gas intensity of the anticipated growth in Chinese capacity is significantly lower than DOE's estimate of the greenhouse gas intensity of U.S. LNG, even under a 100-year GWP.

For Japan, EIA provides generation, rather than capacity data. The material cited by DOE does not forecast future Japanese generation, but it is likely that this information is available, and as noted above, DOE has an affirmative obligation to seek out information regarding the environmental impacts of the proposed project. IEA data relied upon by EIA, however, provides information regarding Japan's current generation mix, and indicates that the greenhouse gas intensity of Japan's aggregate mix is very near NETL's estimate of the intensity of U.S. LNG. Correcting any of the errors in NETL's assessment, therefore, would likely lead to the conclusion that U.S. LNG has higher lifecycle emissions than the energy U.S. LNG would likely displace in Japan.

## **II. Conclusion**

Based on the foregoing, Sierra Club respectfully requests that DOE grant this request for rehearing.

Respectfully submitted,

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