UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
	)	**FE DOCKET NO. 12-77-LNG**
LNG Development Company, LLC	)	
(d/b/a Oregon LNG)	)	
	)	

SIERRA CLUB AND COLUMBIA RIVERKEEPER'S MOTION TO INTERVENE, PROTEST, AND COMMENTS

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LNG Development Company, LLC, d/b/a Oregon LNG ("Oregon LNG"), requests authorization to export up to 1.3 billion cubic feet per day (bcf/d) of natural gas as liquefied natural gas ("LNG") from a proposed LNG export terminal in Warrenton, Clatsop County, Oregon. This proposal cannot move forward without extensive environmental and economic analyses that Oregon LNG has not provided to the Department of Energy Office of Fossil Energy ("DOE/FE"). In any event, the available evidence demonstrates that this proposal is inconsistent with the public interest.

In particular, although Oregon LNG asserts that its facility will primarily export gas produced in Canada, Oregon LNG concedes (as it must) that the proposal would increase natural gas production, especially shale gas production, in the United States. Application at 24. DOE/FE cannot authorize exports without fairly weighing significant environmental and economic impacts of this production. *See, e.g.*, *Udall v. Federal Power Comm'n*, 387 U.S. 428, 450 (1967). Exports will also harm the public interest by increasing domestic gas prices and likely increasing global greenhouse gas emissions. Locally, although Oregon LNG asserts that the project will benefit Clatsop County and Oregon generally, Oregon LNG gives short shrift to the local environmental impacts of the proposal.

Because Sierra Club and Columbia Riverkeeper's many thousands of members have a direct interest in ensuring that domestic natural gas production is conducted safely, and that any exports do not adversely affect domestic consumers, these organizations move to intervene in this proceeding and protest Oregon LNG's application.

I. Sierra Club and Columbia Riverkeeper Should be Granted Intervention

Sierra Club members live and work throughout the area that will be affected by the Oregon LNG export plan, including in the regions adjacent to the proposed facility and in regions near the pipelines necessary to supply the plant. Sierra Club members also live in the domestic gas fields that will likely see increased production as a result of the proposed exports. Sierra Club members everywhere will also be affected by increased gas prices which would be caused by the plan. As of July 2012, Sierra Club had 15,525 members in Oregon and 601,141 members overall. Declaration of Yolanda Andersen at ¶ 7.[1]

Columbia Riverkeeper ("Riverkeeper") is a 501(c)(3) non-profit organization dedicated to restoring and protecting the Columbia River and all life connected to it. Riverkeeper members utilize the land, air, and water throughout the Columbia River estuary and, specifically, the area near and at the Oregon LNG site for economic, recreational, scientific, and aesthetic reasons. Riverkeeper currently has over 3,000 members, including many members who live in Clatsop County. Riverkeeper's members live and/or work near the proposed Oregon LNG site and along the Columbia River and estuary where the proposed tanker routes traverse. Many of Riverkeeper's members live and/or work in communities on the banks of the Columbia River. Some of Riverkeeper's members recreate, on a continuing and ongoing basis, in and along the Columbia River at and/or near the Oregon LNG site. Riverkeeper's members use and enjoy species and habitat of the Columbia River for aesthetic, scientific, education, spiritual and recreational purposes. These uses include, but are not limited to, hiking, swimming, boating, wildlife observation, photography, and general aesthetic enjoyment. Riverkeeper's members intend to continue such uses on an ongoing basis in the future.

To protect their members' interests, Sierra Club and Riverkeeper therefore move to intervene in this proceeding, pursuant to 10 C.F.R. § 590.303(b).Consistent with that rule, Sierra Club and Riverkeeper states that their "asserted rights and interests," in this matter include, but are not limited to, interests in the following:

- The environmental consequences of any gas exports from the Oregon LNG facility, including emissions and other pollution associated with the gasification and liquefaction processes, environmental damage associated with pipeline, facility construction and operation, environmental impacts caused by shipping traffic, and the emissions associated with all phases of the process from production to combustion.
- The environmental and economic consequences of any expansion or change in natural gas production, especially in shale gas plays, as a result of increased gas

[1] Attached as Exhibit 1.

exports. Members living in these regions will be affected by the damage to air, land, and water resources caused by the increasing development of these plays, and the public health risks caused by these harms.

- The economic impacts of any gas exports from the Oregon LNG facility, whether individually or in concert with exports from other such facilities, including the consequences of price changes upon the organizations' members' finances, consumer behavior generally, and industrial and electrical generating facilities whose fuel choices may be affected by price changes. Sierra Club, in particular, works to reduce U.S. and global dependence on fossil fuels, including coal, gas, and oil, and to promote clean energy and efficiency in order to protect public health and the environment. To the extent changes in gas prices increase the use and production of coal and oil, Sierra Club's interests in this proceeding are directly implicated.
- The public disclosure, in National Environmental Protection Act and other documents, of all environmental, cultural, social, and economic consequences of Oregon LNG's proposal, and of all alternatives to that proposal.

In short, Sierra Club and Riverkeeper's members have vital economic, aesthetic, spiritual, personal, and professional interests in the project.

These organizations have demonstrated the vitality of these interests in many ways. Sierra Club runs national advocacy and organizing campaigns dedicated to reducing American dependence on fossil fuels, including natural gas, and to protecting public health. These campaigns, including its Beyond Coal campaign and its Beyond Natural Gas campaign, are dedicated towards promoting a swift transition away from fossil fuels and to reducing the impacts of any remaining natural gas extraction.

Riverkeeper and its members have been and continue to be actively involved in efforts to protect and restore the Columbia River from pollution. These efforts include protecting humans and wildlife from exposure to pollutants. Riverkeeper has pursued numerous avenues to reduce the threats of pollution in the Columbia River and at in the Columbia River Estuary. Riverkeeper and its members have written articles discussing the ecological importance of and threats to the Columbia River and threats posed by LNG terminals and tankers, commented on various federal and state agency actions that affect the Columbia River and Oregon LNG site, and when necessary, pursued litigation.

Thus, although 10 C.F.R. § 590.303 states no particular standard for intervention, Sierra Club and Riverkeeper have interests in this proceeding that would be sufficient to support intervention on any standard. This motion to intervene must be granted.[2]

[2] If any other party opposes this motion, we respectfully requests leave to reply. *Cf.* 10 C.F.R. §§ 590.302, 590.310 (allowing for procedural motions and briefing in these cases).

II. Service

Pursuant to 10 C.F.R. § 590.303(d), Sierra Club and Riverkeeper identify the following persons for service of correspondence and communications regarding this application:

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III. Sierra Club and Riverkeeper Protest this Application Because It Is Not In the Public Interest and Is Not Supported by Adequate Environmental and Economic Analysis

Section 3 of the Natural Gas Act provides that DOE/FE cannot authorize exports unless it finds the exports to be in the public interest. 15 U.C.C. § 717b. Environmental factors must weigh in to this public interest analysis. Accordingly, DOE/FE cannot proceed with Oregon LNG's application without fully evaluating the environmental impacts of Oregon LNG's proposal. The National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4332 *et seq*., provides the congressionally mandated procedure for assessment of these impacts, and NEPA requires that these procedures be completed "at the earliest possible time," *i.e.*, "*before* decisions are made and *before* actions are taken." 40 C.F.R. §§ 1501.2, 1500.1(b) (emphases added). Accordingly, DOE/FE cannot proceed with Oregon LNG's request for conditional export authorization until the NEPA process is completed, including preparation of an Environmental Impact Statement.

Oregon LNG's application is silent as to the environmental impacts of its proposal. For this and other reasons, Oregon LNG utterly fails to demonstrate that its proposal is in the public interest. As we explain below, the proposal will cause three types of significant environmental harm. First, the construction and operation of the terminal, liquefaction facilities, and associated new pipeline will directly impact local water quality, habitats, and air quality. Second, the project will induce additional natural gas production in the United States, primarily involving hydraulic fracturing ("fracking") of unconventional gas sources, causing attendant environmental harm; this inducement will occur notwithstanding Oregon LNG's plan to export gas produced in Canada. Third, the project will increase domestic gas prices, likely causing an increase in coal fired electricity generation, increasing emissions of greenhouse gas, conventional, and toxic air pollutants.

Oregon LNG's economic arguments are unpersuasive. Contrary to Oregon LNG's contentions, LNG export will significantly increase domestic gas prices, harming domestic consumers and, as noted above, increased coal-fired electricity generation. On the other hand, Oregon LNG's predictions of job creation and other economic benefit are overstated. These predictions are derived from flawed IMPLAN input-output models. In particular, these models provide no consideration of counterfactuals, and are therefore unable to identify which of the purportedly "supported" jobs and benefits would have existed anyway.

For these reason and the other reasons set forth below, Sierra Club and Riverkeeper file this protest, pursuant to 10 C.F.R. § 590.304.

A. Legal Standards

DOE/FE has significant substantive and procedural obligations to fulfill before it can authorize Oregon LNG's export proposal. We discuss some of those obligations created by the Natural Gas Act, the National Environmental Policy Act, the Endangered Species Act, and the National Historic Preservation Act, here, before explaining why these obligations preclude Oregon LNG's request for conditional authorization.

1. Natural Gas Act

Pursuant to the Natural Gas Act and subsequent delegation orders, DOE/FE must determine whether Oregon LNG's proposal to export LNG to nations which have not signed a free trade agreement ("FTA") with the United States is in the public interest.[3] Courts, the Federal Energy Regulatory Commission ("FERC"), and DOE/FE, and Oregon LNG all agree that the "public interest" at issue in this provision includes environmental impacts.

Section 3 of the 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

[3] The Natural Gas Act separately provides that DOE/FE must approve exports to nations that have signed a free trade agreement requiring national treatment for trade in natural gas "without modification or delay." 15 U.S.C. § 717b(c). DOE/FE has previously authorized Oregon LNG to export 1.25 bcf/d LNG to such nations. DOE/FE Order No. 3100 (May 31, 2012).

> hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.

15 U.S.C. § 717b(a).[4]

Courts have interpreted this provision to include environmental effects. While the public interest inquiry is rooted in the Natural Gas Act's "fundamental purpose [of] assur[ing] the public a reliable supply of gas at reasonable prices," *United Gas Pipe Line Co v. McCombs*, 442 U.S. 529 (1979), the Natural Gas Act also grants DOE/FE "authority to consider conservation, environmental, and antitrust questions." *Nat'l Ass'n for the Advancement of Colored People v. Federal Power Commission*, 425 U.S. 662, 670 n.4 (citing 15 U.S.C. § 717b as an example of a public interest provision); n.6 (explaining that the public interest includes environmental considerations) (1976). In interpreting an analogous public interest provision applicable to hydroelectric power and dams, the Court has explained that the public interest determination "can be made only after an exploration of all issues relevant to the 'public interest,' including future power demand and supply, alternate sources of power, the public interest in preserving reaches of wild rivers and wilderness areas, the preservation of anadromous fish for commercial and recreational purposes, and the protection of wildlife." *Udall v. Fed. Power Comm'n*, 387 U.S. 428, 450 (1967) (interpreting § 7(b) of the Federal Water Power Act of 1920, as amended by the Federal Power Act, 49 Stat. 842, 16 U.S.C. § 800(b)). Other courts have applied this *Udall* holding to the Natural Gas Act. *See, e.g.*, *N. Natural Gas Co. v. Fed. Power Comm'n*, 399 F.2d 953, 973 (D.C. Cir. 1968) (interpreting section 7 of the Natural Gas Act).[5]

DOE has similarly acknowledged the breadth of the public interest inquiry, including environmental concerns. Deputy Assistant Secretary Smith recently testified that "[a] wide range of criteria are considered as part of DOE's public interest review process, including . . . U.S. energy security . . . [i]mpact on the U.S. economy . . . [e]nvironmental considerations . . . [and] [o]ther issues raised by commenters and/or interveners

[4] The statute vests authority in the "Federal Power Commission," which has been dissolved. DOE/FE has been delegated the former Federal Power Commission's authority to authorize natural gas exports. Department of Energy Redelegation Order No. 00-002.04E (Apr. 29, 2011). The Federal Energy Regulatory Commission has separately been delegated authority regarding the permitting, siting, construction and operation of export facilities. Department of Energy Delegation Order No. 00-004.00A. *See also* Executive Orders 12038 & 10485 (vesting any executive authority to allow construction of export facility in the Federal Power Commission and its successors).

[5] Further support for the inclusion of environmental factors in the public interest analysis is provided by NEPA, which declares that all federal agencies must seek to protect the environment and avoid "undesirable and unintended consequences." 42 U.S.C. 4331(b)(3).

deemed relevant to the proceeding." Testimony of Christopher Smith, Deputy Assistant Secretary of Oil and Gas Before the Senate Committee on Energy and Natural Resources (Nov. 8, 2011).[6] DOE rules require export applicants to provide information documenting "[t]he potential environmental impact of the project." 10 C.F.R. § 590.202(b)(7). In a previous LNG export proceeding, DOE determined that the public interest inquiry looks to "domestic need" as well as "other considerations" that included the environment. *Phillips Alaska Natural Gas Corporation and Marathon Oil Company*, 2 FE ¶ 70,317, DOE FE Order No. 1473, *22 (April 2, 1999); *accord* Opinion and Order Conditionally Granting Long-Term Authorization to Export [LNG] from Sabine Pass LNG Terminal to Non-Free Trade Agreement Nations ("Sabine Pass"), DOE/FE Order 2961 at 29 (May 20, 2011) (acknowledging that the public interest inquiry extends beyond effects on domestic natural gas supplies). Finally, DOE has applied its "policy guidelines" regarding the public interest to focus review "on the domestic need for the natural gas proposed to be exports; whether the proposed exports pose a threat to the security of natural gas supplies, *and any other issue determined to be appropriate*." Sabine Pass at 29 (citing 49 Fed. Reg. 6,684 (Feb. 22, 1984)) (emphasis added).[7]

FERC has agreed that environmental issues weigh on the public interest calculus. In FERC's recent order approving siting, construction, and operation of LNG export facilities in Sabine Pass, Louisiana, FERC considered potential environmental impacts of the terminal as part of its public interest assessment. 139 FERC ¶ 61,039, PP 29-30 (Apr. 14, 2012).[8]

Similarly, Oregon LNG acknowledges that the public interest inquiry has consistently been interpreted to include impacts on the environment. Application at 13.

Although DOE/FE has adopted a presumption that LNG export applications are consistent with the public interest, this presumption is rebuttable and not determinative. The DC Circuit Court has explained to DOE/FE this presumption is "highly flexible, creating *only* rebuttable presumptions and leaving parties free to assert other factors." *Panhandle Producers and Royalty Owners Ass'n v. Economic Regulatory Administration*, 822 F.2d 1105, 1110-1111, 1113 (D.C. Cir. 1987) (emphasis added, internal quotation marks omitted). Put differently, although DOE/FE may "presume" that an application should be granted, this presumption is not determinative, and DOE/FE retains an independent duty to determine whether an application is, in fact, in

[6] Attached as Exhibit 2.

[7] Although germane here, these Policy Guidelines are merely guidelines: they "cannot create a norm binding the promulgating agency." *Panhandle Producers and Royalty Owners Ass'n v. Economic Regulatory Administration*, 822 F.2d 1105, 1110-1111 (D.C. Cir. 1987).

[8] Sierra Club contends that other aspects of this order were wrongly decided, as was FERC's subsequent denial of Sierra Club's petition for rehearing, as we explain below.

the public interest. *See* 10 C.F.R. § 590.404.

2. **National Environmental Policy Act**

NEPA requires federal agencies to consider and disclose the "environmental impacts" of proposed agency actions. 42 U.S.C. § 4332(C)(i). This requirement is implemented via a set of procedures that "insure [sic] that environmental information is available to public officials and citizens *before* decisions are made and *before* actions are taken." 40 C.F.R. § 1500.1(b) (emphases added). Agencies must "carefully consider [ ] detailed information concerning significant environmental impacts" and NEPA "guarantees that the relevant information will be made available" to the public. *Dep't of Transp. v. Public Citizen*, 541 U.S. 752, 768 (2004) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)). The Council on Environmental Quality ("CEQ") directs agencies to "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values." 40 C.F.R. § 1501.2. "It is DOE's policy to follow the letter and spirit of NEPA; comply fully with the [CEQ] Regulations and apply the NEPA review process early in the planning stages for DOE proposals." 10 C.F.R. § 1021.100. DOE has adopted CEQ's NEPA regulations in full. *Id.* § 1021.103. The NEPA rules apply to "any DOE action affecting the quality of the environment of the United States, its territories or possessions." *Id.* § 1021.102.

For purposes of the intersection of NEPA and the NGA, the NGA designated the former Federal Power Commission as the "lead agency" for NEPA purposes. 15 U.S.C. § 717n. The lead agency prepares NEPA documents for an action that falls within the jurisdiction of multiple federal agencies. FERC has since generally filled that role, preparing the NEPA documents for LNG export and import decisions, as it did in *Sabine Pass*. *See* 10 C.F.R. § 1021.342 (providing for interagency cooperation). Whether or not FERC takes a lead role, however, DOE's ultimate NEPA obligations are the same: It may not move forward until the full scope of the action *it* is considering – here the approval of LNG export – has been properly considered. Thus, if FERC prepares an deficient NEPA analysis, this will not meet DOE/FE's NEPA obligations, and DOE/FE will be unable to rely thereon.

The NEPA process is embodied in preparation of an "environmental impact statement" ("EIS") where, as here, the proposed major federal action would "significantly affect[] the quality of the human environment." 42 U.S.C. § 4332(C). With regard to this proposed project, FERC has already committed to completion of an EIS, 77 Fed. Reg. 59,603 (Sept. 28, 2012), including future circulation of a draft EIS and public comment thereon, *id.* at 59,605. DOE/FE regulations similarly provide that "[a]pprovals or disapprovals of authorizations to import or export natural gas… involving major operational changes (such as a major increase in the quantity of liquefied natural gas imported or exported" will "normally require [an] EIS." 10 C.F.R. Part 1021, Appendix D, D9. We agree that a full EIS is appropriate and required here. Furthermore, if the EIS

FERC prepares is inadequate to inform DOE/FE's decision or discharge DOE/FE's NEPA obligations, DOE/FE must prepare a separate EIS.

An EIS must describe:

> i. the environmental impact of the proposed action,
>
> ii. any adverse environmental effects which cannot be avoided should the proposal be implemented,
>
> iii. alternatives to the proposed action,
>
> iv. the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
>
> v. any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

42 U.S.C. § 4332(C). The alternatives analysis "is the heart of the environmental impact statement." 40 C.F.R. § 1502.14. Here, the proposed action is to export LNG from the proposed facility; DOE/FE must consider alternatives to this action. DOE/FE must take care not to define the project purpose so narrowly as to prevent the consideration of a reasonable range of alternatives. *See, e.g.*, *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997). If it did otherwise, it would lack "a clear basis for choice among options by the decisionmaker and the public." *See* 40 C.F.R. § 1502.14.

An EIS must also describe the direct and indirect effects, and cumulative impacts of, a proposed action. 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011). These terms are distinct from one another: Direct effects are "caused by the action and occur at the same time and place." 40 C.F.R. § 1508.8(a). Indirect effects are also "caused by the action" but:

> are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced 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). Cumulative impacts, finally, 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. The EIS must give each of these categories of effect fair emphasis.

Agencies may also prepare "programmatic" EISs, which address "a group of concerted actions to implement a specific policy or plan; [or] systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive." 40 C.F.R. § 1508.17(b)(3); *see also* 10 C.F.R. § 1021.330 (DOE regulations discussing programmatic EISs). As we discuss below, such an EIS is appropriate here.

Finally, while an EIS is being prepared "DOE shall take no action concerning the proposal that is the subject of the EIS" until the EIS is complete and a formal Record of Decision has been issued. 10 C.F.R. § 1021.211. During this time, DOE may take no action which would tend to "limit the choice of reasonable alternatives," or "tend[] to determine subsequent development ." 40 C.F.R. § 1506.1.

3. **Endangered Species Act**

Pursuant to the Endangered Species Act's (ESA) directive that all agencies "shall seek to conserve endangered species," 16 U.S.C. § 1531(c)(1), DOE/FE must ensure that its approval of the Oregon LNG project "is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of [critical] habitat of such species." 16 U.S.C. § 1536(a)(2). "Each Federal agency shall review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat." 50 C.F.R. § 402.14(a); *see also* 16 U.S.C. § 1536(a)(2).

This determination must be wide-ranging, because Oregon LNG's export proposal will increase gas production activities nationwide. Thus, DOE/FE must consider not just the effects of the project at the proposed site (although it must at least do that)[9], but the effects of increased gas production across the full region the plant affects.

[9] In a biological assessment prepared in connection with Oregon LNG's prior import proposal, FERC identified 42 listed or candidate species as potentially occurring in the

To make this determination, DOE/FE should, first, conduct a biological assessment, including the "results of an on-site inspection of the area affected," "[t]he views of recognized experts on the species at issue," a review of relevant literature, "[a]n analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies," and "[a]n analysis of alternate actions considered by the Federal agency for the proposed action." *See* 50 C.F.R. § 402.12(f). If that assessment determines that impacts are possible (as is likely here), DOE/FE must enter into formal consultation with the Fish and Wildlife Service and the National Marine and Fisheries Service, as appropriate, to avoid jeopardizing any endangered species or adversely modifying its habitat as a consequences of its approval of Oregon LNG's proposal. 16 U.S.C. § 1536(a), (b).

4. **National Historic Preservation Act**

DOE/FE must also fulfill its obligations under the National Historic Preservation Act (NHPA) to "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." 16 U.S.C. § 470f; *see also Pit River Tribe v. U.S. Forest Serv.*, 469 F.3d 768, 787 (9th Cir. 2006) (discussing the requirements of the NHPA). Because "the preservation of this irreplaceable heritage is in the public interest," 16 U.S.C. § 470(b)(4), it behooves DOE/FE to proceed with caution.

DOE/FE must, therefore, initiate the NHPA section 106 consultation and analysis process in order to "identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties." 36 C.F.R. § 800.1(a). NHPA regulations make clear that the scope of a proper analysis is defined by the project's area of potential effects, *see* 36 C.F.R. § 800.4, which in turn is defined as "the geographic area . . . within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties," 36 C.F.R. § 800.16(d). This area is "influenced by the scale and nature of an undertaking," *Id.* The area of potential effects should sweep quite broadly here because, as in the ESA and NEPA contexts, the reach of Oregon LNG's proposal extends to the entire area in which it will increase gas production. Thus, to approve Oregon LNG's proposal, DOE/FE must first understand and mitigate its impacts on any historic properties which it may affect. *See also* DOE Policy P.141.1 (May 2001) (providing that DOE will fully comply with the NHPA and many other cultural resources preservation statutes).

The regulations governing this process provide that "[c]ertain individuals and organizations with a demonstrated interest in the undertaking may participate as

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project area. FERC Dkt. CP09-6, Biological Assessment at 1-8 (Nov. 3, 2010), attached as Exhibit 3.

consulting parties" either "due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties." 36 C.F.R. § 800.2(c)(5). Sierra Club and Riverkeeper meet that test, because the organizations and their members are interested in preserving intact historic landscapes, for their ecological and social value, and reside through the regions affected by the Oregon LNG's proposal. Our members have worked for years to protect and preserve the rich human and natural fabric of these regions, and would be harmed by any damage to those resources. Sierra Club and Riverkeeper must therefore be given consulting party status under the NHPA for this application.

B. All Pending Export Applications, Pipelines, and Studies Must Be Incorporated Into DOE/FE's NEPA, NGA, and Other Analyses

As explained above, the NGA, NEPA, ESA and NHPA all require DOE/FE's determination to be informed by the context in which the proposed project would occur. Similarly, DOE/FE's analysis must not be confined to local, direct effects of the particular application; DOE/FE must consider the broader constellation of indirect and cumulative effects. Accordingly, NEPA review of this application must also encompass the associated pipeline proposals pending before FERC (without which this project cannot proceed) and the other LNG export proposals pending before DOE/FE and FERC. To ensure adequate consideration of this context, DOE/FE must not act on the pending application until DOE/FE's pending study of the economic impacts of LNG exports. The broader backdrop of related and similar projects, in turn, must inform the NEPA alternatives analysis. Finally, NEPA bars DOE/FE from granting conditional authorization prior to completion of the NEPA process, including the above analyses.[10]

1. Williams Pipeline Expansion

In its application to DOE/FE, Oregon LNG describes the construction of the terminal and liquefaction facilities in Warrenton, Oregon, and the "Oregon Pipeline," an 86 mile pipeline necessary to connect with the Williams pipeline system. Application at 10. The Oregon Pipeline expansion is itself insufficient, however, to enable operation of the proposed LNG terminal. An additional 136 miles of 36 inch pipe must be added to the Williams system before the requisite volumes of gas can be delivered to the Oregon LNG terminal, as part of the "Washington Expansion Project." *Id.* at 10 n.24. FERC has already concluded that the Washington Expansion Project and Oregon LNG's proposal are "connected actions," such that both will be considered in a single EIS. 77 Fed. Reg. 59604. DOE/FE must similarly ensure that it considers both in its public interest determination.

[10] Similarly, Sierra Club protests any request for final, rather than conditional, authorization prior to completion of NEPA review.

NEPA regulations clearly state that "[p]roposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." 40 C.F.R. § 1502.4(a). Similarly, actions that are "independent parts of a larger action and depend on the larger action for their justification" are "connected actions" that "should be discussed in the same impact statement." *Id.* § 1508.25(a)(1). Separately, if DOE/FE accepts Oregon LNG's invitation to count purported economic benefit from the Washington Expansion Project as a justification for the Oregon LNG's proposal, DOE/FE must also consider the environmental impacts of the Washington Expansion Project.[11] Application at 6.

2. **DOE/FE Must Consider the Cumulative Effect of All Pending Export Proposals, and Should Do So Using A Programmatic EIS**

Oregon LNG's export proposal is only one of many before DOE/FE. Because the effects of these projects are cumulative, and because each approval alters the price and production effects of exports on the economy, DOE/FE must consider these projects' interactions. We note that in the similar proceeding regarding Jordan Cove, LLC's proposal to construct and operate an export terminal in Coos Bay, Oregon, EPA requested consideration of this broader context. EPA, *Scoping Comments – The Jordan Cove Energy Project LP*, FERC Dkt. Nos. PF12-7 and PF12-17, at 3 (Oct. 29, 2012) ("we recommend discussing the proposed project in the context of the larger energy market, including existing export capacity and export capacity under application to the Department of Energy, and clearly describe how the need for the proposed action has been determined.").[12]

DOE/FE can best do so by conducting a programmatic EIS considering the impacts of *all* gas export proposals at once. DOE/FE has the discretion to do so, even if it determines that it does not have the duty to do so. *See* 40 C.F.R. § 1508.17(b)(3); *see also* 10 C.F.R. § 1021.330. Such a programmatic EIS would allow DOE/FE, and the public, to understand the impacts of all of these proposals, their interactions, and their cumulative environmental and economic impacts. That understanding would serve improved decisionmaking, and allow DOE/FE, the public, and industry to identify prudent alternatives to serve the public interest and minimize environmental impacts. DOE/FE must recognize that it is making what is, functionally, a programmatic decision to radically alter the U.S. market and production system by allowing for large-scale LNG export, and conduct an EIS commensurate with the decision it is making, rather than piece-mealing that decision from application to application.

[11] As we explain in part III.C.2 below, Oregon LNG's predictions of economic benefits are overstated.

[12] Attached as Exhibit 4.

3. **DOE/FE Must Not Act Until Its Pending Study of LNG Exports' Economic Impacts Is Complete**

DOE/FE has commissioned two broad studies of exports' impacts. In the first, requested that the Energy Information Administration ("EIA") analyze "the impacts of increased domestic natural gas demand, as exports." EIA, *Effect of Increased Natural Gas Exports on Domestic Energy Markets* ("*EIA Export Study*"), p.1 (Jan. 19, 2012).[13] We discuss this study in detail in part III.C.1.b below. The EIA Export Study predicts price increases from all gas export scenarios, economic impacts to residential and industrial users and environmental harm as gas fired electricity generation to switch to coal power. *Id.* at 6. The study did not, however, consider the macroeconomic impacts of these effects. *Id.* at 3.

DOE has also commissioned a second study that will consider macroeconomic impacts. *See* Christopher Smith, DOE Deputy Assistant Secretary for Oil and Natural Gas, *letter to Representative Edward J. Markey* (February 24, 2012).[14] DOE has committed to withholding final authorization of any pending export application until review of these studies was complete. *Id.* DOE/FE must honor this commitment with respect to Oregon LNG's application. Moreover, because the forthcoming study will inform DOE/FE's decision, DOE/FE should not take action on the application (including granting a conditional authorization) until the public has had an opportunity to comment on this fundamental and underlying study. Because the forthcoming study should address fundamental issues underlying the public interest analysis, any public interest analysis made pursuant to a conditional authorization would need to be wholly revisited once the study is released.

4. **The Alternatives Analysis Must Consider This Broader Context**

Both NEPA and the NGA require DOE/FE fully to consider alternatives to Oregon LNG's proposal. Specifically, the NGA public interest analysis requires an "exploration of all issues relevant to the 'public interest'," an inquiry which the Supreme Court held in *Udall* must be wide-ranging. In that case, which concerned hydropower, the regulatory agency was required to consider, for instance, "alternate sources of power," the state of the power market generally, and options to mitigate impacts on wildlife. 387 U.S. at 450. dHere, likewise, DOE/FE must consider alternatives to the export proposal which would better serve the public interest, broadly analyzing other approaches to structuring LNG exports and gas use generally, given exports' sweeping effects on the economy.

[13] Attached as Exhibit 5.
[14] *Drill Here, Sell There, Pay More* (Appendix 1 at 3).

NEPA is designed to support this sort of broad consideration. The alternatives analysis is "the heart of the environmental impact statement," presenting sharply defined issues which offer "clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. Crucially, the alternatives must include "reasonable alternatives not within the jurisdiction of the lead agency," – meaning that DOE/FE must review actions which it cannot directly order – and must include "appropriate mitigation measures not already included in the proposed action or alternatives." *Id.* Because alternatives are so central to decisionmaking and mitigation, "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Oregon Natural Desert Ass'n*, 625 F.3d at 1122 (internal alterations and citations omitted).

Without limiting this consideration, these alternatives should include, at a minimum, consideration of the following:

(1) Whether, consistent with the *EIA Export Study*, exports, if allowed, should move forward in smaller quantities or a slower time table to mitigate the domestic economic and environmental impacts associated with large export volumes or rapid export schedules;

(2) Whether export from other locations would better serve the public interest by mitigating economic or environmental impacts or by limiting the cumulative impacts of multiple terminals located in one region (*i.e.*, the Gulf Coast);

(3) Whether limitations on the sources of exported gas – e.g., limiting export from particular plays, formations, or regions – would help to mitigate environmental and economic impacts;

(4) Whether to condition export on the presence of an adequate regulatory framework, including the fulfillment of the recommendations for safe production made by the DOE's Shale Gas Subcommittee, would better serve the public interest by ensuring that the production increases associated with export will not increase poorly-regulated unconventional gas production;

(5) Whether to delay, deny, or condition exports based upon their effect on the U.S. utility market (including changes in air pollution emissions associated with the impacts of increased export demand on fuel choice);

(6) Whether to require exporters to certify that any unconventional gas produced as a result of their proposal (or shipped through their facilities) has been produced in accordance with all relevant environmental laws and according to a set of best production practices (such as that discussed by the DOE's Shale Gas Subcommittee);

(7) Whether to deny export proposals all together as contrary to the public interest.

Other alternatives are, no doubt, also available, but DOE/FE must at a minimum consider the possibilities listed above, as they are reasonable and bear directly on the public interest determination before it.

5. DOE/FE May Not Conditionally Approve Oregon LNG's Proposal Prior to NEPA Review

Although as a general matter DOE/FE may issue "conditional" orders, *see* 10 C.F.R. § 590.402, this general authority cannot trump DOE's specific rules barring the agency from taking any "action concerning [a] proposal" that is the subject of an EIS, 10 C.F.R. § 1021.211, if that action tends to "limit the choice of reasonable alternatives," or "tend[] to determine subsequent development." 40 C.F.R. § 1506.1. Because FERC, the lead agency for purposes of NEPA review, has already determined that an EIS is needed here, DOE/FE's regulations prohibit DOE/FE from issuing a conditional authorization now.

Specifically, a conditional approval would limit alternatives, and determine subsequent choices, in precisely this forbidden way. The Sabine Pass EA and DOE/FE conditional approval in that case provide a good example of this problem. In *Sabine Pass*, DOE/FE expressed its "conditional" view that the project was in the public interest, conditioned on "the satisfactory completion of the environmental review process [by FERC] and on issuance by DOE/FE of a finding of no significant impact or a record of decision pursuant to NEPA." *Sabine Pass* at 41.

This decision was, first, irrational: As we have discussed at length above, DOE/FE cannot complete a public interest determination without weighing environmental factors. Because these factors are integral to DOE/FE's decision, and NEPA is purely procedural statute, DOE/FE must weigh environmental interests at the same time that weighs all other interests. It may not parcel them into a separate process without irrationally ignoring required statutory factors and important aspects of the problem before it on the record.

Second, DOE/FE's approval, even if nominally "conditional," plainly influenced the NEPA process. In the Sabine Pass EA, although FERC acknowledged that DOE/FE was making a broad public interest determination, FERC functionally treated DOE/FE's decision as already made. As such, in its alternatives analysis, FERC summarily rejected the "no-action" alternative because "the no-action alternative could not meet the purpose and need for the Project." Sabine Pass EA at 3-1. This statement is incoherent, if FERC truly understood DOE/FE not to have made a decision. DOE/FE is, after all, considering *whether* to allow gas exports. Because that decision has *not* been made, it is wholly appropriate to select a "no-action" alternative (including, for FERC, a decision not site a

facility whose exports have not been permitted). The fact that FERC felt that it was not free to do so indicates that conditional approvals in fact tend to limit alternatives and steer the development decisionmaking process.

To avoid this illegal effect, DOE/FE therefore may not approve the Oregon LNG export proposal, conditionally or not, until it has considered all alternatives to doing so through the NEPA and NGA processes.

C. Oregon LNG's Proposal Will Have Numerous Harmful Environmental Effects and Is Contrary to The Public Interest

Oregon LNG's proposal will harm the local environment surrounding the proposed terminal and pipeline expansion, it will induce environmentally harmful gas production, it will increase prices domestic consumers and industry pay for natural gas, and it will increase domestic coal consumption causing attendant harm to public health and the environment. Oregon LNG's application does not address any of these economic and environmental costs. These environmental harms translate into economic damage. If pollution sickens people, or restricts their travel, economic productivity will suffer – as it will, more directly, if clean air and water and adequate waste disposal capacity are not available. Similarly, as landscapes are industrialized, tourism, agricultural, forestry, hunting and angling, and other place-dependent industries will suffer. Thus, DOE/FE must both consider these environmental impacts in and of themselves and monetize them to weigh them against other economic harms in the public interest analysis.

On the other hand, Oregon LNG's application overstates the economic benefit of its proposal by relying on a faulty economic model that has been extensively criticized by economists.

We explain these deficiencies in the application below. In light of these costs and reduced benefits, if DOE/FE were to make a decision on the available record (rather than engaging in further study of these issues), DOE/FE would have to conclude that these impacts outweigh any possible benefit of the project.

1. The Project Will Have Significant Adverse Impacts Not Discussed in Oregon LNG's Application

Oregon LNG's proposal will impose significant environmental costs. The environmental costs fall into three categories: direct effects of the terminal and associated pipeline construction, indirect effects of the additional gas production the project will induce, and non-localized effects resulting from increased domestic gas prices and resultant increases in coal consumption. As we explain below, each of these categories of effects must be considered in DOE/FE's NEPA and NGA analyses, and each weighs against finding that the proposed project is consistent with the public interest.

a. Local Environmental Impacts

The proposed project involves major infrastructure construction, including a new slip, liquefaction facilities, LNG storage tanks, associated terminal industrial equipment, 222 miles of pipeline (86 miles in the Oregon Pipeline project and 136 miles in the Washington Expansion Project), and many new pipeline compressors. Construction and operation of these facilities will have significant impacts on air, water, landscapes, and wildlife. These impacts must be considered in both the NEPA analysis and in DOE/FE's public interest determination. We offer preliminary comments on these impacts now, although these impacts cannot be fully identified until additional information is presented in the NEPA process (particularly for the Washington Expansion Project, which has only begun submitting draft resource reports to FERC).[15]

i. Local Air Pollution

Operation of the proposed terminal, pipeline, and other facilities will emit harmful carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic chemicals (VOC), greenhouse gases (GHGs), sulfur dioxides (SO_x), particulate matter (PM_{10} and $PM_{2.5}$), and hydrogen sulfide (H_2S) pollution. At this stage, we discuss solely the emissions associated with operation of the project, but as Oregon LNG application acknowledges, construction of the project will result in significant emissions in addition to the quantities discussed below.[16]

VOC and NO_x

The proposed Oregon LNG project will cause significant emissions of volatile organic chemicals ("VOCs") and NO_x, emitted directly from project facilities and indirectly from tanker and other ship traffic and operations. In total, Oregon LNG estimates emissions of 736.1 tons per year ("tpy") of NO_x emissions and 60.47 tpy of VOC.[17]

These figures are an incomplete picture, because they do not include emissions from the Washington Expansion Project. The Washington Expansion Project includes

[15] In particular, we note that at this stage, we use Oregon LNG's own estimates on several issues, such as the volume of air pollutants emitted. Sierra Club and Riverkeeper reserve the right to challenge these estimates once additional information is available.

[16] Sierra Club and Riverkeeper expect to provide further comment on these emissions during the NEPA public comment period.

[17] The 736.1 tpy of NO_x includes 76.1 tpy from terminal operations, 53.9 tpy from ship and dredging activity near the terminal site, 304 tpy from induced tanker transits Oregon exclusive economic zone ("EEZ"), and 306.1 tpy in the Alaska EEZ. *See* FERC Dkt. PF12-18, Resource Report ("RR") 9-16 to 9-19. For VOC, 35.8 tpy are emitted from terminal facilities,

installation of an additional 90,000 horsepower of compression.[18] The documents submitted in connection with that project so far do not specify whether these compressors will be powered by electricity from the grid, natural gas, or some other power source. Because natural gas fired compressors have significant NOx and VOC emissions, total emissions resulting from the project could much higher than the above.[19] Where electrical compressors are used, the EIS must consider the power source and power line route that will service the compressors.

These emissions will harm the environment by increasing the formation of ground level ozone. VOCs and NO_x contribute to the formation of ground-level ozone (also referred to as smog). Smog pollution harms the respiratory system and has been linked to premature death, heart failure, chronic respiratory damage, and premature aging of the lungs.[20] Smog may also exacerbate existing respiratory illnesses, such as asthma and emphysema, or cause chest pain, coughing, throat irritation and congestion. Children, the elderly, and people with existing respiratory conditions are the most at risk from ozone pollution.[21]

Significant ozone pollution also damages plants and ecosystems.[22] Ozone also contributes substantially to global climate change over the short term. According to a recent study by the United Nations Environment Program (UNEP), behind carbon dioxide and methane, ozone is now the third most significant contributor to human-caused climate change.[23]

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[18] FERC Dkt. PF12-20 RR 1-1, 1-42 (Aug. 16, 2012).

[19] The proposal for the Oregon Pipeline proposes electrically driven compression, the environmentally preferable option with few direct NOx or VOC emissions. RR 1-18, 9-13.

[20] EPA, *Proposed New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry: Regulatory Impact Analysis*, 4-25 (July 2011), *available at* http://www.epa.gov/ttnecas1/regdata/RIAs/oilnaturalgasfinalria.pdf and attached as Exhibit 6. (hereinafter O&G NSPS RIA) Jerrett *et al.*, *Long-Term Ozone Exposure and Mortality*, New England Journal of Medicine (Mar. 12, 2009), *available at* http://www.nejm.org/doi/full/10.1056/NEJMoa0803894#t=articleTop, attached as Exhibit 7.

[21] *See* EPA, *Ground-Level Ozone, Health Effects*, *available at* http://www.epa.gov/glo/health.html attached as Exhibit 8. EPA, Nitrogen Dioxide, Health, available at http://www.epa.gov/air/nitrogenoxides/health.html, attached as Exhibit 9.

[22] O&G NSPS RIA at 4-26.

[23] *Id. See also* United Nations Environment Programme and World Meteorological Organization, (2011): *Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers* (hereinafter "UNEP Report," available at http:// www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf), at 7, attached as Exhibit 10.

CO

Operation of the proposed terminal will directly emit 150.5 tpy of CO, with an additional 197.18 tpy of marine vessel emissions.[24] As with NOx and VOC, additional compressors installed as part of the Washington Expansion Project may raise this total. CO can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.[25] CO can be particularly harmful to persons with various types of heart disease, who already have a reduced capacity for pumping oxygenated blood to the heart. "For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion."[26]

GHGs

Oregon LNG estimates that the terminal, pipeline, and associated facilities will directly emit over 2.6 million tpy of carbon dioxide equivalent in greenhouse gases ("CO2e"), with an additional 118,544.6 tpy emitted by marine vessel traffic.[27] Cheniere estimates that the proposed terminal and associated compressor stations will directly emit nearly 3.5 million tpy of carbon dioxide equivalent (CO_2e) in greenhouse gases. RR 9-20, 9-23. These greenhouse gas emissions will increase global warming, harming both the local and global environments.

The impacts of climate change caused by greenhouse gases include "increased air and ocean temperatures, changes in precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity and sea level rise."[28] A warming climate will also lead to loss of coastal land in densely populated areas, shrinking snowpack in Western states, increased wildfires, and reduced crop yields.[29] More frequent heat waves as a result of global warming have already affected public health, leading to premature deaths. And threats to public health are only expected to increase as global warming intensifies. For example, a warming climate will lead to increased incidence of respiratory and infectious disease, greater air and water pollution, increased malnutrition, and greater casualties from fire, storms, and floods.[30] Vulnerable populations—such as children, the elderly, and those with existing health problems—are the most at risk from these threats.

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[24] RR 9-16 to 9-18.

[25] http://www.epa.gov/air/carbonmonoxide/health.html, attached as Exhibit 11.

[26] *Id.*

[27] RR 9-16 to 9-19.

[28] 76 Fed. Reg. at 52,791-22 (citing U.S. EPA, 2011 U.S. GREENHOUSE GAS INVENTORY REPORT EXECUTIVE SUMMARY (2011), attached as Exhibit 12.

[29] *Id.* at 66,532–33.

[30] EPA, *Climate Change, Health and Environmental Effects*, *available at* http://epa.gov/climatechange/effects/health.html, attached as Exhibit 13.

Sulfur Dioxide

The proposed terminal and compressor stations will directly emit an estimated 72 tpy of SO_2, with an additional 80.88 tpy emitted by marine vessel traffic.[31] Sulfur dioxide causes respiratory problems, including increased asthma symptoms. Short-term exposure to sulfur dioxide has been linked to increased emergency room visits and hospital admissions. Sulfur dioxide reacts in the atmosphere to form particulate matter (PM), an air pollutant which causes a great deal of harm to human health.[32] PM is discussed separately below.

Particulate Matter

The proposed terminal and compressor stations will directly emit an estimated 14.9 tpy of particulate matter, with an additional 51.2 tpy emitted by marine vessel traffic.[33] PM consists of tiny particles of a range of sizes suspended in air. Small particles pose the greatest health risk. These small particles include "inhalable coarse particles," which are smaller than 10 micrometers in diameter (PM_{10}), and "fine particles" which are less than 2.5 micrometers in diameter ($PM_{2.5}$). PM_{10} is primarily formed from crushing, grinding or abrasion of surfaces. $PM_{2.5}$ is primarily formed by incomplete combustion of fuels or through secondary formation in the atmosphere.[34]

PM causes a wide variety of health and environmental impacts. PM has been linked to respiratory and cardiovascular problems, including coughing, painful breathing, aggravated asthma attacks, chronic bronchitis, decreased lung function, heart attacks, and premature death. Sensitive populations, include the elderly, children, and people with existing heart or lung problems, are most at risk from PM pollution.[35] PM also reduces visibility,[36] and may damage important cultural resources.[37] Black carbon, a component of PM emitted by combustion sources such as flares and older diesel engines, also warms the climate and thus contributes to climate change.[38]

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[31] RR 9-16 to 9-19.

[32] EPA, Sulfur Dioxide, Health, *available at* http://www.epa.gov/air/sulfurdioxide/health.html, attached as Exhibit 14.

[33] RR 9-16 to 9-19.

[34] *See* EPA, Particulate Matter, Health, *available at* http://www.epa.gov/pm/health.html, attached as Exhibit 15; BLM, *West Tavaputs Plateau Natural Gas Full Field Development Plan Final Environmental Impact Statement* ("West Tavaputs FEIS"), at 3-19 (July 2010), *available at* http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas/wtp_final_eis.html.

[35] O&G NSPS RIA at 4-19; EPA, Particulate Matter, Health

[36] EPA "Visibility – Basic Information" http://www.epa.gov/visibility/what.html, attached as Exhibit 16.

[37] *See* EPA, Particulate Matter, Health West Tavaputs EIS, at 3-19; O&G NSPS RIA at 4-24.

[38] UNEP Report at 6; IPCC (2007) at Section 2.4.4.3.

ii. Terminal and Pipeline Water Quality Impacts

The proposed project will impact water quality in numerous ways, including stream crossings for the pipeline, water withdrawals during construction, stormwater runoff from terminal facilities, and discharge and suspension or re-suspension of sediment in the Columbia River as a result of dredging and ship transits.

Construction of the pipeline will require numerous stream crossings. Oregon LNG states that many of these crossings will be done with horizontal directional drilling. When successful, horizontal directional drilling has lower environmental impacts than other forms of stream crossing. Nonetheless, even where horizontal directional drilling succeeds without a "frack out" failure, and even where work in streams is conducted during periods of low seasonal flow, Oregon's past experiences with construction in streams demonstrates work can lead to large unanticipated sediment discharge. Moreover, there is a substantial risk that horizontal directional drilling will fail at some crossings, with adverse environmental consequences. For example, as the National Marine Fisheries Service cautioned in a comment on the prior import proposal, "a frac-out from horizontal directional drilling will cause bentonite, a very fine clay, to be released into the water column that has the potential, if fish are present, to clog their gills, causing them to suffocate. Whether it is a toxic compound or not, the particle size of the clay is of concern for fish."[39]

Another vector for impacts to water quality is the proposal for hydrostatic testing of the pipeline. Construction of the terminal and Oregon Pipeline, including hydrostatic testing of the pipeline, will require 19.7 million gallons of water.[40] For the Washington Extension Project, hydrostatic testing alone will require 40.9 million gallons of water.[41] We discuss the general problems of water withdrawals in part III.C.1.b.iii.3 below. In the context of hydrostatic testing, an additional issue is disposal of water after the testing has occurred. Because water is moved along the length of the pipeline in the course of this testing, the process has the potential cause inter-basin transfer of non-native species, and can spread pathogens such as P. lateralis, which causes disease in Port-Orford cedars. Discharge of the used water can also spread chemicals found inside the pipeline.

Stormwater runoff from the terminal site will also adversely affect the water quality. Stormwater from the terminal site is likely to contain heavy metals, petroleum products and brake chemicals and compounds that are deleterious to fish and fish habitat.

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[39] FERC Dkt. PF07-10, NMFS Comment at 11 (July 18, 2008), attached as Exhibit 17.
[40] RR 1-22.
[41] WEP RR 1-24 to 1-25.

Finally, dredging, construction of in-water facilities, and ship transits all have the potential to suspend or re-suspend sediment in the Columbia River, adversely affecting water quality.

iii. Geologic Hazards

The proposed project faces numerous geologic hazards. For example, routing the Oregon pipeline through the Range poses a long-term threat to slope stability. FERC's standard erosion control methods do not specify additional methods that may be needed based on local conditions and variations, particularly in the Coast Range where steep and potentially unstable slopes prevail and high, prolonged rainfall is inherent. For example, sidecast, tailings, or spoils on steep slopes will require additional special erosion control methods.

iv. Wildlife

Finally, the project will impact wildlife and species habitat in numerous ways. Clearing of timber along the pipeline right-of-way directly removes habitat, provides a conduit for the spread of wildfires, and provides a tempting route for off-highway vehicle users, despite efforts to introduce barriers to such uses, and these vehicles have the potential to spread noxious weeds, insects, or diseases. Water intake, whether for ship operations, hydrostatic testing, or other uses, risks fish entrainment. Other impacts to water quality can degrade the value of this habitat. Noise from construction and compressor operations may harass and displace species. The project will impact wildlife and habitat in these and numerous other ways. As noted above, FERC has identified 42 listed or candidate species as potentially occurring in the project area.[42]

b. Induced Gas Production

Further, and perhaps greater, environmental impacts will result from increased gas production. The EIA, essentially every other LNG export applicant, and other informed commenters all agree that LNG exports will induce additional production in the U.S. The Oregon LNG proposal is no exception: notwithstanding its stated plan to source gas for export from Canada, Oregon LNG concedes that the proposed project will induce additional production in the U.S. *See* Application at 3, 24. Moreover, available tools allow DOE to predict where this increased production will occur, although such localized predictions are not necessary for meaningful analysis of environmental impacts. NEPA and the NGA therefore require DOE/FE to consider the effects of this additional production. Although DOE/FE recently refused to consider induced production in the *Sabine Pass* proceeding, that order is not final, applies the wrong legal standard of foreseeability, and understates DOE's own ability to predict induced drilling.

[42] FERC Dkt. CP09-6, Biological Assessment at 1-8 (Nov. 3, 2010).

i. Oregon LNG's Proposal Will Induce Additional U.S. Gas Production

As Oregon LNG itself concedes, its export proposal will increase U.S. gas production, notwithstanding Oregon LNG's stated plan to source gas for export from Canada. Application at 24 ("the demand induced by . . . exports will spur production" in the U.S.). Exports' inducement of production is obvious in light of the interconnected nature of the North American gas market. As Oregon LNG explains, if gas produced in Canada is not exported, that gas will enter the U.S. market. *Id.* at 15. This increase of supply in the U.S. market would, in turn, lower gas prices and cause U.S. gas producers to produce less gas than they would otherwise. *Id.* Conversely, to the extent that Canadian gas is exported, U.S. gas prices will be higher, incentivizing domestic gas producers to increase production.[43]

Although Oregon LNG does not estimate the amount by which its proposal would increase U.S. production, other studies suggest that production increases closely correspond with the volume of exported gas. For example, the Energy Information Administration, in a study of effects of U.S. exports commissioned by DOE/FE, estimated that the majority of exported gas would come from increased production, primarily from shale gas. *EIA Export Study*, 6, 11. Specifically, EIA predicts that "about 60 to 70 percent" of the volume of LNG exported would be supplied by increases in domestic production, with the remainder supplied reductions in domestic consumption of current production, and that "about three quarters of this increased production is from shale sources." *Id.* at 6. Simple application of these predictions to Oregon LNG's request to export 1.3 bcf/d indicates that the proposal would result in at least application estimates that the application would result in at least 0.78 bcf/day of increased production in North America, including 0.59 of shale gas production.

Furthermore, EIA and DOE have more precise tools to estimate how U.S. production will change in response to Oregon LNG's proposed exports, including the ability to predict how and when production will increase in individual gas plays. EIA's core analysis tool is the National Energy Modeling System ("NEMS"). NEMS was used to produce the EIA exports study. NEMS models the economy's energy use through a series of interlocking

[43] The project may also export gas produced in the U.S., likely produced in the Rocky Mountain states, directly inducing further U.S. production. Although Oregon LNG states that they expect that market conditions will favor sourcing gas from Canada, the application explicitly notes that the pipeline infrastructure will provide the ability to export gas produced in the U.S., and the application offers no legal restriction on Oregon LNG's ability to do so. As the EIA Export Study demonstrates, exports of gas produced in the US will increase US production.

modules that represent different energy sectors on geographic levels.[44] Notably, the "Natural Gas Transmission and Distribution" module already models the relationship between U.S. and Canadian gas production, consumption, and trade, specifically projecting U.S. production, Canadian production, imports from Canada, etc. *Id.* at 59. For each region, the module links supply and demand annually, taking transmission costs into account, in order to project how demand will be met by the transmission system.[45] Importantly, the Transmission Module is *already* designed to model LNG imports and exports, and contains an extensive modeling apparatus to do so on the basis of production in the U.S., Canada, and Mexico. *See id.* at 22-32. Right now, the Module focuses largely on LNG imports, which have been the status quo up to this point, but it also already links the Supply Module to the existing Alaskan *export* terminal to project exports from that site and their impacts on production. *See id.* at 30-31. Thus, there is no technical barrier to such modeling going forward.. Indeed, EIA used this model for its export study, which forecast production and price impacts.

Similarly, the "Oil and Gas Supply" module models individual regions and describes how production responds to demand across the country. Specifically, the Supply Module is built on detailed state-by-state reports of gas production curves across the country.[46] As EIA explains, "production type curves have been used to estimate the technical production from known fields" as the basis for a sophisticated "play-level model that projects the crude oil and natural gas supply from the lower 48." *Id.* at 2-3. The module distinguishes coalbed methane, shale gas, and tight gas from other resources, allowing for specific predictions distinguishing unconventional gas supplies from conventional supplies. *Id.* at 2-7. The module further projects the number of wells drilled each year, and their likely production – which are important figures for estimating environmental impacts. *See id.* at 2-25 -2-26. In short, the supply module "includes a comprehensive assessment method for determining the relative economics of various prospects based on future financial considerations, the nature of the undiscovered and discovered resources, prevailing risk factors, and the available technologies. The model evaluates the economics of future exploration and development from the perspective of an operator making an investment decision." *Id.* Thus, for each play in the lower 48 states, the EIA is able to predict future production based on existing data. Importantly, the EIA makes clear that "the model design provides the flexibility to evaluate alternative or

[44] Energy Information Administration ("EIA"), *The National Energy Modeling System: An Overview*, 1-2 (2009), attached as Exhibit 18, available at http://www.eia.gov/oiaf/aeo/overview/pdf/0581(2009).pdf

[45] EIA, *Model Documentation: Natural Gas Transmission and Distribution Module of the National Energy Modeling System*, 15-16 (2012), attached as Exhibit 19, available at http://www.eia.gov/FTPROOT/modeldoc/m062(2011).pdf

[46] EIA, *Documentation of the Oil and Gas Supply Module*, 2-2(2011), attached as Exhibit 20, available at http://www.eia.gov/FTPROOT/modeldoc/m063(2011).pdf

new taxes, environmental, or other policy changes in a consistent and comprehensive manner." *Id.*

EIA is not alone in its ability to predict localized effects of LNG exports. A study and model developed by Deloitte Marketpoint claims the ability to make the sort of localized predictions that FERC claims are necessary to assessment of environmental impacts, and numerous other LNG export terminal proponents have relied on this study in applications to FERC and DOE.[47] According to Deloitte, its "North American Gas Model" and "World Gas Model" allow it to predict how gas production, infrastructure construction, and storage will respond to changing demand conditions, including those resulting from LNG export: "The end result is that valuing storage investments, identifying maximally effectual storage field operation, positioning, optimizing cycle times, demand following modeling, pipeline sizing and location, and analyzing the impacts of LNG has become easier and generally more accurate."[48]

Finally, even if (contrary to all available evidence and Oregon LNG's own admission) the proposed exports would not induce additional gas production in the U.S., the proposed exports would undoubtedly induce additional production in Canada, and DOE/FE would be required to consider the effect, if any, of that induced production on the environment in the U.S. *See Border Power Plant Working Group v. Department of Energy*, 260 F.Supp.2d 997 (S.D.Cal. 2003).

ii. Induced Production Must Be Considered in the NEPA and NGA Analyses

DOE/FE must consider the environmental effects of this induced production (both U.S. production and Canadian production potentially impacting the U.S.). As noted above, NEPA requires consideration of "indirect effects" of the proposed action, which include "growth inducing effects" and "reasonably foreseeable" effects "removed in distance" from the site of the proposed action. 40 C.F.R. § 1508.8(b). For example, the Ninth Circuit recently held that, where the Surface Transportation Board was considering a proposal to expand a railway line which would enable increased coal production at

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[47] Deloitte Marketpoint, *Made in America: The Economic Impact of LNG Exports from the United States* (2011) (hereinafter "*Deloitte Report*"), available at http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/Energy_us_er/us_er_MadeinAmerica_LNGPaper_122011.pdf and attached as Exhibit 21.

[48] Deloitte, *Natural Gas Models*, available at: http://www.deloitte.com/view/en_US/us/Industries/power-utilities/deloitte-center-for-energy-solutions-power-utilities/marketpoint-home/marketpoint-data-models/b2964d1814549210VgnVCM200000bb42f00aRCRD.htm and attached as Exhibit 22.

several mines, NEPA required the Board to consider the impacts of increased mining. *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1081-82 (9th Cir. 2011). Similarly, in a prior DOE proceeding regarding an electricity transmission line, DOE was required to consider the effect this line would have on inducing upstream electricity generation, including the environmental effects thereof. *Border Power Plant Working Group*, 260 F.Supp.2d 997 (rejecting DOE's decision to exclude these upstream impacts from analysis).[49] Consideration of induced impacts was required even though the upstream electricity generation would occur in Mexico, outside the jurisdiction of DOE or any other U.S. agency. Thus, it is clear that induced production is the type of "growth inducing," "induced changes in the pattern of land use," or other indirect effect contemplated by 40 C.F.R. § 1508.8(b). EPA, in scoping comments it submitted regarding another LNG export proposal, has opined that in light of the regulatory definition indirect effects and the EIA Export Study's prediction of induced production, "it is appropriate to consider available information about the extent to which drilling activity might be stimulated by the construction of an LNG export facility on the west coast, and any potential environmental effects associated with that drilling expansion."[50]

Induced drilling is also "reasonably foreseeable" so as to be amenable to NEPA analysis. Although DOE/FE recently "accept[ed] and adopt[ed] [FERC's] determination that induced shale gas production is not a reasonably foreseeable effect [of LNG exports] for purposes of NEPA analysis" in another proceeding, that decision rests on factual and legal errors, and is currently being reviewed by DOE. *Sabine Pass* DOE/FE Order 2961-A at 28, *see also* Order Granting Rehearing for Further Consideration, FE Docket 10-111-LNG (Oct. 5, 2012).[51]

The first flaw in DOE/FE's *Sabine Pass* decision is that DOE/FE demanded an unlawfully high level of certain in predictions of future effects. DOE/FE stated that it is "unknown" if "any" new production will result from the proposed exports. Although this cannot be known with absolute certainty, certainty is not required. "An impact is 'reasonably foreseeable' if it is sufficiently likely to occur that a person of ordinary prudence would

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[49] Notably, *Border Power Plant Working Group* also involved a determination as to whether the project was in the public interest. The final EIS for the project (produced after remand from the court) is available at: http://energy.gov/nepa/downloads/eis-0365-final-environmental-impact-statement. Upstream air quality impacts are considered in pages 4-43 to 4-65 of this final EIS.

[50] EPA, Scoping Comments – The Jordan Cove Energy Project LP, FERC Dkt. Nos. PF12-7 and PF12-17, at 14 (Oct. 29, 2012), attached as Exhibit 23.

[51] DOE is not bound by its prior decisions: it may reverse its position "with or without a change in circumstances" so long as it provides "a reasoned analysis" for the change. *Louisiana Pub. Serv. Comm'n v. FERC*, 184 F.3d 892, 897 (D.C. Cir. 1999) (quoting *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983)).

take it into account in reaching a decision." *City of Shoreacres v. Waterworth*, 420 F.3d 440, 453 (5th Cir. 2005).[52] NEPA requires "[r]easonable forecasting and speculation," 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). As explained above, every available source concludes that it is *likely* that the majority of exported gas will come from induced additional production. Thus, an aggregate production increase is unarguably "reasonably foreseeable."

DOE/FE's second error in its final authorization in *Sabine Pass* was to adopt FERC's conclusion that induced production was outside the scope of NEPA analysis because "while it may be the case that additional shale gas development will result from the Liquefaction Project, the amount, timing and location of such development activity is simply unknowable at this time." 140 FERC ¶ 61,076, P9 (July 26, 2012). Such specific, localized predictions are not required for meaningful environmental analysis, but even if they were, DOE/FE has the resources to provide them. On the first point, analysis of the environmental impacts of induced gas production does not require knowledge of the precise sites where additional production will occur. Environmental costs (and the economic costs which accompany them) can be determined in aggregate. The net increases in, for instance, air pollution associated with the number of wells that will be induced can be quantified based on EPA's emissions inventories, for instance. The net volumes of waste similarly can be derived from industry reports and state discharge figures. And these impacts can be localized, at a minimum, by region. Indeed, for many of the environmental impacts, such as emissions of many air pollutants and water consumption, the impacts are likely to be experienced at the regional level, so there would be little value in localizing them further. Even for those impacts that are more closely tied to a specific location, such as habitat fragmentation, DOE/FE can and must acknowledge that the impact will occur, including an estimate of the severity of the impact averaged across potential locations. *See Scientists' Inst. for Pub. Info.*, 481 F.2d 1096-97 (where there are reasonable estimates of the deployment of nuclear power plants, the amount of waste produced, and the land needed to store waste, NEPA required analysis of the impacts of such storage even though the agency could not predict *where* such storage would occur).

Even if DOE/FE were to wrongfully conclude that NEPA would only require analysis of the impacts of induced drilling if it was possible to predict where that drilling would occur, DOE/FE has the tools to make precisely that prediction, as we explain in the previous section. To the extent that these predictions of local impact are not yet in the

[52] In this proceeding, FERC endorses this formulation of "reasonable foreseeability." FERC "Order Granting Section 3 Authorization" 139 FERC ¶ 61,039, FERC Docket CP11-72-001 ¶ 95(April 16, 2012) (hereinafter "FERC April Order").

record, NEPA regulations provide that DOE/FE "shall" obtain this information unless DOE/FE demonstrates that the costs of obtaining it are "exorbitant." 40 C.F.R. §1502.22.

Finally, insofar as Oregon LNG argues that the economic benefits to the Canadian economy of induced production in Canada should be considered, Application at 34, DOE/FE must also consider the environmental effects of such production: the scope of the environmental inquiry cannot be narrower than the scope of the economic inquiry. *Northern Plains Resource Council*, 668 F.3d 1067, *Scientists' Inst. for Pub. Info.*, 481 F.2d at 1092.

In summary, all the available evidence indicates that Oregon LNG's proposed exports will induce additional gas production in the U.S., and this increase can be reasonably foreseen so as to support informed NEPA analysis. NEPA therefore requires consideration of the environmental impacts of induced production.

iii. Environmental Harm Resulting from Induced Production

Natural gas production—from both conventional and unconventional sources—is a significant air pollution source, can disrupt ecosystems and watersheds, leads to industrialization of entire landscapes, and presents challenging waste disposal issues. EIA concluded that "On average, across all cases and export scenarios, the shares of the increase in total domestic production coming from shale gas, tight gas, [and] coalbed sources are 72 percent, 13 percent, [and] 8 percent," respectively. *EIA Export Study* at 11. Oregon LNG predicts that its gas will primarily come from British Columbia's Horn River Basin, which is primarily shale gas. Application at 17. A Subcommittee of the DOE's Secretary of Energy's Advisory Board, recently highlighted "a real risk of serious environmental consequences" resulting from continued expansion of shale gas production. DOE, Secretary of Energy's Advisory Board, *Shale Gas Production Subcommittee Second 90-Day Report* (Nov. 18, 2011) at 10.[53] Shale gas production (as well as coalbed and tight sands production) requires the controversial practice of hydraulic fracturing, or fracking. As we explain below, natural gas production in general, and fracking in particular, imposes a raft of environmental problems. Although some states and federal agencies are taking steps to limit these harms, these efforts are uncertain and, even if fully implemented, will not eliminate the environmental harms.

1. Natural Gas Production is a Major Source of Air Pollution

Below, we briefly describe some of the primary air pollution problems caused by the industry. These issues include direct emissions from production equipment and indirect emissions, caused by natural gas replacing cleaner energy sources. EPA has moved to correct some of these problems with new air regulations finalized this year, but as we

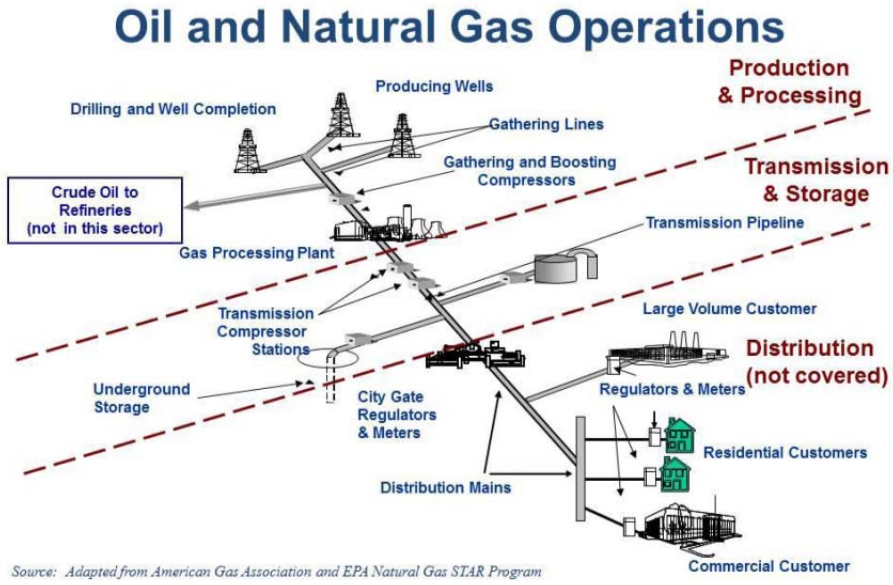
[53] Attached as Exhibit 24. The Board's First 90-Day Report is attached as Exhibit 25.

later discuss, these standards do not fully address the problem. FERC must therefore consider the air pollution impacts of increased natural gas production even if EPA's rules are finalized.

Air Pollution Problems from Natural Gas

Oil and gas operations emit methane (CH_4), volatile organic compounds (VOCs), nitrogen oxides (NO_x), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and particulate matter (PM_{10} and $PM_{2.5}$). Oil and natural gas operations also emit listed hazardous air pollutants (HAPs) in significant quantities, and so contribute to cancer risks and other acute public health problems. Pollutants are emitted during all stages of natural gas development, including (1) oil and natural gas production, (2) natural gas processing, (3) natural gas transmission, and (4) natural gas distribution.[54] Within these development stages, the major sources of air pollution include wells, compressors, pipelines, pneumatic devices, dehydrators, storage tanks, pits and ponds, natural gas processing plants, and trucks and construction equipment.

Figure 1: The Oil and Natural Gas Sector



There is strong evidence that emissions from natural gas production are higher than have been commonly understood. In particular, a recent study by a consortium of researchers led by the National Ocean and Atmospheric Administration (NOAA) Earth System Research Laboratory recorded pollution concentrations near gas fields substantially greater than EPA estimates would have predicted. That research

[54] EPA, Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution, Background Technical Support Document for the Proposed Rules ("TSD") at 2-4 (July 2011), attached as Exhibit 26.

monitored air quality around oil and gas fields.[55] It observed high levels of methane, propane, benzene, and other volatile organic compounds, in the air around the fields. The researchers write that their "analysis suggests that the emissions of the species we measured" – that is the cancer-causing, smog-forming, and climate-disrupting pollutants released from these operations – "are most likely underestimated in current inventories," perhaps by as much as a factor of two.[56]

These emissions have dire practical consequences. A second research team, led by the Colorado School of Public Health, measured benzene and other pollutants released from unconventional well completions.[57] Elevated levels of these pollutants correspond to increased cancer risks for people living within half of a mile from a well[58] – a very large population which will increase as drilling expands.

We discuss the harmful effects of many of these pollutants in part III.C.1.a, above. Below, we detail the sources of emissions within the gas production industry and provide further information regarding the serious global, regional, and local impacts these exploration and production emissions entail:

Methane: Methane is the dominant pollutant from the oil and gas sector. Emissions occur as result of intentional venting or unintentional leaks during drilling, production, processing, transmission and storage, and distribution. For example, methane is emitted when wells are completed and vented, as part of operation of pneumatic devices and compressors, and as a result of leaks (fugitive emissions) in pipelines, valves, and other equipment. EPA has identified natural gas systems as the "single largest contributor to United States anthropogenic methane emissions."[59] The industry is responsible for over 40% of total U.S. methane emissions.[60] Methane causes harm both because of its contributions to climate change and as an ozone precursor.

Beginning with climate change, methane is a potent greenhouse gas that contributes substantially to global climate change. Methane has at least 25 times the global warming potential of carbon dioxide over a 100 year time frame and at least 72 times

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[55] G. Petron *et al.*, *Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study*, 117 J. of Geophysical Research 4304, DOI 10.1029/2011JD016360 (2012), attached as Exhibit 27.
[56] *Id.* at 4304.
[57] L. McKenzie *et al.*, *Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources*, Science of the Total Environment (In Press, Mar. 22, 2012), attached as Exhibit 14.
[58] *Id.* at 2.
[59] 76 Fed. Reg. 52,738, 52,792 (Aug. 23, 2011) (EPA proposed air rules for oil and gas production sector), attached as Exhibit 28.
[60] *Id.* at 52,791–92.

the global warming potential of carbon dioxide over a 20-year time frame.[61] The oil and gas production industry's methane emissions amount to 5% of all carbon dioxide equivalent (CO_2e) emissions in the country.[62]

Because of methane's effects on climate, EPA has found that methane, along with five other well-mixed greenhouse gases, endangers public health and welfare within the meaning of the Clean Air Act.[63]

Methane also reacts in the atmosphere to form ozone.[64] As we discuss elsewhere, ozone is a major public health threat, linked to a wide range of maladies. Ozone can also damage vegetation, agricultural productivity, and cultural resources. Ozone is also a significant greenhouse gas in its own right, meaning that methane is doubly damaging to climate – first in its own right, and then as an ozone precursor.

***Volatile Organic Compounds (VOCs) and NO_x*:** The gas industry is a major source of the ozone precursors VOCs and NO_x.[65] VOCs are emitted from well drilling and completions, compressors, pneumatic devices, storage tanks, processing plants, and fugitives from production and transmission.[66] The primary sources of NO_x are compressor engines, turbines, and other engines used in drilling and hydraulic fracturing.[67] NO_x is also produced when gas is flared or used for heating.[68]

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[61] *IPCC 2007—The Physical Science Basi*s, Section 2.10.2, and *IPCC 2007- Summary for Policymakers*, attached as Exhibit 29. We note that these global warming potential figures may be revised upward in the next IPCC report. A more recent study by Shindell *et al.* estimates methane's 100-year GWP at 33; this same source estimates methane's 20-year GWP at 105.

[62] 76 Fed. Reg. 52,738 at 52,791–92.

[63] EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases, 74 Fed. Reg. 66,496, 66,516 (Dec. 15, 2009) ("Endangerment Finding"), attached as Exhibit 30.

[64] 76 Fed. Reg. at 52,791.

[65] *See, e.g.*, EPA Fact Sheet at 3; Al Armendariz, Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (Jan. 26, 2009), available at http://www.edf.org/documents/9235_Barnett_Shale_Report.pdf (hereinafter "Barnett Shale Report") at 24, attached as Exhibit 31.

[66] *See, e.g.,* TSD at 4-7, 5-6, 6-5, 7-9, 8-1; *see also* Barnett Shale Report at 24.

[67] *See, e.g.*, TSD at 3-6; See also Barnett Shale Report at 24. Air Quality Impact Analysis Technical Support Document for the Revised Draft Supplemental Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project at 11 (Table 2.1).

[68] TSD at 3-6; Colorado Department of Public Health and Environment, *Colorado Visibility and Regional Haze State Implementation Plan for the Twelve Mandatory Class I Federal Areas in Colorado*, Appendix D at 1 (2011), available at

As a result of significant VOC and NO_x emissions associated with oil and gas development, numerous areas of the country with heavy concentrations of drilling are now suffering from serious ozone problems. For example, the Dallas Fort Worth area in Texas is home to substantial oil and gas development. Within the Barnett shale region, as of September 2011, there were more than 15,306 gas wells and another 3,212 wells permitted.[69] Of the nine counties surrounding the Dallas Fort Worth area that EPA has designated as "nonattainment" for ozone, five contain significant oil and gas development.[70] A 2009 study found that summertime emissions of smog-forming pollutants from these counties were roughly comparable to emissions from motor vehicles in those areas.[71]

Oil and gas development has also brought serious ozone pollution problems to rural areas, such as western Wyoming.[72] On March 12, 2009, the governor of Wyoming recommended that the state designate Wyoming's Upper Green River Basin as an ozone nonattainment area.[73] The Wyoming Department of Environmental Quality conducted an extended assessment of the ozone pollution problem and found that it was "primarily due to local emissions from oil and gas . . . development activities: drilling, production, storage, transport, and treating."[74] Last winter alone, the residents of Sublette County suffered thirteen days with ozone concentrations considered "unhealthy" under EPA's current air-quality index, including days when the ozone pollution levels exceeded the worst days of smog pollution in Los Angeles.[75] Residents

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http://www.cdphe.state.co.us/ap/RegionalHaze/AppendixD/4-FactorHeaterTreaters07JAN2011FINAL.pdf, attached as Exhibit 32.

[69] Texas Railroad Commission history of Barnett Shale, attached as Exhibit 33.

[70] Barnett Shale Report at 1, 3.

[71] *Id.* at 1, 25-26.

[72] Schnell, R.C, *et al*. (2009), "Rapid photochemical production of ozone at high concentrations in a rural site during winter," *Nature Geosci.* 2 (120 – 122). DOI: 10.1038/NGEO415, attached as Exhibit 34.

[73] *See* Letter from Wyoming Governor Dave Freudenthal to Carol Rushin, Acting Regional Administrator, USEPA Region 8, (Mar. 12, 2009) ("Wyoming 8-Hour Ozone Designation Recommendations"), *available at* http://deq.state.wy.us/out/downloads/Rushin%20Ozone.pdf, attached as Exhibit 35; Wyoming Department of Environmental Quality, *Technical Support Document I for Recommended 8-hour Ozone Designation of the Upper Green River Basin* (March 26, 2009) ("Wyoming Nonattainment Analysis"), at vi-viii, 23-26, 94-05, *available at* http://deq.state.wy.us/out/downloads/Ozone%20TSD_final_rev%203-30-09_jl.pdf, attached as Exhibit 36.

[74] Wyoming Nonattainment Analysis at viii.

[75] EPA, *Daily Ozone AQI Levels in 2011 for Sublette County, Wyoming*, *available at* http://www.epa.gov/cgi-bin/broker?msaorcountyName=countycode

have faced repeated warnings regarding elevated ozone levels and the resulting risks of going outside.[76]

Ozone problems are mounting in other Rocky Mountain states as well. Northeastern Utah recorded unprecedented ozone levels in the Uintah Basin in 2010 and 2011. In the first three months of 2010—which was the first time that winter ozone was monitored in the region—air quality monitors measured more than 68 exceedances of the federal health standard. On three of these days, the levels were almost twice the federal standard.[77] Between January and March 2011, there were 24 days where the National Ambient Air Quality Standard (NAAQS) for ozone were exceeded in the area. Again, ozone pollution levels climbed to nearly twice the federal standard.[78] The Bureau of Land Management (BLM) has identified the multitude of oil and gas wells in the region as the primary cause of the ozone pollution.[79]

&msaorcountyValue=56035&poll=44201&county=56035&msa=-1&sy=2011&flag=Y&_debug=2&_service=data&_program=dataprog.trend_tile_dm.sas, attached as Exhibit 37; *see also* Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today, *available at* http://content.usatoday.com/communities/greenhouse/post/2011/03/wyomings-smog-exceeds-los-angeles-due-to-gas-drilling/1, attached as Exhibit 38.

[76] *See, e.g., 2011 DEQ Ozone Advisories*, Pinedale Online! (Mar. 17, 2011) (documenting ten ozone advisories in February and March 2011), *available at* http://www.pinedaleonline.com/news/2011/03/OzoneCalendar.htm, attached as Exhibit 39; Wyoming Department of Environmental Quality, Ozone Advisory for Monday, Feb. 28, Pinedale Online! (Feb. 27, 2011), *available at* http://www.pinedaleonline.com/news/2011/02/OzoneAdvisoryforMond.htm, attached as Exhibit 40.

[77] Scott Streater, *Air Quality Concerns May Dictate Uintah Basin's Natural Gas Drilling Future*, N.Y. TIMES, Oct. 1, 2010, *available at* http://www.nytimes.com/gwire/2010/10/01/01greenwire-air-quality-concerns-may-dictate-uintah-basins-30342.html, attached as Exhibit 41.

[78] *See* EPA, AirExplorer, Query Concentrations (Ozone, Uintah County, 2011), available at http://www.epa.gov/cgi-bin/htmSQL/mxplorer/query_daily.hsql?msaorcountyName=countycode&msaorcountyValue=49047&poll=44201&county=49047&site=-1&msa=-1&state=-1&sy=2011&flag=Y&query=download&_debug=2&_service=data&_program=dataprog.query_daily3P_dm.sas, attached as Exhibit 42.

[79] BLM, *GASCO Energy Inc. Uinta Basin Natural Gas Development Draft Environmental Impact State*ment ("GASCO DEIS"), at 3-13, *available at* http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_/gasco_energy_eis.html, attached as Exhibit 43.

Rampant oil and gas development in Colorado and New Mexico is also leading to high levels of VOCs and NO_x. In 2008, the Colorado Department of Public Health and Environment concluded that the smog-forming emissions from oil and gas operations exceed vehicle emissions for the entire state.[80] Moreover, significant additional drilling has occurred since 2008. Colorado is now home to more than 46,000 wells.[81] There is also significant development in the San Juan Basin in southeastern Colorado and northwestern New Mexico, with approximately 35,000 wells in the Basin. As a result of this development and several coal-fired power plants in the vicinity, the Basin suffers from serious ozone pollution.[82] This pollution is taking a toll on residents of San Juan County. The New Mexico Department of Public Health has documented increased emergency room visits associated with high ozone levels in the County.[83]

VOC and NO_x emissions from oil and gas development are also harming air quality in national parks and wilderness areas. Researchers have determined that numerous "Class I areas" – a designation reserved for national parks, wilderness areas, and other such lands[84] – are likely to be impacted by increased ozone pollution as a result of oil and gas development in the Rocky Mountain region, including Mesa Verde National Park and Weminuche Wilderness Area in Colorado and San Pedro Parks Wilderness Area, Bandelier Wilderness Area, Pecos Wilderness Area, and Wheeler Peak Wilderness Area in New Mexico.[85] These areas are all near concentrated oil and gas development in the San Juan Basin.[86]

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[80] Colo. Dept. of Public Health & Env't, Air Pollution Control Division, Oil and Gas Emission Sources, *Presentation for the Air Quality Control Commission Retreat*, at 3-4 (May 15, 2008), attached as Exhibit 44.

[81] Colorado Oil & Gas Conservation Commission, *Colorado Weekly & Monthly Oil and Gas Statistics*, at 12 (Nov. 7, 2011), available at http://cogcc.state.co.us/ (library—statistics—weekly/monthly well activity), attached as Exhibit 45.

[82] *See Four Corners Air Quality Task Force Report of Mitigation Options*, at vii (Nov. 1, 2007), *available at* http://www.nmenv.state.nm.us/aqb/4C/TaskForceReport.html, attached as Exhibit 46.

[83] Myers *et al.*, *The Association Between Ambient Air Quality Ozone Levels and Medical Visits for Asthma in San Juan County* (Aug. 2007), *available at* http://www.nmenv.state.nm.us/aqb/4c/Documents/SanJuanAsthmaDocBW.pdf, attached as Exhibit 47.

[84] *See* 42 U.S.C. § 7472(a).

[85] Rodriguez et al., *Regional Impacts of Oil and Gas Development on Ozone Formation in the Western United States*, 59 Journal of the Air and Waste Management Association 111 (Sept. 2009), available at http://www.wrapair.org/forums/amc/meetings/091111_Nox/Rodriguez_et_al_OandG_Impacts_JAWMA9_09.pdf, attached as Exhibit 48.

[86] *Id.* at 1112.

As oil and gas development moves into new areas, particularly as a result of the boom in development of shale resources, ozone problems are likely to follow. For example, regional air quality models predict that gas development in the Haynesville shale will increase ozone pollution in northeast Texas and northwest Louisiana and may lead to violations of ozone NAAQS.[87]

Sulfur dioxide: Oil and gas production emits sulfur dioxide, primarily from natural gas processing plants.[88] Sulfur dioxide is released as part of the sweetening process, which removes hydrogen sulfide from the gas.[89] Sulfur dioxide is also created when gas containing hydrogen sulfide (discussed below) is combusted in boilers or heaters.[90]

Hydrogen sulfide: Some natural gas contains hydrogen sulfide. When hydrogen sulfide levels are above a specific threshold, gas is classified as "sour gas."[91] According to EPA, there are 14 major areas in the U.S., found in 20 different states, where natural gas tends to be sour.[92] All told, between 15 and 20% of the natural gas in the U.S. may contain hydrogen sulfide.[93]

Given the large amount of drilling in areas with sour gas, EPA has concluded that the potential for hydrogen sulfide emissions from the oil and gas industry is "significant."[94] Hydrogen sulfide may be emitted during all stages of development, including exploration, extraction, treatment and storage, transportation, and refining.[95] For example, hydrogen sulfide is emitted as a result of leaks from processing systems and from wellheads in sour gas fields.[96]

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[87] *See* Kemball-Cook et al., *Ozone Impacts of Natural Gas development in the Haynesville Shale* 44 Environ. Sci. Technol. 9357, 9362 (Nov. 18, 2010), attached as Exhibit 49.
[88] 76 Fed. Reg. at 52,756.
[89] TSD 3-3 to 3-5.
[90] 76 Fed. Reg. at 52,756.
[91] 76 Fed. Reg. at 52,756. Gas is considered "sour" if hydrogen sulfide concentration is greater than 0.25 grain per 100 standard cubic feet, along with the presence of carbon dioxide. *Id.*
[92] EPA, Office of Air Quality Planning and Standards, *Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas* (EPA-453/R-93-045), at ii (Oct. 1993) (hereinafter "EPA Hydrogen Sulfide Report"), attached as Exhibit 50.
[93] Lana Skrtic, *Hydrogen Sulfide, Oil and Gas, and People's Health* ("Skrtic Report"), at 6 (May 2006), *available at* http://www.earthworksaction.org/pubs/hydrogensulfide_oilgas_health.pdf, attached as Exhibit 51.
[94] EPA Hydrogen Sulfide Report at III-35.
[95] *Id.* at ii.
[96] TSD at 2-3.

Hydrogen sulfide emissions from the oil and gas industry are concerning because this pollutant may be harmful even at low concentrations.[97] Hydrogen sulfide is an air pollutant with toxic properties that smells like rotten eggs and can lead to neurological impairment or death. Long-term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.[98] Although hydrogen sulfide was originally included in the Clean Air Act's list of hazardous air pollutants, it was removed with industry support.[99]

Although direct monitoring of hydrogen sulfide around oil and gas sources is limited, there is evidence that these emissions may be substantial, and have a serious impact on people's health. For example, North Dakota reported 3,300 violations of an odor-based hydrogen sulfide standard around drilling wells.[100] People in northwest New Mexico and western Colorado living near gas wells have long complained of strong odors, including but not limited to hydrogen sulfide's distinctive rotten egg smell. Residents have also experienced nose, throat and eye irritation, headaches, nose bleeds, and dizziness.[101] An air sample taken by a community monitor at one family's home in western Colorado in January 2011 contained levels of hydrogen sulfide concentrations 185 times higher than safe levels.[102]

Particulate Matter (PM): The oil and gas industry is a major source of PM pollution. This pollution is generated by heavy equipment used to move and level earth during well pad and road construction. Vehicles also generate fugitive dust by traveling on access roads during drilling, completion, and production activities.[103] Diesel engines used in drilling

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[97] *See* James Collins & David Lewis, Report to CARB, Hydrogen Sulfide: Evaluation of Current California Air Quality Standards with Respect to Protections of Children (Sept. 1, 2000), *available at* http://oehha.ca.gov/air/pdf/oehhah2s.pdf, attached as Exhibit 52.

[98] EPA, Office of Air Quality Planning and Standards, *Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas* (EPA-453/R-93-045), at ii (Oct. 1993) (hereinafter "EPA Hydrogen Sulfide Report"), attached as Exhibit 50.

[99] *See* Pub. L. 102-187 (Dec. 4, 1991). We do not concede that this removal was appropriate. Hydrogen sulfide meets section 112 of the Clean Air Act's standards for listing as a hazardous air pollutant, and should be so regulated.

[100] EPA Hydrogen Sulfide Report at III-35.

[101] See Global Community Monitor, *Gassed! Citizen Investigation of Toxic Air Pollution from Natural Gas Development*, at 11-14 (July 2011), attached as Exhibit 53.

[102] *Id.* at 21.

[103] *See* BLM, GASCO Energy Inc. Uinta Basin Natural Gas Development Project Draft Environmental Impact Statement, at App. J at 2 (Oct. 2010) ("GASCO DEIS")

rigs and at compressor stations are also large sources of fine PM/diesel soot emissions. VOCs are also a precursor to formation of $PM_{2.5}$.[104]

PM emissions from the oil and gas industry are leading to significant pollution problems. For example, monitors in Uintah County and Duchesne County, Utah have repeatedly measured wintertime $PM_{2.5}$ concentrations above federal standards.[105] These elevated levels of $PM_{2.5}$ have been linked to oil and gas activities in the Uinta Basin.[106] West Tavaputs FEIS at 3-20. Modeling also shows that road traffic associated with energy development is pushing PM_{10} levels very close to violating NAAQS standards.[107]

EPA's Air Rules Will Not Fully Address These Air Pollution Problems

Although EPA's recently finalized new source performance standards and standards for hazardous air pollutants[108] do reduce some of these pollution problems, they will not solve them. The rules, first, do not even address some pollutants, including NO_x, methane, and hydrogen sulfide, so any reductions of these pollutants occur only as co-benefits of the VOC reductions that the rules require.[109] Second, the rules do not control emissions from most transmission infrastructure.[110] Third, existing sources of air pollution are not controlled for any pollutant, meaning that increased use of existing infrastructure will produce emissions uncontrolled by the rules. Fourth, without full enforcement, the rules will not reduce emissions completely. Fifth, the rules will not address important emissions effects of LNG in particular, including LNG exports' tendency to increase the use of coal power. Thus, though DOE/FE might work with EPA to fully understand the emissions levels likely after the rules are fully implemented, it may not rely upon the EPA rules to avoid weighing and disclosing these impacts.

2. Gas Production Disrupts Landscapes and Habitats

Increased oil and gas production will transform the landscape of regions overlying shale gas plays, bringing industrialization to previously rural landscapes and significantly

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[104] O&G NSPS RIA at 4-18.
[105] GASCO DEIS at 3-12.
[106] West Tavaputs FEIS, at 3-20 (July 2010).
[107] *See* GASCO DEIS at 4-27.
[108] *See* EPA, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants, Final Rule (Apr. 17, 2012), not yet published in the Federal Register, but available at http://www.epa.gov/airquality/oilandgas/actions.html.
[109] *See id.*128-31.
[110] *See, e.g.*, *id.* at 173, 177

affecting ecosystems, plants, and animals. These impacts are large and difficult to manage.

Land use disturbance associated with gas development impacts plants and animals through direct habitat loss, where land is cleared for gas uses, and indirect habitat loss, where land adjacent to direct losses loses some of its important characteristics.

Regarding direct losses, land is lost through development of well pads, roads, pipeline corridors, corridors for seismic testing, and other infrastructure. The Nature Conservancy ("TNC") estimated that in Pennsylvania, "Well pads occupy 3.1 acres on average while the associated infrastructure (roads, water impoundments, pipelines) takes up an additional 5.7 acres, or a total of nearly 9 acres per well pad." TNC, Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind (2010) at 10, [111] *see also id.* at 18. New York's Department of Environmental Conservation reached similar estimates. New York Department of Environmental Conservation's Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, 5-5 (Sept. 2011) (hereinafter "NY RDSGEIS").[112] After initial drilling is completed the well pad is partially restored, but 1 to 3 acres of the well pad will remain disturbed through the life of the wells, estimated to be 20 to 40 years. *Id.* at 6-13. Associated infrastructure such as roads and corridors will likewise remain disturbed. Because these disturbances involve clearing and grading of the land, directly disturbed land is no longer suitable as habitat. *Id.* at 6-68.

Indirect losses occur on land that is not directly disturbed, but where habitat characteristics are affected by direct disturbances. "Adjacent lands can also be impacted, even if they are not directly cleared. This is most notable in forest settings where clearings fragment contiguous forest patches, create new edges, and change habitat conditions for sensitive wildlife and plant species that depend on "interior" forest conditions." TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* at 10. "Research has shown measureable impacts often extend at least 330 feet (100 meters) into forest adjacent to an edge." NY RDSGEIS 6-75.

TNC's study of the impacts of gas extraction in Pennsylvania is particularly telling. TNC mapped projected wells across the state, considering how the wells and their associated infrastructure, including roads and pipelines, interacted with the landscape. TNC's conclusions make for grim reading. It concluded:

- About 60,000 new Marcellus wells are projected by 2030 in Pennsylvania with a range of 6,000 to 15,000 well pads, depending on the number of wells per pad;

[111] Attached as Exhibit 54.
[112] Available at http://www.dec.ny.gov/energy/75370.html

- Wells are likely to be developed in at least 30 counties, with the greatest number concentrated in 15 southwestern, north central, and northeastern counties;

- Nearly two thirds of well pads are projected to be in forest areas, with forest clearing projected to range between 34,000 and 83,000 acres depending on the number of number of well pads that are developed. An additional range of 80,000 to 200,000 acres of forest interior habitat impacts are projected due to new forest edges created by well pads and associated infrastructure (roads, water impoundments);

- On a statewide basis, the projected forest clearing from well pad development would affect less than one percent of the state's forests, but forest clearing and fragmentation could be much more pronounced in areas with intensive Marcellus development;

- Approximately one third of Pennsylvania's largest forest patches (>5,000 acres) are projected to have a range of between 1 and 17 well pads in the medium scenario;

- Impacts on forest interior breeding bird habitats vary with the range and population densities of the species. The widely-distributed scarlet tanager would see relatively modest impacts to its statewide population while black-throated blue warblers, with a Pennsylvania range that largely overlaps with Marcellus development area, could see more significant population impacts;

- Watersheds with healthy eastern brook trout populations substantially overlap with projected Marcellus development sites. The state's watersheds ranked as "intact" by the Eastern Brook Trout Joint Venture are concentrated in north central Pennsylvania, where most of these small watersheds are projected to have between two and three dozen well pads;

- Nearly a third of the species tracked by the Pennsylvania Natural Heritage Program are found in areas projected to have a high probability of Marcellus well development, with 132 considered to be globally rare or critically endangered or imperiled in Pennsylvania. Several of these species have all or most of their known populations in Pennsylvania in high probability Marcellus gas development areas.

- Marcellus gas development is projected to be extensive across Pennsylvania's 4.5 million acres of public lands, including State Parks, State Forests, and State Game Lands. Just over 10 percent of these lands are legally protected from surface development.

TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind* (2010) at 29.[113] Increased gas production will exacerbate these problems, which is bad news for the state's lands and wildlife, and the hunting, angling, tourism, and forestry industries which depend upon them. Although TNC adds that impacts could be reduced with proper planning, *id.*, more development makes mitigation more difficult. Indeed, the Pennsylvania Department of Conservation and Natural Resources recently concluded that "zero" remaining acres of the state forests are suitable for leasing with surface disturbing activities, or the forests will be significantly degraded. Penn. Dep't of Conservation and Natural Resources, *Impacts of Leasing Additional State Forest for Natural Gas Development* (2011).[114] These costs are not in the public interest.

Presumably, the additional production Oregon LNG's proposal will induce will occur primarily in the Rockies, rather than the Marcellus Shale. The TNC report nonetheless highlights the extreme changes the gas boom is bringing to affected landscapes, and it is likely that similar effects are being felt elsewhere. Oregon LNG's proposal would add fuel to this fire.

These effects will harm rural economies and decrease property values, as major gas infrastructure transforms and distorts the existing landscape. They will also harm endangered species in regions where production would increase in response to Cheniere's exports. Harm to these species and their habitat is, too, against the profound public interest in species conservation, as expressed in the Endangered Species Act and similar statutes.

3. Gas Production Poses Risks to Ground and Surface Water

As noted above, most of the increased production that would result from Cheniere's proposal will be from shale and other unconventional gas sources, and producing gas from these sources requires hydraulic fracturing, or fracking. *See* DOE, *Shale Gas Production Subcommittee First 90-Day Report* at 8.[115]. Hydraulic fracturing involves injecting a base fluid (typically water),[116] sand or other proppant, and various fracturing chemicals into the gas-bearing formation at high pressures to fracture the rock and release additional gas. Each step of this process presents a risk to water resources. Withdrawal of the water may overtax the water source. Fracking itself may contaminate groundwater with either chemicals added to the fracturing fluid or with naturally occurring chemicals mobilized by fracking. After the well is fracked, some water will

[113] *See* Exhibit 54.
[114] Attached as Exhibit 55.
[115] Attached as Exhibit 56.
[116] The majority of hydraulic fracturing operations are conducted with a water based fracturing fluid. Fracking may also be conducted with oil or synthetic-oil based fluid, with foam, or with gas.

return to the surface, composed of both fracturing fluid and naturally occurring "formation" water. This water, together with drilling muds and drill cuttings, must be disposed of without further endangering water resources.

Water Withdrawals

The first step is the procurement of water. The precise amount of water varies by the shale formation being fracked. To use one example formation, fracking a Marcellus Shale well requires between 4 and 5 million gallons of water. TNC, *Pennsylvania Energy Impacts Assessment, Report 1: Marcellus Shale Natural Gas and Wind*, 5.[117] Fresh water constitutes 80% to 90% of the total water used a well even where operators recycle "flowback" water from the fracking of previous well for use in fracking the current one. New York Department of Environmental Conservation's *Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, 6-13 (Sept. 2011) (hereinafter "NY RDSGEIS").[118]

Water withdrawals can drastically impact aquatic ecosystems and human communities. Reductions in instream flow negatively affect aquatic species by changing flow depth and velocity, raising water temperature, changing oxygen content, and altering streambed morphology. *Id.* 6-3 to 6-4. Even when flow reductions are not themselves problematic, the intake structures can harm aquatic organisms. *Id.* at 6-4. Where water is withdrawn from aquifers, rather than surface sources, withdrawal risks permanent depletion. This risk is even more prevalent with withdrawals for fracking than it is for other withdrawal, because fracking is a consumptive use. Fluid injected during the fracking process is (barring accident) deposited below freshwater aquifers and into sealed formations. *Id.* 6-5; DOE Subcommittee First 90 day report at 19 ("in some regions and localities there are significant concerns about consumptive water use for

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[117] *Accord* New York Department of Environmental Conservation's *Revised Draft Supplemental General Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, (September 2011) ("Between July 2008 and February 2011, average water usage for high-volume hydraulic fracturing within the Susquehanna River Basin in Pennsylvania was 4.2 million gallons per well, based on data for 553 wells."), *available at* http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf. Other estimates are that as much as 7.2 million gallons of frack fluid may be used in a 4000 foot well bore. NRDC, *et al.*, *Comment on NY RDSGEIS on the Oil, Gas and Solution Mining Regulatory Program* (Jan. 11, 2012) (Attachment 2, Report of Tom Myers, at 10), attached as Exhibit 57 (hereafter *Comment on NY RDSGEIS*).

Water needs in other geological formations vary. See Exhibit 25 at 19 (estimating that nationwide, fracking an individual well requires between 1 and 5 million gallons of water).

[118] Available at http://www.dec.ny.gov/energy/75370.html

shale gas development."). Thus, the water withdrawn from the aquifer will be used in a way that provides no opportunity to percolate back down to the aquifer and recharge it.

Fracturing

Fracturing poses a serious risk of groundwater contamination. Contaminants include chemicals added to the fracturing fluid and naturally occurring chemicals that are mobilized from deeper formations to groundwater by the fracking process. Contamination may occur through several methods, including where the well casing fails or where the created fractures intersect an existing a poorly sealed well. Although information on groundwater contamination is incomplete, the available research indicates that contamination has already occurred on multiple occasions.

One category of potential contaminants includes chemicals added to the drilling mud and fracturing fluid. The fluid used for slickwater fracturing is typically comprised of more than 98% fresh water and sand, with chemical additives comprising 2% or less of the fluid. NY RDSGEIS 5-40. Chemicals are added as solvents, surfactants, friction reducers, gelling agents, bactericides, and for other purposes. *Id.* 5-49. New York recently identified 322 unique ingredients used in fluid additives, recognizing that this constituted a partial list. *Id.* 5-41. These chemicals include petroleum distillates; aromatic hydrocarbons; glycols; glycol ethers; alcohols and aldehydes; amides; amines; organic acids, salts, esters and related chemicals; microbicides; and others. *Id.* 5-75 to 5-78. Many of these chemicals present health risks. *Id.* Of particular note is the use of diesel, which the DOE Subcommittee has singled out for its harmful effects and recommended be banned from use as a fracturing fluid additive. DOE Subcommittee First 90-Day Report, 25. The minority staff of the House Committee on Energy and Commerce determined that despite diesel's risks, between 2005 and 2009 "oil and gas service companies injected 32.2 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states." Natural Resources Defense Council, Earthjustice, and Sierra Club, *Comments [to EPA] on Permitting Guidance for Oil and Gas Hydraulic Fracturing Activities Using Diesel Fuels* (June 29, 2011) at 3 (quoting Letter from Reps. Waxman, Markey, and DeGette to EPA Administrator Lisa Jackson (Jan. 31, 2001) at 1) (hereafter Comment on Diesel Guidance).[119]

Contamination may also result from chemicals naturally occurring in the formation. Flowback and produced water "may include brine, gases (e.g. methane, ethane), trace metals, naturally occurring radioactive elements (e.g. radium, uranium) and organic compounds." DOE Subcommittee first 90 day report at 21; *see also* Comment on NY RDSGEIS (attachment 3, Report of Glen Miller, at 2). For example, mercury naturally occurring in the formation becomes mixed in with water-based drilling muds, resulting

[119] Attached as Exhibit 58.

in up to 5 pounds of mercury in the mud per well drilled in the Marcellus region. Comment on NY RDSGEIS (attachment 1, Report of Susan Harvey, at 92).

There are several vectors by which these chemicals can reach groundwater supplies. Perhaps the most common or significant are inadequacies in the casing of the vertical well bore. DOE Subcommittee First 90 Day Report, 20. The well bore inevitably passes through geological strata containing groundwater, and therefore provides a conduit by which chemicals injected into the well or traveling from the target formation to the surface may reach groundwater. The well casing isolates the groundwater from intermediate strata and the target formation. This casing must be strong enough to withstand the pressures of the fracturing process--the very purpose of which is to shatter rock. Multiple layers of steel casing must be used, each pressure tested before use, then centered within the well bore. Each layer of casing must be cemented, with careful testing to ensure the integrity of the cementing. Comment on Diesel Guidance, 5-9.

Separate from casing failure, contamination may occur when the zone of fractured rock intersects an abandoned and poorly-sealed well or natural conduit in the rock. Comment on NY RDSGEIS (Attachment 3, Report of Tom Myers, 12 - 15). One recent study concluded, on the basis of geologic modeling, that frack fluid may migrate from the hydraulic fracture zone to freshwater aquifers in less than ten years.[120]

Available empirical data indicates that fracking has resulting in groundwater contamination in at least five documented instances. One study "documented the higher concentration of methane originating in shale gas deposits . . . into wells surrounding a producing shale production site in northern Pennsylvania." DOE Subcommittee first 90 day report at 20 (citing Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner, and Robert B. Jackson, *Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing*, Proceedings of the National Academy of Science, 108, 8172-8176, (2011)). By looking at particular isotopes of methane, this study was able to determine that the methane originated in the shale deposit, rather than from a shallower source. *Id.* The DOE Subcommittee referred to this as "a recent, credible, peer-reviewed study." *Id.* Two other reports "have documented or suggested the movement of fracking fluid from the target formation to water wells linked to fracking in wells." Comment on NY RDSGEIS (Attachment 2, Report of Tom Meyers, 13). "Thyne (2008)[[121]] had found bromide in wells 100s of feet above the

[120] Tom Myers, *Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers*, Ground Water (Apr. 17, 2012), attaches as Exhibit 59.
[121] Dr. Meyers relied on Thyne, G. 2008. *Review of Phase II Hydrogeologic Study.* Prepared for Garfield County, Colorado.

fracked zone." *Id.* "The EPA (1987)[122] documented fracking fluid moving into a 416-foot deep water well in West Virginia; the gas well was less than 1000 feet horizontally from the water well, but the report does not indicate the gas-bearing formation." *Id.*

More recently, EPA has investigated groundwater contamination in Pavillion, Wyoming and Dimock, Pennsylvania. In Pavillion, EPA's draft report concludes that "when considered together with other lines of evidence, the data indicates likely impact to ground water that can be explained by hydraulic fracturing." EPA, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (Dec. 2011), at xiii.[123] EPA tested water from wells extending to various depths within the range of local groundwater. At the deeper tested wells, EPA discovered inorganics (potassium, chloride), synthetic organic (isopropanol, glycols, and tert-butyl alcohol), and organics (BTEX, gasoline and diesel range organics) at levels higher than expected. *Id.* at xii. At shallower levels, EPA detected "high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons." *Id.* at xi. EPA determined that surface pits previously used for storage of drilling wastes and produced/flowback waters were a likely source of contamination for the shallower waters, and that fracturing likely explained the deeper contamination. *Id.* at xi, xiii. Although this is a draft report in an ongoing investigation, an independent expert who reviewed the EPA Pavillon study at the request of Sierra Club and other environmental groups has supported EPA's findings.[124] it demonstrates a possibility of contamination that DOE must consider in its public interest evaluation.

EPA is also investigating groundwater contamination in Dimock, Pennsylvania. EPA Region III, *Action Memorandum - Request for Funding for a Removal Action at the Dimock Residential Groundwater Site* (Jan. 19, 2012).[125] In Dimock, EPA has determined that "a number of home wells in the Dimock area contain hazardous substances, some of which are not naturally found in the environment." *Id.* at 1. Specifically, wells are contaminated with arsenic, barium, bis(2(ethylhexyl)phthalate, glycol compounds, manganese, phenol, and sodium. *Id.* at 3-4. Many of these chemicals are hazardous

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[122] Environmental Protection Agency. 1987. Report to Congress, Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy, Volume 1 of 3, Oil and Gas. Washington, D.C., available at nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20012D4P.txt, attached as Exhibit 60.

[123] Attached as Exhibit 61, available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf

[124] Tom Myers, *Review of DRAFT: Investigation of Ground Water Contamination near Pavillion Wyoming* (April 30, 2012), attached as Exhibit 62 and available at http://docs.nrdc.org/energy/files/ene_12050101a.pdf.

[125] Attached as Exhibit 63, available at http://www.epaosc.org/sites/7555/files/Dimock%20Action%20Memo%2001-19-12.PDF

substances as defined under CERCLA section 101(14); *see also* 40 C.F.R. § 302.4. EPA's determination is based on "Pennsylvania Department of Environmental Protection (PADEP) and Cabot Oil and Gas Corporation (Cabot) sampling information, consultation with an EPA toxicologist, the Agency for Toxic Substances and Disease Registry (ATSDR) Record of Activity (AROA), issued, 12/28/11, and [a] recent EPA well survey effort." *Id.* The PADEP information provided reason to believe that drilling activities in the area led to contamination of these water supplies. Drilling in the area began in 2008, and was conducted using the hazardous substances that have since been discovered in well water. *Id.* at 1, 2. Shortly thereafter methane contamination was detected in private well water. *Id.* at 2. In addition, there were several surface spills in connection with the drilling operation. *Id.* at 1. After the contamination was detected, PADEP entered a consent decree with Cabot which required permanent restoration or replacement of the water supply. *Id.* at 2. Cabot has installed or is installing a "gas mitigation" system for the affected wells. *Id., see also* Agency for Toxic Substances and Disease Registry, *Record of Activity/Technical Assist* (Dec. 28, 2011) at 2 (hereafter ATSDR).[126]

Pursuant to the consent decree, Cabot was providing replacement water to all 18 homes until November 30, 2011, at which point Cabot halted deliver with PADEP's consent. ATSDR at 2. EPA has intervened because "EPA does not know what, if any, hazardous substances these 'gas mitigation' systems, originally designed to address methane, are removing." EPA Action Memorandum at 2. EPA sampled water from 64 home wells.[127], "EPA found hazardous substances, specifically arsenic, barium or manganese, all of which are also naturally occurring substances, in well water at five homes at levels that could present a health concern. In all cases the residents have now or will have their own treatment systems that can reduce concentrations of those hazardous substances to acceptable levels at the tap."[128]

Waste Management

Fracturing produces a variety of liquid and solid wastes that must be managed and disposed of. These include the drilling mud used to lubricate the drilling process, the drill cuttings removed from the well bore, the "flowback" of fracturing fluid that returns to the surface in the days after fracking, and produced water that is produced over the life of the well (a mixture of water naturally occurring in the shale formation and lingering fracturing fluid). These wastes contain the same contaminants described in the

[126] Attached as Exhibit 64, available at http://www.epa.gov/aboutepa/states/dimock.pdf.
[127] EPA, *EPA Completes Drinking Water Sampling in Dimock, Pa* (July 25, 2012), attached as Exhibit 65, and available at http://yosemite.epa.gov/opa/admpress.nsf/0/1A6E49D193E1007585257A46005B61AD
[128] *Id.*

preceding section. They present environmental hazards with regard to their onsite management and with their eventual disposal.

On site, drilling mud, drill cuttings, flowback and produced water are often stored in pits. Such open pits can have harmful air emissions, can leach into shallow groundwater water, and can fail and result in surface discharges. Many of these harms can be minimized by the use of seal tanks in a "closed loop" system. *See, e.g.*, NY RDSGEIS at 1-12. Presently, only New Mexico mandates the use of closed loop waste management systems, and pits remain in use elsewhere.

Flowback and produced water must ultimately be disposed of offsite. Some of these fluids may be recycled and used in further fracturing operations, but even where a fluid recycling program is used, recycling leaves concentrated contaminants that must be disposed of. The most common methods of disposal are disposal in underground injection wells or through water treatment facilities leading to eventual surface discharge.

Underground injection wells present risks of groundwater contamination similar to those identified above for fracking itself. Gas production wastes are not categorized as hazardous under the Safe Drinking Water Act, 42 U.S.C. § 300f *et seq.*, and may be disposed of in Class II injection wells. Class II wells are brine wells, and the standards and safeguards in place for these wells were not designed with the contaminants found in fracking wastes in mind. *See also* NRDC *et al.*, Petition for Rulemaking Pursuant to Section 6974(a) of the Resource Conservation and Recovery Act Concerning the Regulation of Wastes Associated with the Exploration, Development, or Production of Crude Oil or Natural Gas or Geothermal Energy (Sept. 8, 2010).[129]

Additionally, underground injection of fracking wastes appears to have induced earthquakes in several regions. Underground injection of fracking waste in Ohio has been correlated with earthquakes as high as 4.0 on the Richter scale. Columbia University, Lamont-Doherty Earth Observatory, *Ohio Quakes Probably Triggered by Waste Disposal Well, Say Seismologists* (Jan. 6, 2012).[130] Underground injection may cause earthquakes by causing movement on existing fault lines: "Once fluid enters a preexisting fault, it can pressurize the rocks enough to move; the more stress placed on the rock formation, the more powerful the earthquake." *Id.* Underground injection is more likely than fracking to trigger large earthquakes via this mechanism, "because more fluid is usually being pumped underground at a site for longer periods." *Id.* In light of the apparent induced seismicity, Ohio has put a moratorium on injection in the affected region. *Id.* Similar associations between earthquakes and injection have

[129] Attached as Exhibit 66.

[130] Attached as Exhibit 67, available at http://www.ldeo.columbia.edu/news-events/seismologists-link-ohio-earthquakes-waste-disposal-wells

occurred in Arkansas, Texas, Oklahoma and the United Kingdom. *Id*., Alexis Flynn, *Study Ties Fracking to Quakes in England*, Wall Street Journal (Nov. 3, 2011).[131] In light of these effects, Ohio and Arkansas have placed moratoriums on injection in the affected areas. Lamont-Doherty Earth Observatory; Arkansas Oil and Gas Commission, *Class II Commercial Disposal Well or Class II Disposal Well Moratorium* (Aug. 2, 2011).[132] The recently released abstract of a forthcoming United States Geological Survey study affirms the connection between disposal wells and earthquakes. Ellsworth, W. L., *et al*., *Are Seismicity Rate Changes in the Midcontinent Natural or Manmade?*, Seismological Society of America, (April 2012).[133]

As an alternative to underground injection, flowback and produced water is also sent to water treatment facilities, leading to eventual surface discharge. This presents a separate set of environmental hazards, because these facilities (particularly publicly owned treatment works) are not designed to handle the nontraditional pollutants found in fracking wastes. For example:

> One serious problem with the proposed discharge (dilution) of fracture treatment wastewater via a municipal or privately owned treatment plant is the observed increases in trihalomethane (THM) concentrations in drinking water reported in the public media (Frazier and Murray, 2011), due to the presence of increased bromide concentrations. Bromide is more reactive than chloride in formation of trihalomethanes, and even though bromide concentrations are generally lower than chloride concentrations, the increased reactivity of bromide generates increased amounts of bromodichloromethane and dibromochloromethane (Chowdhury, et al., 2010). Continued violations of an 80microgram/L THM standard may ultimately require a drinking water treatment plant to convert from a standard and cost effective chlorination disinfection treatment to a more expensive chloramines process for water treatment. Although there are many factors affecting THM production in a specific water,

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[131] Attached as Exhibit 68, available at http://online.wsj.com/article/SB10001424052970203804204577013771109580352.html

[132] Attached as Exhibit 69, available at http://www.aogc.state.ar.us/Hearing%20Orders/2011/July/180A-2-2011-07.pdf

[133] This abstract is attached as Exhibit 70, and is available at http://www2.seismosoc.org/FMPro?-db=Abstract_Submission_12&-recid=224&-format=%2Fmeetings%2F2012%2Fabstracts%2Fsessionabstractdetail.html&-lay=MtgList&-find

> simple (and cheap) dilution of fracture treatment water in a stream can result in a more expensive treatment for disinfection of drinking water. This transfer of costs to the public should not be permitted.

Comment on NY RDSGEIS (attachment 3, Report of Glen Miller, at 13). Similarly, municipal treatment works typically to not treat for radioactivity, whereas produced water can have high levels of naturally occurring radioactive materials. In one examination of three samples of produced water, radioactivity (measured as gross alpha radiation) were found ranging from 18,000 pCi / L to 123,000 pCi/L, whereas the safe drinking water standard is 15 pCi/L. *Id.* (Miller Report at 4).

c. Other Nationwide and Global Impacts

i. Price Increases

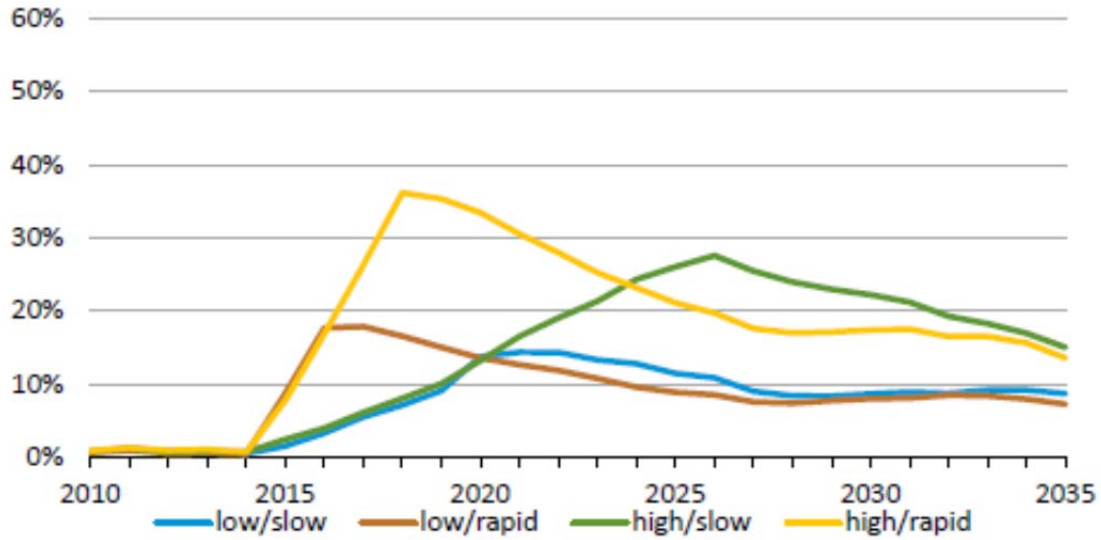
The *EIA Export Study* predicts that LNG exports will significantly increase demand for natural gas and thereby raise domestic gas prices. *EIA Export Study* at 6. Higher gas prices will in turn hurt American consumers and limit or eliminate manufacturing and farming jobs, in addition to inflicting the environmental effects described above. *Id*.[134] Although Oregon LNG offers its own differing predictions, DOE/FE should adopt the estimates of its own sub-agency. Even if DOE/FE were to accept Oregon LNG's own, lower predictions of price impacts, however, DOE/FE would have to conclude that these impacts constituted a significant harm to the public interest.

The *EIA Export Study* predicts striking price increases from a range of export scenarios. EIA considered several combinations of conditions of shale gas export rates and economic circumstances. It considered a "low" export case of 6 bcf/d, phased in either quickly or slowly starting in 2015, and a "high" case of 12 bcf/d, again phased in quickly or slowly. *EIA Export Study* at 1. These four export volumes and timelines were then evaluated in the contexts of four background scenarios: the EIA's Annual Energy Outlook ("AEO") 2011 reference case, cases where shale recoveries were 50% higher or lower than in the reference case, and a high economic growth reference case. *Id.* Models were run from 2015 (the year in which the first exports were presumed to begin) through 2035. *EIA Export Study* 1. EIA forecast effects of export on wellhead gas prices, on various gas consumers, and on residential electricity bills. *EIA Export Study* 6-16. The

[134] *See also* Democratic Staff, House Natural Resources Comm., *Drill Here, Sell There, Pay More: The Painful Price of Exporting Natural Gas* (2012) ("*Drill Here, Sell There, Pay More*"), attached as Exhibit 71; Industrial Energy Consumers of America, *Response to Hamilton Project: "A Strategy for U.S. Natural Gas Exports" by Michael Levi* (July 16, 2012), *available at* http://www.ieca-us.com/wp-content/uploads/07.16.12_IECA-Response-to-Brookings.pdf and attached as Exhibit 72.

study summarizes its results for its four export scenarios on the reference economic case as follows:

Figure 1:[135] Natural Gas Wellhead Price Percentage Increases from the AEO 2011 Baseline under Four Export Scenarios



These figures likely understate the impact of aggregate exports, because the volume of proposed exports greatly exceeds EIA's "high" export scenario, and because current estimates of total reserves are much lower than those used in the EIA Export Study. Beginning with export volumes, EIA's "high" export cases of 12 bcf/d fall far short of the 27.58 bcf/d of exports for which applications are presently pending before DOE/FE.[136] For perspective, note that 27.58 bcf/d is over 36% of current domestic gas production. EIA, Monthly Natural Gas Gross Production Report (November 2, 2012). [137] On the other end, EIA has drastically reduced its estimates of total gas supplies. The EIA production cases were derived from EIA's 2011 Annual Energy Outlook, which assumed total

[135] From the EIA Export Study, at 8.

[136] *Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of October 16, 2012)*, available at http://fossil.energy.gov/programs/gasregulation/reports/Long_Term_LNG_Export_10-16-12.pdf and attached as Exhibit 73.

[137] Available at http://www.eia.gov/oil_gas/natural_gas/data_publications/eia914/eia914.html and attached as Exhibit 74. This report states that, for the month of August 2012, gross U.S. withdrawals (not limited to the lower 48) were 76.60 bcf/d. The highest monthly production in the past 12 months was 83.06 bcf/d in January 2012: the proposed exports amount to over 33% of this total.

domestic reserves of 827 tcf of natural gas. The more recent 2012 Annual Energy Outlook cuts the estimates of reserves by over 40%, to 482 tcf.[138]

Oregon LNG offers separate (and lower) predictions of price impacts. Absent a strong showing that the EIA estimates are inferior to those prepared by Oregon LNG, it would be arbitrary and capricious for DOE/FE to use industry estimates instead of the estimates produced by the impartial federal agency DOE/FE specifically tasked with examining this particular issue. 5 U.S.C. § 706, *Motor Vehicle Mfrs. Ass'n of the United States v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). Oregon LNG has failed to make such a showing here.

Oregon LNG's estimates must also be excluded because they fail to account for the cumulative impacts of pending export proposal. The Navigant study Oregon LNG commissioned used three cases: the status quo, approval of Oregon LNG's proposal but no other pending export proposals, and an "aggregate" LNG export scenario under which 6.8 bcf/d of LNG is exported. Application at 23. In light of the 27.58 bcf/d of proposed exports, DOE/FE cannot rest on these low export scenarios. Although Oregon LNG may contend that it is unlikely that all, or even many, of the proposed export projects will come to fruition or operate at full capacity, the possibility of that volume of exports is hardly so "remote and speculative" that it can be discounted. *See New York v. NRC*, 681 F.3d 471, 482 (D.C. Cir. 2012) (under NEPA, agency may only exclude analysis of an event and its consequences when the event "is so 'remote and speculative' as to reduce the effective probability of its occurrence to zero."), *San Luis Obispo Mothers for Peace v. Nuclear Regulatory Comm'n*, 449 F.3d 1016, 1031 (9th Cir. 2006) (same). Therefore, DOE/FE must consider the cumulative impacts of all pending export proposals, and thus consider Oregon LNG's application in light of other pending proposals. Consideration of the cumulative effects of the pending proposals is necessary because the public, after all, will not experience each proposed terminal as an individual project: It will experience them cumulatively, through the gas and electricity prices that they will raise and the environmental damage that they will cause. To determine whether any one export proposal is consistent with the public interest, DOE/FE must consider whether a given proposal will harm the public in concert with (a) all proposals which have already been approved and (b) whether it will cause harm if all reasonably foreseeable proposals were approved. If the answer to this second question is yes, DOE/FE must be able to justify why it is still in the public interest to approve the project before it.[139]

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[138] EIA 2012 Annual Energy Outlook at 9, 13, *see also* Exhibit 5.

[139] Although it would be unlawful to consider the price impacts of Jordan Cove's proposed exports in isolation, such consideration would nonetheless reveal a significant impact. Jordan Cove itself predicts that the effects of its exports, if considered in isolation, would increase gas prices in the Pacific Northwest by 3.9% to 7.2%. Application at 15. As the EIA explains, this level of increase is detrimental to consumers,

All of EIA's scenarios predict greater price increases than Oregon LNG does. The high export/low recovery scenarios predict that in the years leading up to 2020, wellhead prices will increase over 50%.[140] Similarly, over the longer term, EIA's low-recovery high-export scenarios predict Henry Hub price increases of $1.46 (20%) to $2.33 (32%) by 2025 and $0.94 (10%) to $1.59 (18%) by 2035.[141] EIA predicts similar increases in wellhead prices for these periods.[142] Even the low/slow exports reference case predicts predicts Henry Hub prices to increase by $0.60 per MMBtu, or over 9%, by 2035.[143] These predictions are all significantly higher than Oregon LNG's predictions of 5.43% to 4.96% increases in Henry Hub prices as a result of aggregate exports between 2017 and 2045. Application at 23.

Even if DOE/FE were to accept Oregon LNG's projections, DOE/FE would have to conclude that these projections were significant and contrary to the public interest. Oregon LNG's aggregate scenario predicts price increases of 5.71% to 8.49% at the nearby Sumas hub in 2017 and 2045, respectively, and 5.43% (2017) to 4.96% (2045) at the more distant Henry Hub. Application 25-26. Although these price predictions are significantly lower than the *EIA Export Study*'s projections of hub price increases, Oregon LNG's predictions are still significant enough to risk the economic impacts outlined in the EIA Export Study.

EIA predicts that in light of these price increases, all consumers of natural gas—residential, commercial, industrial, and electricity generating users—will decrease consumption. EIA Export Study at 11, 15. Despite decreased consumption, each consumer type would pay a higher total gas bill. As EIA explains:

> On average, from 2015 to 2035, natural gas bills paid by end-use consumers in the residential, commercial, and industrial sectors combined increase 3 to 9 percent over a comparable baseline case with no exports, depending on the export scenario and case, while increases in electricity bulls paid by end-use customers range from 1 to 3 percent. In the rapid growth cases, the increase is notably greater in the early years relative to the later years. The slower

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industry, and electricity generators. EIA Export Study at 6, 11, 15. Jordan Cove offers no argument as to why these increases are not contrary to the public interest.

[140] EIA Export Study Figure 4.

[141] EIA Export Study tables B3 and B4.

[142] *Id.*

[143] EIA Export Study at Table B4. For other export scenarios and reference cases, EIA's estimates range from $0.40 to $1.59. *Id.*

> export growth cases tend to show natural gas bills increasing more towards the end of the projection period.

EIA Export Study at 6. Industrial consumers would pay 6.4% to 14.6% more annually. *Id.* at 15.

These percentage increases are very large in absolute terms. In the low/slow scenario, gas and electricity bills increase by $9 billion *per year*, and this increase grows to $20 billion per year in other scenarios. *EIA Export Study* at 14. Industries particularly dependent on natural gas—such as farming, steel production, fertilizer manufacturing, and chemical manufacturing—will all be particularly impacted by these increases.[144] Increased costs to these industries will likely result job losses, or at least stymied job growth, offsetting job growth exports would create in the natural gas production industry. *Id.*

ii. Changes in Domestic Power Production

Oregon LNG's export proposal will further increase air pollution by increasing the amount of coal used for domestic electricity production. The EIA Export Study predicts that exports, by causing natural gas prices to rise, will drive more electricity generation t coal than to renewable energy. EIA Export Study at 6 (The power sector will "primarily" respond by shifting to coal-fired generation, and only secondarily to renewable sources), *see also id.* at 17 ("higher natural gas prices lead electric generators to burn more coal and less natural gas."). Specifically, EIA predicts that 72 percent of the decrease in gas-fired electricity production will be replaced by coal-fired production, with increased liquid fuel consumption, increased renewable generation, and decreases in total consumption making up the remainder (8, 9, and 11 percent, respectively). *Id.* at 18.

The shift from gas- to coal-fired electricity generation will increase emissions of both traditional air pollutants and greenhouse gases. Gas-fired power plants generate less than a third of the nitrogen oxides and one percent of the sulfur oxides that coal-fired plants generate.[145] Thus, the EIA Export Study demonstrates that exports will harm the local environment by causing the opposite shift here.

Coal-fired plants also release roughly twice the carbon dioxide combustion emissions as gas-fired plants, *id.*, although as discussed in the following section, some of this combustion advantage is offset by the greenhouse gas emissions resulting from gas

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[144] Drill Here, Sell There, Pay More at 9-13; Industrial Energy Consumers of America, *Response to Hamilton Project: "A Strategy for U.S. Natural Gas Exports" by Michael Levi* (July 16, 2012).

[145] EPA, Air Emissions, attached as Exhibit 75, available at http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html

production. Accordingly, the price increase and corresponding shift to coal-fired power generation risks increasing greenhouse gas pollution. The *EIA Export Study* examined the effects of 6 or 12 bcf/d of exports, phased in slowly or quickly, together with various estimates for the extent of shale gas reserves and the pace of US economic development. EIA concluded that under every scenario exports would produce a significant increase in domestic greenhouse gas emissions, as illustrated by the table below.

Table 1: Cumulative CO_2 Emissions from 2015 to 2035 With Various Export Scenarios[146]

Case	no added exports	low/slow	low/rapid	high/slow	high/rapid
Reference					
Cumulative carbon dioxide emissions	125,056	125,699	125,707	126,038	126,283
Change from baseline		643	651	982	1,227
Percentage change from baseline		0.5%	0.5%	0.8%	1.0%
High Shale EUR					
Cumulative carbon dioxide emissions	124,230	124,888	124,883	125,531	125,817
Change from baseline		658	653	1,301	1,587
Percentage change from baseline		0.5%	0.5%	1.0%	1.3%
Low Shale EUR					
Cumulative carbon dioxide emissions	125,162	125,606	125,556	125,497	125,670
Change from baseline		444	394	335	508
Percentage change from baseline		0.4%	0.3%	0.3%	0.4%
High Economic Growth					
Cumulative carbon dioxide emissions	131,675	131,862	132,016	131,957	132,095
Change from baseline		187	341	282	420
Percentage change from baseline		0.1%	0.3%	0.2%	0.3%

Source: U.S. Energy Information Administration, National Energy Modeling System, with emissions related to natural gas assumed to be consumed in the liquefaction process included.

The fact that gas exports will tend to favor coal as a fuel for domestic electrical generation has particularly important implications for national emissions control efforts. EPA has just released proposed carbon pollution standards for electricity generating units which set emissions levels based upon the performance of natural gas combined-cycle plants. *See*77 Fed. Reg. 22,392 (Apr. 13, 2012). EPA anticipates no notable compliance costs for the rule because it expects utilities to react to low gas prices, among other factors, by avoiding constructing expensive coal-fired plants. *See id.* at 22,430. If LNG exports move forward, however, gas prices will increase, making it more difficult and expensive to capture combustion-side carbon pollution reductions from fossil-fuel fired power plants. This interference with national efforts to control global warming, which endangers public health and welfare, *see* 74 Fed. Reg. 66,496 (Dec. 15, 2009), is not in the public interest.

[146] From the *EIA Export Study* at 19.

iii. Effects on Global Greenhouse Gas Emissions

Several other export applicants have argued that LNG exports will benefit the environment by allowing importing countries to burn natural gas in place of coal, fuel oil, or other fuels with higher carbon intensities, and that LNG exports will thereby reduce global greenhouse gas emissions. This argument is wrong for two reasons.

First, looking at importing countries' response to exports, a recent study by the International Energy Agency predicts that international trade in LNG and other measures to increase global availability of natural gas will lead many countries to use natural gas in place of wind, solar, or other renewables, displacing these more environmentally beneficial energy sources instead of displacing other fossil fuels, and that these countries may also increases their overall energy consumption beyond the level that would occur with exports.[147] In the United States alone, the IEA expects the gas boom to result in a 10% reduction in renewables relative to a baseline world without increased gas use and trade.[148] The IEA goes on to conclude that high levels of gas production and trade will produce "only a small net shift" in global greenhouse gas emissions, with atmospheric CO2 levels stabilizing at over 650 ppm and global warming in excess of 3.5 degrees Celsius, "well above the widely accepted 2°C target." *Id.*

Second, even where importing countries do substitute gas for coal or fuel oil, the available evidence indicates that this substitution is likely to cause little, if any, reduction in global greenhouse gas emissions. On this issue, it is important to highlight the energy and environmental costs LNG incurs in beyond those incurred by domestic gas use. Liquefying natural gas is an energy intensive process. Additional energy is then consumed in the transportation of the gas, with attendant greenhouse gas emissions. Finally, the LNG must be regasified at the import terminal, often by being heated with the combustion of other gas. These operations drastically increase the lifecycle greenhouse gas emissions of LNG, adding between 24.7 and 27.5 tons of CO_2e per MMBtu.[149]

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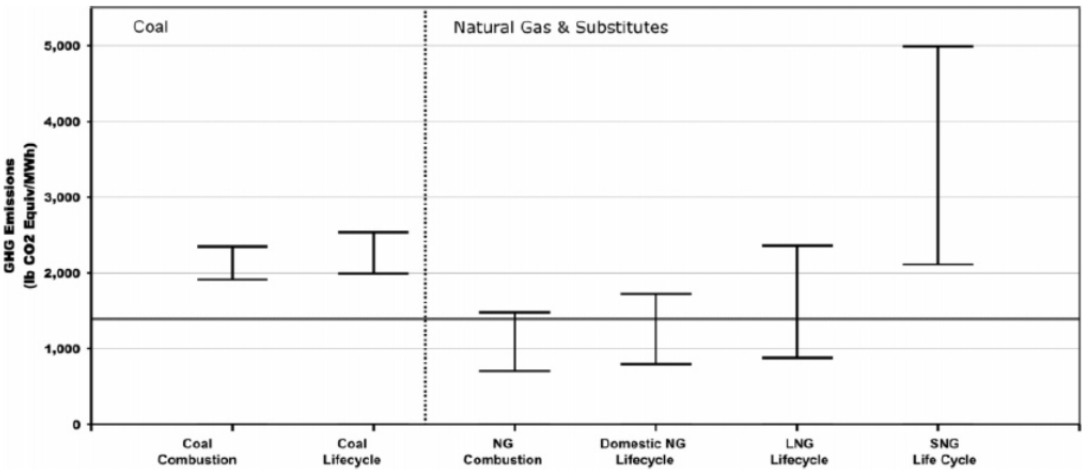
[147] International Energy Agency, *Golden Rules for a Golden Age of Gas*, Ch. 2 p. 91 (2012), attached as Exhibit 76 and available at http://www.iea.org/publications/freepublications/publication/WEO2012_GoldenRulesReport.pdf

[148] *Id.* at 80.

[149] Paulina Jaramillo, W. Michael Griffin, H. Scott Matthews, Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation, 41 Environ. Sci. Technol. 6,290 (2007) (Jaramillo 2007). Available at http://www.ce.cmu.edu/~gdrg/readings/2007/09/13/Jaramillo_ComparativeLCACoalNG.pdf, and attached as
Exhibit 77. The supporting information for this article is available at http://pubs.acs.org/doi/suppl/10.1021/es063031o/suppl_file/

Emissions from liquefaction, transportation and gasification mean that LNG is significantly worse than domestic natural gas in terms of greenhouse gas emissions. For perspective, natural gas *combustion* emits roughly 120 pounds of CO_2e per MMBtu. *See, e.g.*, Jaramillo Supporting Info at 9. Using the above conservative figures, the process of liquefying, transporting, and regasifying LNG accordingly emits 19% to 23% of the CO_2e emitted by natural gas combustion itself—a substantial increase. Jaramillo 2007 concluded that this increase could bring LNG's lifecycle greenhouse gas emissions into parity with coal:

Figure 2: Life-Cycle Emissions of LNG, Natural Gas, and Coal in Electricity Generation[150]



Moreover, Jaramillo's analysis understates LNG's lifecycle greenhouse gas emissions, because this analysis does not reflect recent studies that have raised estimates for emissions associated with natural gas production. The Jaramillo studies were conducted prior to shale gas boom. As noted in part III.C.1.b.iii.1 above, shale gas production's methane emissions are drastically higher than those of conventional gas production. Moreover, in April 2011 (well after the Jaramillo studies were published), EPA released improved methodologies for estimating fugitive methane emissions from all natural gas systems (unconventional and otherwise), which lead to higher estimates. EPA, *Inventory*

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es063031osi20070516_042542.pdf, and attached as Exhibit 78 ("Jaramillo Supporting Information"). An earlier, related report with some additional information is Paulina Jaramillo, W. Michael Griffin, H. Scott Matthews, *Comparative Life Cycle Carbon Emissions of LNG Versus Coal and Gas for Electricity Generation* (2005), available at http://www.ce.cmu.edu/~gdrg/readings/2005/10/12/Jaramillo_LifeCycleCarbonEmissionsFromLNG.pdf, and attached as Exhibit 79.

[150] From Jaramillo 2007 at 6,295. "SNG," in the figure, refers to synthetic natural gas made from coal.

of U.S. Greenhouse Gas Emissions And Sinks: 1990 – 2009, U.S. EPA, EPA 430-R-11-005.[151]

These recent studies estimate that aggregate domestic natural gas production releases at least 44 pounds of CO_2e per MMBtu. A report from the Worldwatch Institute and Deutsche Bank summarizes much of the recent work.[152] Specifically, the Worldwatch Report synthesizes three other reports that used "bottom-up" methodologies to estimate natural gas production emissions, prepared by Dr. Robert Howarth et al., of Cornell,[153] Mohan Jiang et al. of Carnegie-Mellon,[154] and Timothy Skone of NETL.[155] The Worldwatch Report separately derived a "top-down" estimate, which produced a result similar to the NETL estimate. Worldwatch Report at 9. These various assessments are summarized in the following chart.

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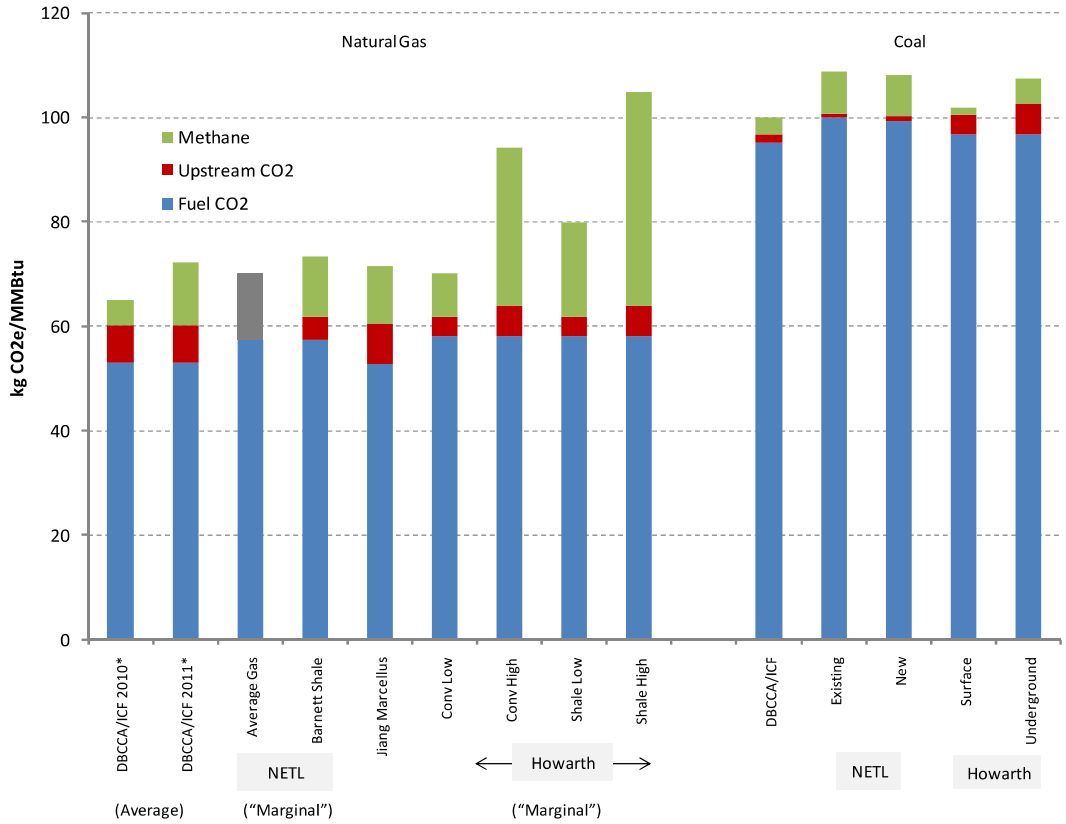
[151] Attached as Exhibit 80. The executive summary to this document is Exhibit 81.
[152] Mark Fulton *et al.*, *Comparing Life-Cycle Greenhouse Gas Emissions from Natural Gas and Coal* (Aug. 25, 2011) ("Worldwatch Report"), attached as Exhibit 82.
[153] Robert W. Howarth *et al*., *Methane and the greenhouse-gas footprint of natural gas from shale formations*, Climactic Change (Mar. 2011), attached as Exhibit 83.
[154] Mohan Jiang *et al.*, *Life cycle greenhouse gas emissions of Marcellus shale gas*, Environ. Res. Letters 6 (Aug. 2011), attached as Exhibit 84.
[155] Timothy J. Skone, *Life Cycle Greenhouse Gas Analysis of Natural Gas Extraction and Delivery in the United States*, Presentation to Cornell (May 12, 2011), attached as Exhibit 85. NETL has also put out a fuller version of this analysis. *See also* Timothy J. Skone, *Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production* (Oct. 24, 2011), attached as Exhibit 86.

Figure 3: Comparison of Recent Life-Cycle Assessments[156]



Source: DBCCA Analysis 2011; NETL 2011; Jiang 2011; Howarth 2011. Note: NETL Average Gas study includes bar shaded grey due to inability to segregate upstream CO2 and methane values, which were both accounted for in the study. See page 10 for more information. *2011 EPA methodology compared to 2010.

As this figure demonstrates, although the 2011 studies differ, they all estimate production greenhouse gas emissions (combined methane and "upstream CO_2") in a similar range. Synthesizing these studies, the Worldwatch Report estimated normalized life-cycle GHG emissions from domestic natural gas production (i.e., excluding liquefaction, transport, and gasification of LNG) at approximately 20.1 kilograms, or over 44 pounds, of CO_2e/MMBtu. Worldwatch Report at 15 Ex. 8. Some studies estimate that production emissions are significantly higher.

Jaramillo used production emission estimates that are much lower than those produced by the more recent studies, and using the recent and higher figures appears to erode what little climate advantage Jaramillo found LNG to have over coal. Jaramillo used estimates of 15.3 to 20.1 pounds CO_2e/ MMBtu, *i.e.*, estimates that were *at least* 24 pounds lower than the 2011 studies'. Jaramillo Supporting Information at 8. Jamarillo estimated total life-cycle emissions for LNG at 149.6 to 192.3 lbs CO_2e/MMBtu. *Id.* Simply increasing these life-cycle estimates by 24 lbs CO_2e represents a 12% to 16%

[156] Worldwatch Report at 3.

increase in total emissions. This increase substantially erodes any climate advantage LNG-fired electricity generation may have over coal-fired generation.

Finally, any LNG exported from Oregon LNG will likely have life cycle emissions that are even higher than the above estimates. The above studies generally estimate gas production emissions in aggregate, mixing conventional gas extraction with unconventional sources such as shale gas. As noted above, the EIA Export Study predicts that extraction induced by exports will overwhelmingly be from shale gas sources, EIA Export Study at 11, and shale gas has higher production emissions than conventional sources.[157] This fact highlights the need for a thorough study regarding the indirect and cumulative impacts of export prior to any DOE/FE authorization. Further study is similarly needed to combine the analysis of export on fuel switching domestically with life-cycle emissions of LNG exports. Nonetheless, using even the more conservative estimates in the existing record, it is unlikely LNG export will reduce global greenhouse gas emissions.

2. **The Economic Benefits Oregon LNG Predicts are Uncertain and Overstated**

Oregon LNG claims that construction of the terminal and associated pipeline will deliver over $800 million in annual economic benefit during the construction period, followed by $100 million in annual benefit during operation of the project. Application at 5.

These predictions, however, rest on a flawed analysis that overstates the number and quality of jobs created. Oregon LNG's arguments relating to job creation and economic benefit all rest on predictions made using IMPLAN modeling software. *See, e.g.*, Application at Appendix C page 11. To use IMPLAN or any other input-output model, the user inputs a description of economic activity in a given set of economic sectors, and the model responds by tracing this spending through the economy. Specifically, the model uses accounting tables to track how the initial expenditure will flow through various industrial sectors and then uses local multipliers to estimate how this allocation will alter employment decisions.

IMPLAN, like input-output models generally, suffers from numerous significant limitations that lead it to drastically overestimates economic benefits. A recent study by Amanda Weinstein and Dr. Mark Partridge, of Ohio State University, explains why many of these limitations matter. *See* Amanda Weinstein and Mark D. Partridge, *The Economic Value of Shale Natural Gas in Ohio*, OHIO STATE UNIVERSITY, Swank Program in Rural-Urban Policy Summary and Report (December 2010) ("*Ohio Study*").[158] Further

[157] EPA recently estimated methane emissions from a conventional well completion at only 0.80 tons, while completion of a hydraulically fractured well yielded 158.55 tons of methane. *See* O&G NSPS TSD at 4-7 (Table 4-2).
[158] Attached as Exhibit 87.

limitations are discussed by David Kay, *The Economic Impacts of Marcellus Shale Gas Drilling: What Have We Learned? What are the Limitations?* (Apr. 2011).[159]

First, input-output models do not consider counterfactuals and foregone opportunities. They map the consequences of a particular expenditure, rather than asking how the economy might have grown had investors and regulators made different choices. Nor do they consider how the particular choice at issue might displace other economic activity. The absence of a counter-factual is at the core of the Ohio Study's critique. *Id.* at 11. Specifically, input-output models "do not include various displacement effects and do not reflect the true counterfactual of comparing what would have happened *without*" the activity in question. *Id.* (emphasis in original). Looking at the particular case of input-output models of oil and natural gas drilling, the Ohio Study explains that these omitted factors include "higher local wages and land costs, *which reduce employment that would have occurred elsewhere in the economy*. Likewise, the environmental effects may reduce activity in the tourism sector and other residents may not want to live near such degrading activity." *Id.* (emphasis added).

Second, input-output studies may not reflect actual spending patterns, as the Ohio Study explains. *Id.* at 14-15. For example, construction employees may choose to save their money (which may be prudent in light of the temporary nature of facility construction work) rather than to spend it. *Id.*

Third, input-output models are static, providing a series of one-year snapshots. Thus, input-output models measure "job-years" but not jobs held year to year. As the Ohio Study explains, "impact studies do not produce continuous employment numbers. If an impact study says there are 200,000 jobs, this does not mean 200,000 workers are continuously employed on a permanent basis. . . . [W]hile the public is likely more interested in continuous ongoing employment effects, impact studies are producing total numbers of supported jobs that occur in a more piecemeal fashion." Ohio Study at 11.

Fourth, input-output models cannot determine how many jobs are *created*. The model identifies the number of jobs *supported* by the predicted spending. *Id.* Job support cannot be treated as job creation without consideration of a counterfactual, however, because absent a counterfactual, it is impossible to determine whether the job would have existed without the project under consideration. *Id.*

Fifth, as a result of the above limitations, input models are not readily able to "evaluate economic circumstances in which the change in the economy has been or will be rapid and large," or to deal with the complicated series of individual choices and community disruptions (including the displacement of existing economic activity) occasioned by the

[159] Attached as Exhibit 88.

boom. David Kay, *The Economic Impacts of Marcellus Shale Gas Drilling: What Have We Learned? What are the Limitations?*, 5-6, 22-30 (Apr. 2011).[160] Input output models struggle, particularly, to map these distributional effects, where some prosper while others suffer, and, more generally, is not designed to chart the long-term effects of such major dislocations. *See id.* at 22-30.

In summary, input-output model result should be seen as estimates of solely the effects of increased expenditures on a particular project (here, gas exports and production), and limited and overly-optimistic ones at that, rather than as a reliable comparison of how the economy would fare with and without gas exports. The NGA's "public interest" test requires DOE/FE to determine whether the country would be better off with Oregon LNG's proposal than without it. Input-output -based analyses cannot answer this question, but these are the only analyses Oregon LNG offers.

3. **DOE/FE Cannot Rationally Approve Oregon LNG's Export Plan On the Record Before It**

The NGA, and subsequent DOE delegation orders and regulations, charge DOE/FE with determining whether or not a gas export application is in the public interest. *See, e.g.* 15 U.S.C. § 717b(a). DOE/FE must make this decision on the record before it. This means that, regardless of DOE/FE's decision to presume, initially, that an application should be granted, this presumption does not, and cannot, absolve DOE/FE of its duty to make its *own* determination. *Panhandle Producers and Royalty Owners Ass'n*, 822 F.2d at 1110-1111. Simply put, "the *agency* must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n of the United States v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (emphasis supplied). DOE/FE cannot rationally find for Oregon LNG on the record in this case.

As we have demonstrated, record support for Oregon LNG's claimed benefits is extraordinarily thin. Oregon LNG has submitted input-output model derived argument of economic benefit, but the underlying model does not show whether the economy would improve *more* without Oregon LNG proposal than it would without it. Oregon LNG further argues that export will not cause significant gas price increases, but this argument is contradicted by the *EIA Export Study* that DOE/FE itself commissioned.

Sierra Club and Riverkeeper, on the other hand, have shown that the gas and electricity price increases associated with exports will add billions of dollars in costs to the consumers. These costs will propagate through the economy, retarding growth. We have also shown that the economic benefits, if any, associated with gas production increases may actually do long-term damage to the U.S. economy by plunging large

[160] *See* Exhibit 88.

regions of the country into a boom-and-bust extractive cycle. Further, we have shown that gas extraction and export have major environmental (and, hence, additional economic) costs, which Oregon LNG has failed to even acknowledge.

On this record, DOE/FE cannot approve export. Were it do so, it would be violating basic norms of agency record rulemaking, as well as its own rules. *See, e.g.*, 5 U.S.C. § 706; 10 C.F.R. § 590.404 (requiring DOE/FE to base its final opinion "solely on the official record of the proceeding" and to impose terms "as may be required by the public interest" after record review).

D. If DOE/FE Does Move Forward, It Must Impose Rigorous Monitoring Conditions

If DOE/FE nonetheless approves Oregon LNG's application, it must recognize its continuing duty to protect the public interest, as it explained in its *Sabine Pass* decision. This duty is of crucial importance in the context of LNG export, where circumstances are rapidly changing. DOE/FE therefore announced its intention to monitor environmental, economic, and other relevant considerations. *Sabine Pass* at 31-33. Such a monitoring provision must be imposed here, as well, but must be significantly expanded.

Specifically, although *Sabine Pass* announces an intention to monitor many different considerations, it most clearly states that the agency will act if there is a "reduction in the supply of natural gas needed to meet essential domestic needs." *Id.* at 32. This consideration is undoubtedly of great importance, but it is not the only way in which changing circumstances could imperil the public interest.

On the contrary, as we have demonstrated at length in these comments, there is strong evidence that the public interest will be impaired by gas exports. These impairments include (1) regional and national economic dislocations and disruptions caused by natural gas extraction, including by the industry's boom-and-bust cycle, (2) national increases in gas and electricity prices and resulting shifts to more polluting fuels, (3) and environmental impacts of many sorts. Any one of these categories of interests could be impaired by gas export. DOE/FE must therefore state that it will monitor each of these areas, providing specific monitoring terms and thresholds which will trigger agency actions of various types, ranging from further study through reductions in export volume or changes in timing to a revocation of DOE/FE's approval.[161]

If DOE/FE fails to include such provisions in any final approval, it will fail to fulfill its "continuing duty to protect the public interest," *id.* at 31, and so violate the Natural Gas Act. Because neither Oregon LNG nor DOE/FE have described or proposed such terms,

[161] Providing a clear monitoring plan of this sort will also benefit Jordan Cove, which will be better able to determine when and how DOE/FE may act, improving the company's ability to plan its actions and investments.

Sierra Club and Riverkeeper also protest this application to the extent that DOE/FE fails to develop adequate monitoring terms of the sort we have described.

IV. Conclusion

Sierra Club and Riverkeeper therefore move to intervene, offer the above comments, and protest Oregon LNG's export proposal for the reasons described above. Oregon LNG's application is not consistent with the public interest and must be denied.

Respectfully submitted,

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UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
	)	**FE DOCKET NO. 12-77-LNG**
LNG Development Company, LLC	)	
(d/b/a Oregon LNG)	)	

VERIFICATION

SAN FRANCISCO	§
	§
CALIFORNIA	§

Pursuant to C.F.R. §590.103(b), Nathan Matthews, being duly sworn, affirms that he is authorized to execute this verification, that he has read the foregoing document, and that facts stated herein are true and correct to the best of his knowledge, information, and belief.

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Email: Nathan.matthews@sierraclub.org

Subscribed and sworn to before me this 6 day of November, 2012.

Notary Public

NICHOLAS JAMES LIFE
Commission # 1951418
Notary Public - California
San Francisco County
My Comm. Expires Sep 9, 2015

My commission expires: 09/09/2015

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
	)	**FE DOCKET NO. 12-77-LNG**
LNG Development Company, LLC	)	
(d/b/a Oregon LNG)	)	

CERTIFIED STATEMENT OF AUTHORIZED REPRESENTATIVE

Pursuant to C.F.R. § 590.103(b), I, Nathan Matthews, hereby certify that I am a duly authorized representative of the Sierra Club and Columbia Riverkeeper, and that I am authorized to sign and file with the Department of Energy, Office of Fossil Energy, on behalf of the Sierra Club and Columbia Riverkeeper, the foregoing documents and in the above captioned proceeding.

Dated at San Francisco, CA, this 6th day of November, 2012.

Nathan Matthews
Associate Attorney
Sierra Club Environmental Law Program
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San Francisco, CA 94105
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Fax: (415) 977-5793
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UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	**)**	
	)	**FE DOCKET NO. 12-77-LNG**
LNG Development Company, LLC	**)**	
(d/b/a Oregon LNG)	**)**	

CERTIFICATE OF SERVICE

I hereby certify that I caused the above documents to be served on the applicant and all others parties in this docket, in accordance with 10 C.F.R. § 590.107, on November 6, 2012.

Dated at San Francisco, CA, this 6th day of November, 2012.

_____

Nathan Matthews
Associate Attorney
Sierra Club Environmental Law Program
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