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UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
	)	**FE DOCKET NO. 11-161-LNG**
Freeport LNG Expansion, L.P. &	)	
FLNG Liquefaction, LLC	)	

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

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Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC (collectively, "FLEX") request authorization to export up to 1.4 billion cubic feet per day (bcf/d) of natural gas as liquefied natural gas ("LNG") from an existing LNG import terminal near Freeport, Texas. This proposal is inconsistent with the public interest, and, in any event, cannot move forward without extensive environmental and economic analyses that FLEX has not provided to the Department of Energy Office of Fossil Energy ("DOE/FE").

FLEX argues that exports from Freeport would be in the public interest in significant part because they would support increased domestic production of natural gas. Perhaps so, but FLEX offers no meaningful analysis of the significant environmental and economic dislocations associated with the shale gas boom that it claims its facility would enhance. DOE/FE cannot authorize exports without fairly weighing these impacts. *See, e.g.*, *Udall v. Federal Power Comm'n*, 387 U.S. 428, 450 (1967). If it did so, it would have to conclude that the export project should not be authorized.

Because Sierra Club'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, Sierra Club therefore moves to intervene in this proceeding and protests FLEX's application.

I. Sierra Club Should be Granted Intervention

Sierra Club members live and work throughout the area that will be affected by the FLEX export plan, including in the regions adjacent to the Freeport facility and in regions near the pipelines and gas fields necessary to supply the plant. Sierra Club members everywhere will also be affected by increased gas prices which would be caused by the plan. As of April 2012, Sierra Club had 22,412 members in Texas and 608,095 members

overall. Declaration of Yolanda Fortuna at ¶ 7.[1] To protect its members' interests, Sierra Club therefore moves to intervene in this proceeding, pursuant to 10 C.F.R. § 590.303(b).

Consistent with that rule, Sierra Club states that its "asserted rights and interests," in this matter include, but are not limited to, its interests in the following:

- The economic impacts of any gas exports from the FLEX facility, whether individually or in concert with exports from other such facilities, including the consequences of price changes upon its 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 fossil fuels, Sierra Club's interests in this proceeding are directly implicated.
- The environmental consequences of any gas exports from the FLEX 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 exports, including 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 environmental and economic consequences of the proposed FLEX export facilities themselves, whether considered by FERC or by DOE/FE, and the implications of such facility construction on the communities and ecosystems surrounding those facilities.
- The public disclosure, in National Environmental Protection Act and other documents, of all environmental, cultural, social, and economic consequences of FLEX's proposal, and of all alternatives to that proposal.

Sierra Club has 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 Natural Gas Reform campaign,

[1] Attached as Exhibit 1.

are dedicated towards promoting a swift transition away from fossil fuels and to reducing the impacts of any remaining natural gas extraction.

Finally, Sierra Club members will be directly affected by the export project in many ways. Members living in and around drilling sites in the Marcellus Shale and other shale plays, who will, according to FLEX, see drilling activity continue and intensify in part due to the export project. Gas production brings major industrial activity to previously rural sites, fragmenting formerly intact forests and fields, and can and has caused serious air and water pollution problems, loud noises, foul odors, and crushing traffic on small roads, among many other harms, discussed below. Members living near the facility itself will have to contend with the pollution and nuisance caused by export operations. And members throughout the country will be burdened by higher gas prices and increased climate change harms caused by project. In short, Sierra Club's members have a vital economic, aesthetic, spiritual, personal, and professional in the project.

Thus, although 10 C.F.R. § 590.303 states no particular standard for intervention, Sierra Club's interests in this proceeding would be sufficient to support intervention on any standard. Its motion must be granted.[2]

II. Service

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

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

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

DOE cannot approve this application under the Natural Gas Act for the reasons set out below. Sierra Club therefore files this protest pursuant to 10 C.F.R. § 590.304.

A. Legal Standard

DOE/FE has significant substantive and procedural obligations to fulfill before it can authorize FLEX'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 require DOE to deny export authorization in this case.

1. Natural Gas Act

Pursuant to the Natural Gas Act and subsequent delegation orders, DOE/FE must determine whether FLEX'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] As FLEX acknowledges, the public interest determination must include evaluation of 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 hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.

15 U.S.C. § 717b(a).[4]

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[3] The Natural Gas Act separately provides that DOE/FE must approve exports to nations which have signed a free trade agreement requiring national treatment for trade in natural gas "without modification or delay." 15 U.S.C. § 717b. DOE/FE has approved two such applications for the FLEX facility. *See* DOE/FE Order Nos. 2986, 3066.

[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.

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. § 17b 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 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," including 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

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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).

[6] Attached as Exhibit 2.

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]

Finally, FLEX's application acknowledges that the public interest determination includes environmental impacts. In discussing the public interest, FLEX cites various purported environmental benefits, including effects on greenhouse gas emissions. FLEX Application at 16-17, 35. Although Sierra Club disputes FLEX's environmental assessment, it agrees on the broader principle that environmental issues weigh on the public interest determination.

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 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

[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).

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.

The NEPA procedures require the agency to prepare an Environmental Impact Statement ("EIS") where a proposed major federal action would "significantly affect[] the quality of the human environment." 42 U.S.C. § 4332(C). The "significance" of effects is determined by both the context and intensity of the proposed action. 40 C.F.R. § 1508.27. If there is a "substantial question" as to the severity of impacts, an EIS must be prepared. *See Klamath Siskiyou Wildlands Center v. Boody*, 468 F.3d 549, 561-62 (9th Cir. 2006) (holding that the "substantial question" test sets a "low standard" for plaintiffs to meet). DOE has determined 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; *see also* 40 C.F.R. § 1501.4 (discussing considerations relevant to whether to prepare an EIS). If it not clear that a proposal will "significantly" affect the environment, the agency may prepare an "environmental assessment" ("EA") to determine whether an EIS is necessary. 40 C.F.R. § 1508.9.

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 Freeport 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*, - F.3d -, 2011 WL 6826409 at * 5 (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 this possibility. As we later discuss, such an EIS is appropriate here.

Finally, and critically, 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.

The Natural Gas Act designated the old Federal Power Commission as the "lead agency" for NEPA purposes. 15 U.S.C. § 717n. 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 in a valid EIS. Thus DOE/FE cannot approve FLEX's project on the basis of an EIS, or other NEPA document, that considers only the impacts of facility siting which are in FERC's jurisdiction.

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 FLEX 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 FLEX's export proposal will increase gas production activities nationwide. Thus, DOE/FE must consider not just the effects of the project at the Freeport site (although it must at least do that, as endangered tiger beetles, among other species, inhabit the plant site), but the effects of increased gas production across the full region the plant affects.

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, 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 FLEX'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 FLEX's proposal extends to the entire area in which it will increase gas production. Thus, to approve FLEX'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 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 meets that test, because the Club and its members are interested in preserving intact historic landscapes, for their ecological and social value, and reside through the regions affected by the FLEX proposal. Its 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 must therefore be given consulting party status under the NHPA for this application.

B. DOE/FE Cannot Consider FLEX's Prior Application Separately from The Present Application

This proceeding concerns FLEX's second of two applications for export to non-free trade agreement countries. Both applications seek to export LNG from the existing LNG import terminal on Quintana Island near Freeport, Texas. The first application was filed on December 17, 2010, under DOE/FE Docket 10-161. The second application was filed

December 19, 2011. Each application seeks authority to export 1.4 bcf/d of LNG, for a total of 2.8 bcf/d.[8]

For all pertinent analyses, DOE/FE should consider these applications jointly. The cover letter to FLEX's second application asserts that the two applications are separate, and that the second application should not "delay . . . or adversely affect the public interest analysis" for the initial application. It is clear, however, that the two are interrelated projects. The public will experience the effects on domestic gas supply, pricing, and production jointly. Presumably FLEX will experience economies of scale and other economic benefits from the two combined projects. Insofar as these increase the profitability of each application, each phase is more likely to be completed if the other is also approved.

Accordingly, DOE/FE should consider the two proposals jointly for all purposes, and DOE/FE should reject FLEX's request to evaluate the prior application without reference to FLEX's subsequently-disclosed plans to double the volume of exports.

C. The FLEX Project Is Inconsistent With The Public Interest

FLEX's proposal is inconsistent with the public interest because it will induce significant environmental and economic harm that outweighs the proposal's benefits. The proposal will induce extensive additional natural gas extraction, primarily from shale gas sources. This extra production will have air, water, and other environmental impacts, but will deliver far fewer economic benefits than FLEX asserts. The proposal will also increase domestic gas prices, causing environmentally harmful increases in coal-fired electricity production, increased prices for domestic consumers, and harm to manufacturing industries and the jobs they support. Finally, FLEX's assertion of environmental benefits are overstated, because FLEX fails to take into account the lifecycle emissions of natural gas.

1. DOE/FE Must Not Evaluate The Public Interest Until Pending DOE/FE Studies Are Complete

As a threshold matter, DOE/FE should not evaluate the public interest until its pending systemic studies of LNG exports is complete and the public has had an opportunity to comment on this study. As part of this study, DOE/FE has commissioned two reports. First, DOE/FE requested that the Energy Information Administration ("EIA") analyze "the

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8 http://www.fossil.energy.gov/programs/gasregulation/LNG_Summary_Table_3_23_12.2.pdf

impacts of increased domestic natural gas demand, as exports." EIA, *Effect of Increased Natural Gas Exports on Domestic Energy Markets* ("*EIA Study*"), p.1 (Jan. 19, 2012).[9] This study predicts price increases from all gas export scenarios, economically impact residential and industrial users and causing environmental harm by causing 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 stated that it has commissioned a second study that will consider these impacts. This statement was made in response to an inquiry from Representative Edward J. Markey, Christopher Smith, DOE Deputy Assistant Secretary for Oil and Natural Gas, wrote in a letter dated February 24, 2012.[10] DOE further stated that it would not grant final authorization to any pending export application until review of these studies was complete. *Id.*

DOE/FE must honor this commitment with respect to the FLEX applications. Moreover, because the forthcoming study will inform DOE/FE's decision, DOE/FE should not take action on the FLEX applications (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.

2. **The Project Will Have Significant Adverse Environmental Impacts Not Discussed in FLEX's Application**

FLEX's proposal would impose significant environmental costs. The proposed exports would lead to increased natural gas production, especially from unconventional resources such as shale, which will significantly harm air, water, and landscape impacts. The proposal would also lead to increased domestic gas prices, which will increase domestic coal use and consequent air and water pollution. Each of these environmental harms translates 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

[9] Attached as Exhibit 3.

[10] 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*"), (Appendix 1 at 3), Attached as Exhibit 4, available at http://democrats.naturalresources.house.gov/sites/democrats.naturalresources.house.gov/files/content/files/2012-03-01__RPT_NGReport.pdf

impacts in and of themselves and monetize them to weigh them against other economic harms in the public interest analysis.

a. The Project Will Harm The Environment by Inducing Further Natural Gas Production, Especially Shale Gas 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. These impacts were recently highlighted by a Subcommittee of the DOE's Secretary of Energy's Advisory Board, which identified "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.[11] These risks are discussed in greater detail below. 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.

LNG exports will induce further gas production, primarily from shale gas. The *EIA Study* concluded that across all modeled export scenarios, "[n]atural gas markets in the United States [would] balance in response to increased natural gas exports largely through increased natural gas production." EIA, *Effect of Increased Natural Gas Exports on Domestic Energy Markets* ("*EIA Study*"), p.6 (Jan. 2012).[12] 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. *Id.* at 11.

Indeed, FLEX's application is premised on inducement of further shale gas extraction. FLEX asserts that exports will induce additional extraction. FLEX Application at 15, 16, 20, 28-29. FLEX asserts that additional production will largely come from shale gas sources. Id. at 10, 31. The predicted increase is not confined to Texas or the Gulf, but includes shale gas nationwide. Id. at 21-22, 24. Sierra Club agrees that export will induce additional gas extraction, especially shale gas extraction, although Sierra Club disagrees with FLEX's assertions regarding the benefits of this increase, as explained below.

Although FLEX's application is premised on an increase in natural gas extraction, and shale gas extraction in particular, FLEX has not even acknowledged the environmental consequences of such extraction.

[11] Attached as Exhibit 5. The Board's First 90-Day Report is attached as Exhibit 6.
[12] See Exhibit 3.

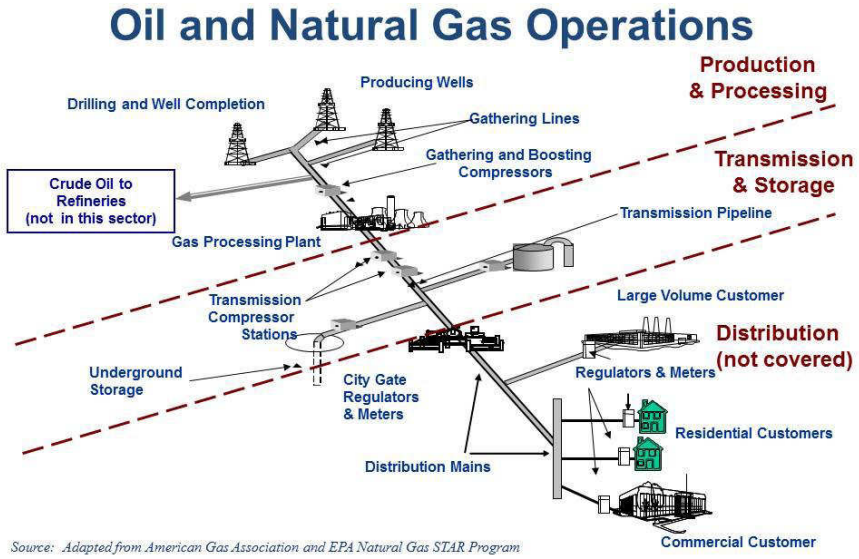
i. Natural Gas Production is a Major Source of Air Pollution

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 is moving to correct some of these problems with new air regulations, to be finalized this April, but as we later discuss, these standards will not fully address the problem. DOE/FE must therefore consider the air pollution impacts of increased natural gas production even if EPA's rules are finalized.

1. Air Pollution Problems from Natural Gas

Oil and gas operations emit methane (CH4), volatile organic compounds (VOCs), nitrogen oxides (NOx), sulfur dioxide (SO2), hydrogen sulfide (H2S), and particulate matter (PM10 and PM2.5). 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.[13] 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



[13] 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 7.

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."[14] The industry is responsible for over 40% of total U.S. methane emissions.[15] 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 the global warming potential of carbon dioxide over a 20-year time frame.[16] The oil and gas production industry's methane emissions amount to 5% of all carbon dioxide equivalent (CO_2e) emissions in the country.[17]

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.[18] The impacts of climate change caused by methane and other 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."[19] 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.[20] More frequent heat waves as a result of global warming have already affected public

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[14] 76 Fed. Reg. 52,738, 52,792 (Aug. 23, 2011) (EPA proposed air rules for oil and gas production sector), attached as Exhibit 8.
[15] *Id.* at 52,791–92.
[16] *IPCC 2007—The Physical Science Basi*s, Section 2.10.2, and *IPCC 2007- Summary for Policymakers*, attached as Exhibit 9. 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.
[17] 76 Fed. Reg. 52,738 at 52,791–92.
[18] 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 10.
[19] 76 Fed. Reg. at 52,791-22 (citing U.S. EPA, 2011 U.S. GREENHOUSE GAS INVENTORY REPORT EXECUTIVE SUMMARY (2011), http://www.epa.gov/climateexchange/emissions/downloads11/US-GHGInventory-2011-Executive Summary.pdf) attached as Exhibit 11).
[20] *Id.* at 66,532–33.

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.[21] Vulnerable populations—such as children, the elderly, and those with existing health problems—are the most at risk from these threats.

Methane also reacts in the atmosphere to form ozone.[22] As we discuss below, 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.[23] VOCs are emitted from well drilling and completions, compressors, pneumatic devices, storage tanks, processing plants, and fugitives from production and transmission.[24] The primary sources of NO_x are compressor engines, turbines, and other engines used in drilling and hydraulic fracturing.[25] NO_x is also produced when gas is flared or used for heating.[26] 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.[27] Smog may also exacerbate

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[21] EPA, *Climate Change, Health and Environmental Effects*, *available at* http://epa.gov/climatechange/effects/health.html, attached hereto as Exhibit 12.

[22] 76 Fed. Reg. at 52,791.

[23] 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 hereto as Exhibit 13.

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

[25] 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).

[26] 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 http://www.cdphe.state.co.us/ap/RegionalHaze/AppendixD/4-FactorHeaterTreaters07JAN2011FINAL.pdf.

[27] RIA at 4-25; 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 14.

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.[28]

Significant ozone pollution also damages plants and ecosystems.[29] 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.[30]

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.[31] Of the nine counties surrounding the Dallas Forth Worth area that EPA has designated as "nonattainment" for ozone, five contain significant oil and gas development.[32] 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.[33]

Oil and gas development has also brought serious ozone pollution problems to rural areas, such as western Wyoming.[34] On March 12, 2009, the governor of Wyoming recommended that the state designate Wyoming's Upper Green River Basin as an ozone

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[28] *See* EPA, *Ground-Level Ozone, Health Effects*, *available at* http://www.epa.gov/glo/health.html attached hereto as Exhibit 15. EPA, Nitrogen Dioxide, Health, available at http://www.epa.gov/air/nitrogenoxides/health.html, attached hereto as Exhibit 16.

[29] RIA at 4-26.

[30] *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 hereto as Exhibit 17.

[31] Texas Railroad Commission, http://www.rrc.state.tx.us/data/fielddata/barnettshale.pdf (Accessed Nov. 21, 2011), attached hereto as Exhibit 18.

[32] Barnett Shale Report at 1, 3.

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

[34] 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 hereto as Exhibit 19.

nonattainment area.[35] 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."[36] 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.[37] Residents have faced repeated warnings regarding elevated ozone levels and the resulting risks of going outside.[38]

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

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[35] *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 hereto as Exhibit 20; 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 hereto as Exhibit 21.

[36] Wyoming Nonattainment Analysis at viii.

[37] EPA, *Daily Ozone AQI Levels in 2011 for Sublette County, Wyoming*, *available at* http://www.epa.gov/cgi-bin/broker?msaorcountyName=countycode&msaorcountyValue=56035&poll=44201&county=56035&msa=-1&sy=2011&flag=Y&_debug=2&_service=data&_program=dataprog.trend_tile_dm.sas, attached hereto as Exhibit 22.; *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 hereto as Exhibit 23.

[38] *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 hereto as Exhibit 24; 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 hereto as Exhibit 25.

standard.[39] 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.[40] 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.[41]

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.[42] Moreover, significant additional drilling has occurred since 2008. Colorado is now home to more than 46,000 wells.[43] 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.[44] This pollution is taking a toll on residents of San Juan

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[39] 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?pagewanted=1 (last visited Sept. 28, 2011), attached hereto as Exhibit 26.

[40] *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 hereto as Exhibit 27.

[41] 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 hereto as Exhibit 28.

[42] 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 hereto as Exhibit 29.

[43] 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 hereto as Exhibit 30.

[44] *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 hereto as Exhibit 31.

County. The New Mexico Department of Public Health has documented increased emergency room visits associated with high ozone levels in the County.[45]

VOC and NOx 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[46] – 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.[47] These areas are all near concentrated oil and gas development in the San Juan Basin.[48]

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.[49] Experts also anticipate air quality problems associated with development of the Marcellus shale in the Mid-Atlantic region.[50] In particular, the state of Delaware has conducted an extensive analysis of NOx pollution from the oil and gas sector, in part because Delaware is downwind from the Marcellus gas plays which projects like FLEX's proposal would support.[51] It demonstrates that Delaware and other

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[45] 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 hereto as Exhibit 32.

[46] *See* 42 U.S.C. § 7472(a).

[47] 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 hereto as Exhibit 33.

[48] *Id.* at 1112.

[49] *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 hereto as Exhibit 34.

[50] Elizabeth Shogren, *Air Quality Concerns Threaten Natural Gas's Image*, National Public Radio (June 21, 2011), *available at* http://www.npr.org/2011/06/21/137197991/air-quality-concerns-threaten-natural-gas-image, attached hereto as Exhibit 35.

[51] *See* Delaware Department of Natural Resources and Environmental Quality, *Background Information Oil and Gas Sector Significant Sources of NOx Emissions* (2011) attached as Exhibit 36.

downwind states will experience significant NOx pollution if production increases without appropriate controls.

Sulfur dioxide: Oil and gas production emits sulfur dioxide, primarily from natural gas processing plants.[52] Sulfur dioxide is released as part of the sweetening process, which removes hydrogen sulfide from the gas.[53] Sulfur dioxide is also created when gas containing hydrogen sulfide (discussed below) is combusted in boilers or heaters.[54]

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.[55] PM is discussed separately below.

Hydrogen sulfide: Some natural gas contains hydrogen sulfide. When hydrogen sulfide levels are above a specific threshold, gas is classified as "sour gas."[56] According to EPA, there are 14 major areas in the U.S., found in 20 different states, where natural gas tends to be sour.[57] All told, between 15 and 20% of the natural gas in the U.S. may contain hydrogen sulfide.[58]

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[52] 76 Fed. Reg. at 52,756.
[53] TSD 3-3 to 3-5.
[54] 76 Fed. Reg. at 52,756.
[55] EPA, Sulfur Dioxide, Health, *available at* http://www.epa.gov/air/sulfurdioxide/health.html, attached hereto as Exhibit 37.
[56] 76 Fed. Reg. at 52,756. Gas is considered "sour" of hydrogen sulfide concentration is greater than 0.25 grain per 100 standard cubic feet, along with the presence of carbon dioxide. *Id.*
[57] 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"); *available at* http://nepis.epa.gov/Exe/ZyNET.exe/00002WG3.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C91thru94%5CTxt%5C00000006%5C00002WG3.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL, attached hereto as Exhibit 38.
[58] 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 hereto as Exhibit 39.

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."[59] Hydrogen sulfide may be emitted during all stages of development, including exploration, extraction, treatment and storage, transportation, and refining.[60] For example, hydrogen sulfide is emitted as a result of leaks from processing systems and from wellheads in sour gas fields.[61]

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.[62] Although hydrogen sulfide was originally included in the Clean Air Act's list of hazardous air pollutants, it was removed with industry support.[63]

Hydrogen sulfide emissions from the oil and gas industry are concerning because this pollutant may be harmful even at low concentrations.[64] 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.[65] 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.[66] 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.[67]

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

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[59] EPA Hydrogen Sulfide Report at III-35.
[60] *Id.* at ii.
[61] TSD at 2-3.
[62] EPA Hydrogen Sulfide Report at i.
[63] *See* Pub. L. 102-187 (Dec. 4, 1991). We do not concede that this approval 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.
[64] 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 hereto as Exhibit 40.
[65] EPA Hydrogen Sulfide Report at III-35.
[66] See Global Community Monitor, Gassed! Citizen Investigation of Toxic Air Pollution from Natural Gas Development, at 11-14 (July 2011), attached hereto as Exhibit 41.
[67] *Id.* at 21.

well pad and road construction. Vehicles also generate fugitive dust by traveling on access roads during drilling, completion, and production activities.[68] Diesel engines used in drilling rigs and at compressor stations are also large sources of fine PM/diesel soot emissions. VOCs are also a precursor to formation of $PM_{2.5}$.[69]

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.[70]

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.[71] PM also reduces visibility,[72] and may damage important cultural resources.[73] 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.[74]

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.[75] These elevated levels of $PM_{2.}$ have been linked to oil and gas activities in the Uinta Basin.[76] West

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[68] *See* BLM, GASCO Energy Inc. Uinta Basin Natural Gas Development Project Draft Environmental Impact Statement, at App. J at 2 (Oct. 2010) ("GASCO DEIS")
[69] RIA at 4-18.
[70] *See* EPA, Particulate Matter, Health, *available at* http://www.epa.gov/pm/health.html, attached hereto as Exhibit 42; 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.
[71] RIA at 4-19; EPA, Particulate Matter, Health
[72] EPA "Visibility – Basic Information" http://www.epa.gov/visibility/what.html, attached hereto as Exhibit 43.
[73] *See* EPA, Particulate Matter, Health West Tavaputs EIS, at 3-19; RIA at 4-24.
[74] UNEP Report at 6; IPCC (2007) at Section 2.4.4.3.
[75] GASCO DEIS at 3-12.
[76] West Tavaputs FEIS, at 3-20 (July 2010).

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.[77]

2. Recent Studies Indicate Even Greater Air Quality Impacts

The air quality risks discussed above are serious but the most recent studies available demonstrate that those risks, if anything, underestimated. These studies, based on direct monitoring of gas operations in Colorado, show actual emissions larger than those in EPA's estimates, and links unconventional gas drilling, specifically, to increased cancer risk. These serious threats to public health and the environment argue strongly against granting this application.

The first of these studies, by a consortium of researchers led by the National Ocean and Atrmospheric Administration (NOAA) Earth System Research Laboratory, monitored air quality around oil and gas fields.[78] 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.[79]

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.[80] Elevated levels of these pollutants correspond to increased cancer risks for people living within half of a mile from a well[81] – a very large population which will increase as drilling expands. Thus, the increased gas production that Freeport touts comes along with increased cancer risk in the areas where that production occurs.

In short, the more we learn about pollution associated with unconventional gas production, the worse that pollution appears to be. DOE/FE must weigh these risks as it considers this license; if it weighs them properly, it must conclude that the proposal is

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[77] *See* GASCO DEIS at 4-27.
[78] 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 44.
[79] *Id.* at 4304.
[80] 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 45.
[81] *Id.* at 2.

not in the public interest because increased production substantially threatens public health.

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

Although EPA's proposed new source performance standards and standards for hazardous air pollutants should, if finalized, reduce some of these pollution problems, they will not solve them. The rules, first, do not even address some pollutants, including NOx, methane, and hydrogen sulfide. Second, the rules do not control existing sources of air pollution (though, as proposed, they do require emissions controls at well completions of existing unconventional wells), meaning that increased use of existing infrastructure will produce emissions uncontrolled by the rules. Third, without full enforcement, the rules will not reduce emissions completely. Fourth, 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.

ii. 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 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, *see also id.* at 18.[82] 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

[82] Attached as Exhibit 46.

RDSGEIS").[83] 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 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;

- 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;

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

- 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.[84] 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).[85] These costs are not in the public interest.

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 FLEX's exports. For example, dozens of endangered and threatened species inhabit the

[84] See Exhibit 46.
[85] Attached as Exhibit 47.

Marcellus region, including in forests, streams, and coastal areas which will be affected by gas development.[86] 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.

iii. Gas Production Poses Risks to Ground and Surface Water

Hydraulic fracturing involves injecting a base fluid (typically water),[87] 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 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.

1. Water Withdrawals

The first step is the procurement of water. The precise amount of water varies by the shale formation being fracked; FLEX predicts that its export proposal will induce shale gas development in all of the country's shale gas plays. 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.[88] Fresh water constitutes 80% to 90% of the total water used a well even where

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[86] *See* Maryland DNR, *Rare, Threatened & Endangered Animals* & *Rare, Threatened & Endangered Plants* (2012), attached as Exhibit 48; Pennsylvania Game Commission, *Threatened and Endangered Species* (2012), attached as Exhibit 49. If FLEX's proposal harms any of these species, or their habitat, directly or indirectly, it will be against the public interest. DOE/FE must consider harms to all endangered and threatened species in its public interest analysis.

[87] 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.

[88] 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

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").[89]

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 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.

2. 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

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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 50 (hereafter *Comment on NY RDSGEIS*).

Water needs in other geological formations vary. See Exhibit 6 at 19 (estimating that nationwide, fracking an individual well requires between 1 and 5 million gallons of water).

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

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).[90]

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 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. Proper casing construction is an elaborate engineering effort, with multiple layers of steel casing (that have been pressure tested), centralizers to center the casing in the well bore, careful cementing of the casing strings (together with testing to ensure the integrity of this cementing). *Id.*

[90] Attached as Exhibit 52.

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).

Available 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)[91] had found bromide in wells 100s of feet above the fracked zone." *Id.* "The EPA (1987)[92] 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.[93] 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

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[91] Dr. Meyers relied on Thyne, G. 2008. *Review of Phase II Hydrogeologic Study.* Prepared for Garfield County, Colorado.

[92] 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 53.

[93] Attached as exhibit 54, available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf

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, 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).[94] 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 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).[95]

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 plans to sample water from approximately 61 home wells, and to provide alternative drinking water supplies to the four homes with the most contaminated wells in the interim. *Id.* at 6.

[94] Attached as Exhibit 55, available at http://www.epaosc.org/sites/7555/files/Dimock%20Action%20Memo%2001-19-12.PDF

[95] Attached as Exhibit 56, available at http://www.epa.gov/aboutepa/states/dimock.pdf.

3. 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 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).[96]

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*

[96] Attached as Exhibit 57, available at http://docs.nrdc.org/energy/files/ene_10091301a.pdf

Waste Disposal Well, Say Seismologists (Jan. 6, 2012).[97] 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 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).[98] 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).[99] 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).[100]

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

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[97] Attached as Exhibit 58, available at http://www.ldeo.columbia.edu/news-events/seismologists-link-ohio-earthquakes-waste-disposal-wells

[98] Attached as Exhibit 59, available at http://online.wsj.com/article/SB10001424052970203804204577013771109580352.html

[99] Attached as Exhibit 60, available at http://www.aogc.state.ar.us/Hearing%20Orders/2011/July/180A-2-2011-07.pdf

[100] This abstract is attached as Exhibit 61, and is available at http://www2.seismosoc.org/FMPro?-db=Abstract_Submission_12&-recid=224&-format=%2Fmeetings%2F2012%2Fabstracts%2Fsessionabstractdetail.html&-lay=MtgList&-find

> 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, 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).

b. The Project Will Harm The Environment by Inducing Some Domestic Electricity Generators to Switch from Gas to Coal

Separate from the effects resulting from induced natural gas production, FLEX's export proposal will increase air pollution by increasing the about of coal used for electricity production. The EIA predicts that LNG export will increase domestic natural gas prices, including potential wellhead price increases of 10 to 50%. *EIA Study* at 6, 8. As explained in part III.C.4 below, EIA's estimates are superior to those offered by FLEX. These price increases will decrease domestic consumption of natural gas, primarily in the electric power sector. *Id.* at 6. The power sector will "primarily" respond by shifting to coal-fired generation, and only secondarily to renewable sources. *Id.*, *see also id.* at 17 ("higher natural gas prices lead electric generators to burn more coal and less natural gas."). Specifically, EIA predicts that the decrease in 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. As FLEX asserts, 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. FLEX Application at 35 (citing EPA, Air Emissions,

available at http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html). Coal-fired plants also release roughly twice the carbon dioxide as gas-fired plants, *id.*, although as discussed in the following section, this combustion advantage is partially offset by the greenhouse gas emissions resulting from gas production.

The result is yet more greenhouse gas pollution. The *EIA 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 4: Cumulative CO_2 Emissions from 2015 to 2035 With Various Export Scenarios[101]

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 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.

[101] From the *EIA Study* at 19.

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.

3. **FLEX's Claimed Environmental Benefits Are Overstated or Non-existent**

FLEX's asserted environmental benefits are overstated and unsupported. FLEX's primary environmental argument is that that LNG export will benefit the environment because if importing countries burn natural gas "instead of coal and fuel oil, it will significantly reduce greenhouse gas emissions," and because gas fired power plants emit fewer traditional pollutants than coal-fired power plants. FLEX Application at 16-17, 35. FLEX offers no evidence for the underlying assumption that imported LNG will displace coal and fuel oil use. Even assuming this to be the case, FLEX's argument fails to account for emissions associated with natural gas production and with the liquefaction and transportation processes.

Considering production and combustion, rather than combustion alone, diminishes gas's advantage over coal and oil in terms of greenhouse gas emissions when used for electricity generation. We discuss the general problem of greenhouse gas emissions from gas production in part III.C.2.a.i above. Numerous studies have attempted to calculate just how much these upstream methane emissions degrade natural gas's combustion advantage over coal. Although most studies find that natural gas retains *some* advantage, that advantage is clearly diminished. One of the most recent of these studies, a report from the Worldwatch Institute and Deutsche Bank,[102] synthesizes three other reports, which were prepared by Dr. Robert Howarth et al., of Cornell,[103] Mohan Jiang et al. of Carnegie-Mellon,[104] and Timothy Skone of NETL.[105] As the figure below shows, whether viewed in absolute terms as a very large methane source, on in relative terms in the context of energy production, increased gas extraction is accompanied by increased greenhouse gas emissions.

Figure 2:

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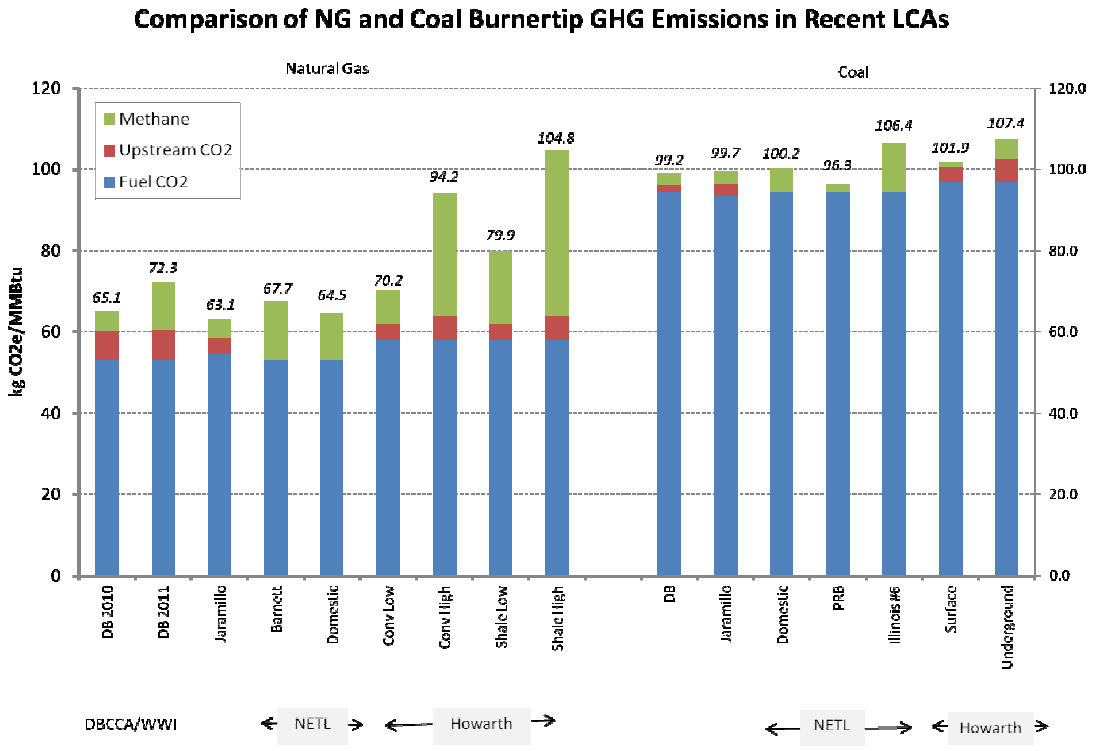
[102] Mark Fulton *et al.*, *Comparing Life-Cycle Greenhouse Gas Emissions from Natural Gas and Coal* (Aug. 25, 2011), attached as Exhibit 61.

[103] Robert W. Howarth *et al*., *Methane and the greenhouse-gas footprint of natural gas from shale formations*, Climactic Change (Mar. 2011), attached as Exhibit 62.

[104] Mohan Jiang *et al.*, *Life cycle greenhouse gas emissions of Marcellus shale gas*, Environ. Res. Letters 6 (Aug. 2011), attached as Exhibit 63.

[105] 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 64. NETL has also put out a fuller version of this analysis. *See* Timothy J. Skone, *Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production* (Oct. 24, 2011), attached as Exhibit 65.



FLEX separately asserts that gas consumption proceeds "about 25-30% less CO2 than gasoline and diesel." FLEX Application at 35. As with power plants, looking to combustion without production and transportation presents an incomplete picture. A recent study examined the climate effects of switching gasoline and diesel fueled vehicles to compressed natural gas, including the emissions from fuel production and transportation. Ramon Alvarez et al., *Greater focus needed on methane leakage from natural gas infrastructure*, Proceedings of the National Academy of Sciences, Early Edition, p. 1 of 6 (2012) (analyzing "well-to-wheels" emissions). [106] This study concluded that "CNG-fueled vehicles are not a viable mitigation strategy for climate change." *Id.* at 2. Converting gasoline-fueled cars to compressed natural gas would make the climate *worse* for 80 years; converting heavy-duty diesel vehicles to natural gas increases warming for 300 years. *Id.*

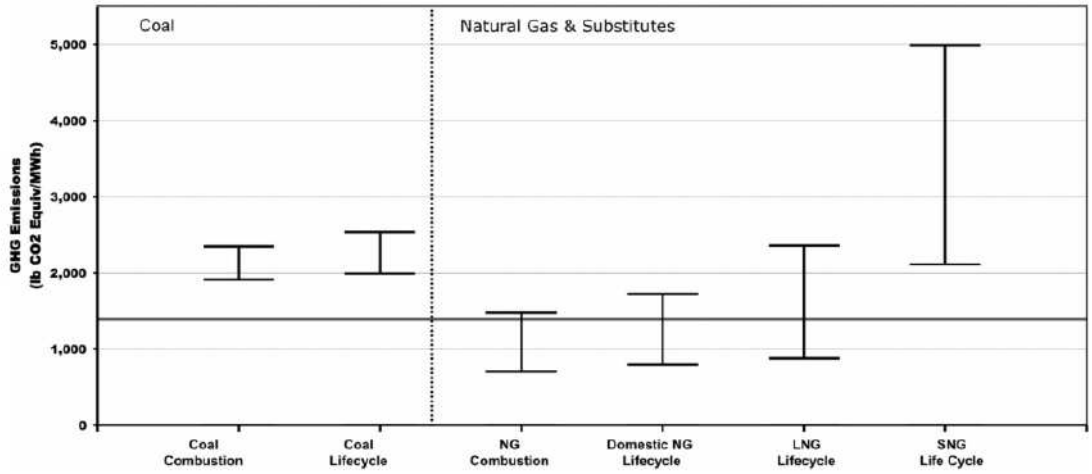
In considering these numbers, it is important to remember that greenhouse gas emissions from shale gas production are vastly higher than emissions from conventional gas production. EPA recently estimated methane emissions from a conventional well completion at only 0.76 tons, while an unconventional well completion yielded 150.6

[106] Attached as Exhibit 66, available at http://www.pnas.org/cgi/doi/10.1073/pnas.1202407109

tons of methane.[107] As noted above, EIA predicts that, averaged across all export scenarios, 72% of the additional gas production induced by export will come from shale gas. *EIA Study* at 11.

Considering liquefaction further erodes, if not eliminates, gas's advantage over coal. Because LNG requires additional energy to liquefy, transport, and then regasify, its energy and emissions lifecycle releases substantially more greenhouse pollution than that of gas generally, whether conventionally or unconventionally sourced. In fact, according to the only published lifecycle study of LNG used for electricity generation of which we are aware, these upstream emissions are sufficient to push LNG lifecycle emissions well above those of natural gas generally, and into the range of coal emissions.

Figure 3: Life-Cycle Emissions of LNG, Natural Gas, and Coal in Electricity Generation[108]



This study was conducted before EPA raised its emissions estimates for natural gas, and before unconventional gas plays boomed. Because unconventional gas already has higher emissions than conventional gas, *liquefied* unconventional gas will have higher emissions still, further erasing any daylight between LNG and coal emissions in electric power.

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[107] EPA, *Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution; Background Technical Support Document for Proposed Standards* (July 2011) at Table 4-6, attached as Exhibit 67.

[108] From Jaramillo et al., *Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation*, 41 Environ. Sci. Technol. 6,290, 6,295 (2007), attached as Exhibit 68. "SNG," in the figure, refers to synthetic natural gas made from coal.

FLEX ignores the emissions associated with natural gas production and liquefaction, and FLEX provides no support for its claim that US LNG exports will displace consumption of coal or other fuels. Accordingly, FLEX's claim that natural gas significantly reduces total greenhouse gas emissions is unsupported.

4. FLEX's Proposal Will Cause Economic Harm by Raising Domestic Gas Prices and Eliminating Domestic Jobs

The *EIA Study* predicts that LNG exports will significantly increase demand for natural gas and thereby raise domestic gas prices. *EIA 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.*; 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*").[109] These estimates are significantly higher than those provided by FLEX.[110] In assessing these impacts, DOE/FE must consider the cumulative effect of all pending export proposals. FLEX implicitly concedes this, as FLEX's discussion of price impacts does not attempt to identify impacts solely attributable to the proposed project. Even if the project is considered in isolation, however, it will likely significantly increase gas prices.

The *EIA 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 Study* at 1. Note that even the "high" case falls short of the 16.1 bcf/d of exports for which applications are presently pending before DOE/FE and FERC. [111] For perspective, note that 16.1 bcf/d is equivalent to 23% of current domestic gas production. EIA, Monthly Natural Gas Gross Production Report (Jan. 30, 2012).[112] The *EIA Study* considered the effects of these exports in the context 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. *Id.*

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[109] See Exhibit 4.

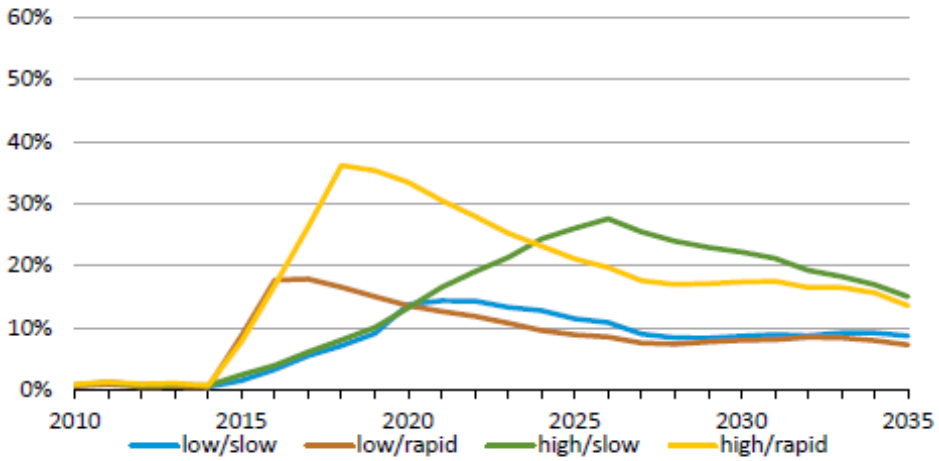
[110] Note that the EIA Study was published in January 2012, after FLEX's application was submitted.

[111] http://www.fossil.energy.gov/programs/gasregulation/LNG_Summary_Table_3_23_12.2.pdf (identifying 14.00 Bcf/d of proposals), Application of Corpus Christi Liquefaction, LLC, FERC docket PF12-3 (FERC pre-filing docket for an additional 2.1 Bcf/d exports).

[112] Attached as Exhibit 69.

EIA forecast effects of export on wellhead gas prices, on various gas consumers, and on residential electricity bills. *EIA Study* 6-16. The study summarizes its results for its four export scenarios on the reference economic case as follows:

Figure 4:[113] Natural Gas Wellhead Price Percentage Increases from the AEO 2011 Baseline Under Four Export Scenarios



Lower exports produce wellhead price increases of between 10-20% by 2020, while higher exports can push prices up by just under 40%. If shale gas supplies are more limited, the EIA projects sharper price increases – by over 50% in the high/rapid scenario. *EIA Study* at 9. The increase would presumably be greater still if the full 16.1 bcf/d of proposed export facilities are placed into operation. These wellhead price increases would significantly affect residential, commercial, industrial, and electricity generating users of natural gas. *Id.* at 11, 15. Each type of consumer would respond to increased prices by decreasing consumption. *Id.* Despite decreased consumption, each consumer type would pay a higher total gas bill. Across the 20 year period, residential consumers would face annual gas expenditure increases of 3.2% to 7.0% despite consuming less gas, using EIA's reference case and range of export scenarios. *Id.* at 15. Industrial consumers would pay 6.4% to 14.6% more annually. *Id.*

On the existing record, DOE/FE must use the EIA's estimates rather than those offered by FLEX. FLEX's estimates are drastically lower than those provided by EIA; they are even lower than those provided by other export applicants. FLEX principally relies on a study by the Deloitte Marketpoint LLC, which concludes that exporting 6 bcf/d of LNG would

[113] From the EIA Study, at 8.

average increase citygate prices by 1.7%.[114] Deloitte MarketPoint LLC and the Deloitte Center for Energy Solutions, *Made in America: The Economic Impact of LNG Exports from The United States*, (2011) ("Deloitte Study"). As noted above, EIA estimates that exporting 6 bcf/d will increase wellhead prices by 10 to 20%. *EIA Study* at 8. Another export applicant recently estimated that exporting 2.2 bcf/d would increase prices by 5-6%. Dominion Cove Point LNG, LP, *Application for Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries*, DOE/FE Docket 11-128-LNG, Ex. D at 42 (Oct. 3, 2011).[115] The reason for FLEX's low estimate is unclear. For example, FLEX's application, relying on the Deloitte Study, repeatedly emphasizes the predictability of demand generated by LNG export, asserting that producers will be able to foresee demand from LNG export terminals and increase production accordingly. FLEX Application at 20, Deloitte Study at 8. The *EIA Study* used the same assumption. *EIA Study* at 10-11. Absent a strong showing that the FLEX estimates are superior to those prepared by EIA (and by other members of industry), 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).

FLEX's proposed project will contribute to price increases, and in evaluating gas price increases, DOE/FE must consider the cumulative effect of all authorized and proposed exports. Here, FLEX has not argued that its proposed exports should be considered in isolation for purposes of this economic analysis, nor has FLEX attempted to calculate the effects specifically attributable to its proposal. 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. Therefore, 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. Nonetheless, even if FLEX's exports were considered in isolation, they would likely have a significant effect on gas prices. The Dominion Cove Point application indicated that exporting 2.7 bcf/d would raise gas prices by 5-6%; FLEX's instant application, together with the prior pending application

[114] This study appears to draw heavily from, and restate many of the conclusions of, the Altos Management Partners study submitted as Appendix B to FLEX's prior export application in DOE/FE Docket No. 10-161. *See id.* at 21 (explaining Deloitte's acquisition of Altos in 2011).

[115] Attached as Exhibit 70 and available at http://www.fossil.energy.gov/programs/gasregulation/11-128-LNG.pdf

for the same facility, seeks to export 2.8 bcf/d. Dominion Cove Point LNG, LP, *Application for Long-Term Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries*, DOE/FE Docket 11-128-LNG, Ex. D at 42 (Oct. 3, 2011). Although Dominion's analysis suffers various flaws that lead it to underestimate the impact of exports, as articulated in the Sierra Club's comment on the Dominion application, Dominion's estimate may serve as a lower bound on the impacts of the FLEX proposal.

These increases in gas prices will harm residential consumers and limit manufacturing jobs. The *EIA Study* explains that:

> Even while consuming less, on average, consumers will see an increase in their natural gas and electricity expenditures. 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 export growth cases tend to show natural gas bills increasing more towards the end of the projection period.

EIA Study at 6. 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 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. *Drill Here, Sell There, Pay More* at 9-13. 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.*

5. **The Economic Benefits FLEX Predicts are Uncertain and Overstated**

FLEX claims that its export proposal will produce billions of dollars in economic benefits and up to 21,000 jobs. FLEX Application at 29. Only "20 to 30" persons, however, will be permanently employed by the facility itself. *Id.* During the limited period in which the facility is constructed, FLEX estimates that "over 3,000 on-site design and construction

jobs" will be directly created. *Id.*[116] FLEX's economic benefit argument therefore rests on predictions both of jobs in the gas production industry and, importantly, jobs in other sectors supported by gas production activity.

These predictions of indirect benefits cannot withstand scrutiny. FLEX's argument rests entirely on analyses using the "input-output" models to calculate economic benefits, primarily IMPLAN. As we explain below, the analyses FLEX cites fail to present adequate counterfactuals (*i.e.*, to account for opportunity costs), overstate spending, and overstate the benefit of spending that does occur. Analysis of the economic effects of the shale gas boom using empirical data, rather than simplistic models, reveals that the benefits are much smaller than FLEX asserts.

a. FLEX's Economic Analysis

FLEX's economic estimates are extrapolated from other studies, all of which use input-output economic models like IMPLAN, if not IMPLAN itself. FLEX primarily rests on the "Altos Report" submitted in connection with FLEX's prior non-FTA export application. FLEX Application at 29 (citing *Freeport LNG Expansion, L.P. and FLNG Liquefaction, LLC*, DOE/FE Docket 10-161-LNG, Appendix B: THOMAS CHOI, DALE NESBITT, AND BRAD BARNDS, ANALYSIS OF FREEPORT LNG EXPORT IMPACT ON U.S. MARKETS (Atmos Management Partners, Inc. 2010)). This report's discussion of economic benefit in turn applies the results of three other studies FLEX also cites directly: Bauman, Robert H., D.E. Dismukes, D.V. Mesyanzhinov, and A.G. Pulsipher, *Analysis of the Economic Impact Associated with Oil and Gas Activities on State Leases*, LOUISIANA STATE UNIVERSITY CENTER FOR ENERGY STUDIES (2002) ("Bauman"); Snead, Marck C., *The Economic Impact of Oil and Gas Production and Drilling on the Oklahoma Economy*, OKLAHOMA STATE UNIVERSITY (2002) ("Snead"); and Considine, Timothy J., *The Economic Impacts of the Marcellus Shale: Implications for New York, Pennsylvania and West Virginia*, A REPORT TO THE AMERICAN PETROLEUM INSTITUTE (2010) ("Considine 2010"). *See* Altos Report at 12. Of these three, Considine 2010 explicitly used the IMPLAN input-output model. Considine 2010 at i, 18. Bauman and Snead used input-output models similar to IMPLAN, and may have used IMPLAN itself, although they do not specify the model used name. Bauman at 1, Snead at 10. Other studies cited by FLEX also used IMPLAN. Timothy Considine et al., *An Emerging Giant: Prospects and Economic Impacts of Developing the Marcellus Shale Natural Gas Play*, THE PENN. STATE UNIV. DEP'T OF ENERGY & MINERAL ENG'G, 18-19 (2009) ("Considine 2009");

[116] DOE/FE cannot afford the construction jobs and economic benefits much weight in its public interest determination because DOE/FE's concern is whether exports will be in the public interest, not whether facility construction would be so. Every LNG export proposal will involve construction activities; if these activities could suffice to demonstrate public benefits, every application would be approved, regardless of the merits of the exports which the construction would allow. That rubber-stamp result would violate the letter and spirit of the Natural Gas Act.

Economic Impact of the Eagle Ford Shale, UTSA Center for Community and Business Research, at 5 (Feb. 2011) ("Eagle Ford study"); National Energy Technology Laboratory, *Projecting the Economic Impact of Marcellus Shale Gas Development in West Virginia*, at 20 (2010) ("West Virginia study").

To use IMPLAN, 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. In some studies the author uses surveys to derive localized accounting tables and multipliers. *See, e.g.*, Considine 2010. In others, the author uses existing tables of general correlations between industries. *See, e.g.*, Eagle Ford Study at 5.

FLEX's analysis, drawn from the Altos Report, is even more rudimentary. The Altos report did not run an IMPLAN model. Instead, Altos looked to three prior studies to estimate a generalized "economic multiplier" of how much total spending was created by natural gas expenditures and an estimate of jobs created per $1 million spent. Altos Report at 11-12. Specifically, the Altos Report drew these figures from Bauman, Snead, and Considine 2010. The "economic multipliers" range from 1.34 to 1.9, and the "jobs created/$ million" from 6.2 to 7.7. *Id.* Predicting that 1.4 bcf/d of export would require an investment of $2.7 billion per year in gas production, the Altos Report concluded that nationwide induced gas production would lead to nearly 17,000 to nearly 21,000 jobs and $3.2 to $5.2 billion in "gross economic output." *Id.* at 11-12. Both the Altos Report and FLEX's application assume that the additional production and economic activity will be nationwide. FLEX Application at 21-22, 24.

Of the three studies the Altos Report relied on, only Considine 2010 considered shale gas extraction, and this study had the lowest estimate of job creation. Bauman and Snead were both published in 2002 and make no mention of hydraulic fracturing, horizontal drilling, or shale gas. As noted above, the majority of additional production is expected to come from shale gas reserves. Considine 2010 used the lowest job creation multiplier. Accordingly, if the Altos Report's IMPLAN-based analysis is to be used at all, only the Considine job-creation estimate should be used, of approximately 17,000 jobs rather than 21,000.

The remaining studies cited by FLEX are not used in FLEX's prediction of job creation or economic benefit. Instead, these studies are cited to support the general proposition that gas development provides economic benefit.

b. Limits in IMPLAN

IMPLAN suffers at least numberous significant limitations. A recent study by Amanda Weinstein and Dr. Mark Partridge, of Ohio State University, explains why many of these

limitations matter in the shale gas context. *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*").[117] Further limitations are discussed by David Kay, *The Economic Impacts of Marcellus Shale Gas Drilling: What Have We Learned? What are the Limitations?* (Apr. 2011).[118]

First, IMPLAN does not consider counterfactuals and foregone opportunities. It maps the consequences of a particular expenditure, rather than asking how the economy might have grown had investors and regulators made different choices. Nor does it 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. As the Ohio Study explains:

> Impact analysis [of the sort that IMPLAN conducts] is usually based on an old input-output technology that is typically not used today by economists to estimate actual economic effects. Impact studies do not include various displacement effects and do not reflect the true counterfactual of comparing what would have happened without natural gas drilling. For example, oil and natural gas drilling would lead to 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. Finally, greater natural gas employment means that there are fewer jobs in coal that would have occurred without the increase in natural gas employment.

Id. (emphasis in original).

Second, IMPLAN studies may not reflect actual spending patterns, as the Ohio Study explains. *Id.* at 14-15. For example, landowners given gas production leases may choose to save their money, rather than to spend it. *Id.* Unlike some other studies, Considine 2010 does not mention individual saving rates.

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[117] Attached as Exhibit 71. Of particular note here, many of the examples of problems the Ohio Study provides are drawn from the Considine reports FLEX relies on in its application.

[118] Attached as Exhibit 72.

Third, IMPLAN is static, providing a series of one-year snapshots. Thus, IMPLAN measures "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. For example, there are workers that do site preparation. Then there is another group who do the drilling followed by another group who maintains the well when it is in production. Finally, there is an entirely different group doing pipeline construction, and so on. So, while 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, IMPLAN 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, IMPLAN is 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 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).[119] IMPLAN struggles, 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, IMPLAN model results 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 Natural Gas Act's "public interest" test requires DOE/FE to determine whether the country would be better off with FLEX's proposal than without it. IMPLAN-based analyses cannot answer this question, but these are the only analyses FLEX offers.

[119] See Exhibit 72.

c. Empirical Analysis Reveals Much Less Economic Benefit and Offsetting Economic Harm

Available empirical data shows that the real economic effects of increasing gas production are far more limited and equivocal than FLEX claims. The Ohio Study works to describe these effects by analyzing the counterfactual that IMPLAN results lack. It begins by noting that Pennsylvania, the center of the shale gas boom, does not appear to be creating nearly as many jobs as industry claims suggest. Bureau of Labor Statistics for 2004-2010 show that *all* oil and gas sector jobs (not just those in shale gas, or those drilling new wells), increased by only about 10,000 in the state over that period. Ohio Study at 12.

The study went further, using Bureau of Economics Analysis statistics to directly compare employment and income in counties in Pennsylvania with significant Marcellus drilling and those without significant drilling, before after the boom started. As Table 1, below, shows, counties in both areas *lost* jobs during the boom (after 2005)—and, though that result is reasonable considering the economic downturn in those years, it is striking that drilling counties declined at a slightly *faster* rate in that period, though per capita income also increased more quickly in those counties.

Table 1: Comparing Pennsylvania Counties, With and Without Drilling, Over Time[120]

	Employment Growth Rate 2001-2005	**Employment Growth Rate 2005-2009**	**Income Growth Rate 2001-2005**	**Income Growth Rate 2005-2009**
Drilling Counties	1.4%	-0.6%	12.8%	18.2%
Non-Drilling Counties	5.3%	-0.4%	12.6%	13.6%

The jobs effect, in either direction, turns out to be too small to be statistically significant. *Id.* at 16. This is not a surprising pattern: Incomes likely rise thanks to lease payments to some landowners, and some degree of hiring for high-income production decisions, but extraction displaces other workers, or jobs go to out-of-state workers rather than to residents who likely lack industry experience. *See id.*

A set of more detailed studies from Cornell University's Department of City and Regional Planning largely confirm this pattern. Those researchers spent more than a year studying the economic impacts of the gas boom on Pennsylvania and New York. Their core conclusion is that boom-bust cycle inherent in gas extraction makes employment

[120] Adapted from Table 1 of the *Ohio Study* at 15.

benefits tenuous, and may leave some regions hurting if they are unable to convert the temporary boom into permanent growth. As the researchers put it:

> The extraction of non-renewable natural resources such as natural gas is characterized by a "boom-bust" cycle in which a rapid increase in economic activity is followed by a rapid decrease. The rapid increase occurs when drilling crews and other gas-related businesses move into a region to extract the resource. During this period, the local population grows and jobs in construction, retail and services increase, though because the natural gas extraction industry is capital rather than labor intensive, drilling activity itself will produce relatively few jobs for locals. Costs to communities also rise significantly, for everything from road maintenance and public safety to schools. When drilling ceases because the commercially recoverable resource is depleted, there is an economic "bust" – population and jobs depart the region, and fewer people are left to support the boomtown infrastructure.

Susan Cristopherson, CaRDI Reports, *The Economic Consequences of Marcellus Shale Gas Extraction: Key Issues* ("*Cornell Study*") (Sept. 2011) at 4.[121] This boom and bust cycle is exacerbated by the purportedly vast resources of the Marcellus play, because regional impacts will persist long after local benefits have dissipated, as the authors explain, and may be destructive if communities are not able to plan for, and capture, the benefits of industrialization:

> [B]ecause the Marcellus Play is large and geologically complex, the play as a whole is likely to have natural gas drilling and production over an extended period of time. While individual counties and municipalities within the region experience short-term booms and busts, the region as a whole will be industrialized to support drilling activity, and the storage and transportation of natural gas, for years to come. Counties where drilling-related revenues were never realized or could have ended may still be impacted by this <u>regional</u> industrialization: truck traffic, gas storage facilities, compressor plants, and pipelines. The cumulative effect of these seemingly contradictory impacts – a series of localized short-term boom-bust cycles coupled with regional long-term industrialization of life

[121] Attached as Exhibit 73.

> and landscape – needs to be taken into account when anticipating what shale gas extraction will do communities, their revenues, and the regional labor market, as well as to the environment.

Id. (emphasis in original). The benefits of gas development are, in other words, not smoothly distributed, in space or in time. Some people will prosper and some will not during the resultant disruption and, warn the Cornell researchers, the long-term effects may well not be positive, based upon years of research on the development of regions dependent on resource extraction:

> [T]he experience of many economies based on extractive industries warns us that short-term gains frequently fail to translate into lasting, community-wide economic development. *Most alarmingly, a growing body of credible research evidence in recent decades shows that resource dependent communities can and often do end up worse than they would have been without exploiting their extractive reserve.* When the economic waters recede, the flotsam left behind can look more like the aftermath of a flood than of a rising tide.

Id. at 6 (emphasis supplied).

The researchers also outline many of the challenges communities face as they attempt to benefit from natural gas development. Most obviously, it is difficult to convert technical natural gas field jobs directly into sustainable, well-paying local employment. *See* Jeffrey Jacquet, *Workforce Development Challenges in the Natural Gas Industry* (Feb. 2011).[122] This is in part because the industry's employment patterns are uneven: the researchers cite Pennsylvania employment data showing that "*the drilling phase accounted for over 98% of the natural gas industry workforce* engaged at the drilling site," and complementary Wyoming data showing a similar drop-off. *Id.* at 4 (emphasis in original). As a result, drilling jobs correspond to the boom and bust cycle inherent to resource extraction industries. *Id.* The remaining, small, percentage of production phase and office jobs are far more predictable, *id.* at 4-5, but need to filled with reasonably experienced workers, *id.* at 12-14. Although job training at the local level can help residents compete, the initial employment burst is usually made up for people from out of the region moving in and out of job sites; indeed, "[t]he gas industry consistently battles one of the highest employee turnover problems of any industrial sector." *Id.* at 13.

[122] Attached as Exhibit 74.

Meanwhile, communities also confront a panoply of development issues, ranging from coping with sudden population increases, major road damage from drilling operations, damage to the tourism industry, and a host of environmental risks (discussed in more detail below). *See, e.g.*, CJ Randall, *Hammer Down: A Guide to Protecting Local Roads Impacted by Shale Gas Drilling* (Dec. 2010)[123]; Susan Riha & Brian G. Rahm, *Framework for Assessing Water Resource Impacts from Shale Gas Drilling* (Dec. 2010)[124]; *Cornell Study* at 8).

These tourism threats are particularly concerning for many parts of Marcellus region, including New York's Southern Tier, because tourism is a major source of income and employer. In the Southern Tier, according to one recent study, the industry directly accounts for $66 million in direct labor income, and 4.7% of all jobs, and supports 6.7% of the region's employment. Andrew Rumbach, *Natural Gas Drilling in the Marcellus Shale: Potential Impacts on the Tourism Economy of the Southern Tier* (2011).[125] Although the study concludes that the near-term economic impact of gas drilling would likely be positive, it identifies two "major caveats" – that the monetary value of the gas industry underestimates its disruption to the region's stability and way of life, and that gas drilling benefits "will be relatively short-term and non-local." *Id.*at 9. Once again, simple arguments for the raw economic benefits of gas extraction's benefits turn out to conceal complex social and economic consequences, and a complicated mix between benefits and costs in each particular place the industry affects.

The point of all this, of course, is that a simple economic model, like IMPLAN, cannot reliably capture the consequences of transforming an entire region of the country, converting it from a largely rural swath of small towns, farms, and forests into an industrial gas extraction zone. That transformation will benefit some discrete actors considerably, and some communities, if they are able to navigate the durable challenges of boom and bust economics. But it will also harm people, by displacing existing businesses and lifeways, straining infrastructure, shifting populations, and, potentially, leading to devastating economic crashes in some areas.

6. DOE/FE Cannot Rationally Approve FLEX's Export Plan On the Record Before It

The Natural Gas Act, 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

[123] Attached as Exhibit 75.
[124] Attached as Exhibit 76.
[125] Attached as Exhibit 77.

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 FLEX on the record in this case.

As we have demonstrated, record support for FLEX's claimed benefits is extraordinarily thin. FLEX has submitted IMPLAN-derived argument of economic benefit, but the underlying model does not show whether the economy would improve *more* without FLEX's proposal than it would without it, nor address the many costs and displacement effects associated with natural gas booms. FLEX further argues that export will not cause gas price increases, but this argument is contradicted by the *EIA Study* that DOE/FE itself commissioned.

Sierra Club, on the other hand, has 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. Sierra Club has 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 regions of the country into a boom-and-bust extractive cycle. Further, Sierra Club has shown that gas extraction and export have major environmental (and, hence, additional economic) costs, which FLEX 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).

In this case, this record review data requires that DOE/FE play particularly close regard to both the positive and negative impacts of gas export and extraction. FLEX's application discusses only the purported benefits of its proposal, casting a wide net in hopes of capturing indirect and induced economic activity, while failing to recognize the environmental and economic costs of that same activity. If DOE/FE were to consider the benefits of increased gas production without also considering the costs, it would have "entirely failed to consider an important aspect of the problem, [or] offered an explanation for its decision that runs counter to the evidence before the agency. *State Farm*, 463 U.S. at 43. It must not do so.

At bottom, the decision to export U.S. gas resources is a major public policy decision and must, by law, be made with extraordinary care. DOE/FE cannot justify moving forward on the scanty and incomplete record before it.

D. DOE/FE Must Not Approve FLEX's Export Plan Without a Proper NEPA Analysis

As we have demonstrated, DOE/FE can – and indeed must – ground its decision upon a full consideration of the environmental impacts of gas export and extraction. The NEPA process must be "coordinate[d] with its decisionmaking," 10C.F.R. § 1021.210, and can usefully inform it. Indeed, because approval of a gas export application is a major federal action which may significantly affect the environment, DOE/FE is barred from moving forward without a full EIS. Sierra Club therefore protests this application to the extent that DOE/FE grants either a conditional or a full approval without the completion of a full and legal EIS and Record of Decision which support its decision.

1. DOE/FE Must Fully Analyze the Direct, Indirect, and Cumulative Impacts of Increased Gas Production Linked to Gas Exports from Freeport

As we have explained, FLEX rests its public interest claims on its claimed ability to stimulate enhanced natural gas production. Environmental impacts of this increased production, including "growth inducing effects," are thus manifestly "reasonably foreseeable" indirect effects of FLEX's proposal. *See* 40 C.F.R. § 1508.8. These effects will be added to the effects of gas production (and other environmental burdens from other industries) already present in the gas plays which FLEX affects, along with any induced production associated with other export proposals. DOE/FE must fully describe all of these effects and develop alternatives which would avoid them, including the alternative of denying FLEX's application, limiting exports to a smaller quantity, or imposing environmental controls on gas produced for export.[126]

Although this requirement is clear on the face of the statute and binding regulations, it is also clear on the NEPA case law. As the Ninth Circuit Court of Appeals recently explained:

> Because "NEPA places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action," *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 553, 98 S.Ct. 1197, 55 L.Ed.2d 460 (1978), the considerations made relevant by the substantive statute driving the proposed action must be addressed in NEPA analysis.

[126] Thus, the EIS must address each of the many impacts we have discussed above. Likewise, appropriate ESA and NHPA analysis must address these impacts as they bear upon ESA- and NHPA-protected resources.

Oregon Natural Desert Ass'n v. Bureau of Land Management, 625 F.3d 1092, 1109 (9th Cir. 2010). DOE/FE is determining whether or not gas exports are in the "public interest," a term which the Supreme Court has repeatedly held includes consideration of environmental impacts. *Nat'l Ass'n for the Advancement of Colored People v. Federal Power Commission*, 425 U.S.at 670 n.4; *Udall v. Federal Power Comm'n*, 387 U.S. at 450. Thus, just as DOE/FE must consider upstream environmental impacts in its Natural Gas Act determination, so, too, it must analyze and disclose these impacts in the NEPA analysis that will support its final determination.

Thus, infrastructure projects, like FLEX's proposal, that enable resource extraction activities to expand upstream naturally must fully analyze those impacts in the NEPA framework. In *Northern Plains Resource Council v. Surface Transportation Board*, - F.3d - , 2011 WL 6826409, for instance, the Court considered a railway line which was developed in order to expand coal production at several mines. *Id.* at *10. It held that the Surface Transportation Board's NEPA analysis for the line was illegal because the Board had refused to consider the mines' impacts. The Court held that such impacts were plainly "reasonably foreseeable" – and, indeed, were the premise for the construction project in the first place. *Id.* They therefore had to be considered in the NEPA analysis.

The same analysis applies here. Upstream gas production provides the justification for FLEX's proposal – because gas is being produced in historically large quantities, FLEX argues that export is appropriate, and important to stabilize and enhance gas production – and is a reasonably foreseeable result of FLEX's exports. Indeed, FLEX has been at pains to demonstrate that such production will occur. DOE/FE must therefore fully account for this production in an EIS for its decision.

Notably, DOE/FE has failed to do so in the past. As we observed in our comments on the Sabine Pass facility's Environmental Assessment (EA),[127] FERC, the lead agency on that EA, failed even to acknowledge the upstream impacts of the facility. Although DOE/FE may again allow FERC to take lead agency status, it may not move forward unless either it or FERC completes an adequate EIS that *does* cover all upstream impacts of DOE/FE's decision. Because FERC is, instead, focused on the environmental consequences of facility siting, DOE/FE make clear to FERC that this upstream consideration *must* be included in a full EIS for the Freeport project.

2. **DOE/FE May Not Conditionally Approve FLEX's Proposal Without a Full EIS**

It is true that, as a general matter, DOE/FE may issue "conditional" orders, *see* 10 C.F.R. § 590.402, but this general authority cannot trump DOE's specific rules barring the

[127] Attached as Exhibit 78. We incorporate those comments in full by reference.

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. A conditional approval limits alternatives, and determines 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 selected 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 FLEX export proposal, conditionally or not, until it has considered all alternatives to doing so through the NEPA and Natural Gas Act processes.

3. **A Programmatic EIS is Appropriate**

Finally, we again emphasize that the FLEX 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.

It 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.

Programmatic EISs are designed to serve precisely this purpose. Rather than proceeding in a piecemeal fashion, 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.

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

If DOE/FE nonetheless approves FLEX'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.[128]

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 FLEX nor DOE/FE have described or proposed such terms, Sierra Club also protests this application to the extent that DOE/FE fails to develop adequate monitoring terms of the sort we have described.

IV. Conclusion

Sierra Club therefore moves to intervene, offers the above comments, and protests FLEX's export proposal for the reasons described above. Flex's application is not consistent with the public interest and must be denied.

Respectfully submitted,

Nathan Matthews
Sierra Club Environmental Law Program
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San Francisco, CA 94105

[128] Providing a clear monitoring plan of this sort will also benefit FLEX, 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.

UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
FREEPORT LNG EXPANSION, L.P. &	)	
FLNG LIQUEFACTION, LLC	)	**FE DOCKET NO. 11-161-LNG**

CERTIFICATE OF SERVICE

I hereby certify that I caused the above documents to be served on the applicant and all other parties in this docket, in accordance with 10 C.F.R. § 590.107, on April 13, 2012.

Dated at San Francisco, CA this 13th of April, 2012

Nathan Matthews
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UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
FREEPORT LNG EXPANSION, L.P. &	)	
FLNG LIQUEFACTION, LLC	)	**FE DOCKET NO. 11-161-LNG**

CERTIFIED STATE OF AUTHORIZED REPRESENTATIVE

Pursuant to 10 C.F.R. § 690.103(b), I, Nathan Matthews, hereby certify that I am a duly authorized representative of the Sierra Club, and that I am authorized to sign and file with the Department of Energy, Office of Fossil Energy, on behalf of the Sierra Club, the foregoing document and in the above-captioned proceeding.

Dated at San Francisco, CA this 13th of April, 2012

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UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

IN THE MATTER OF	)	
FREEPORT LNG EXPANSION, L.P. &	)	
FLNG LIQUEFACTION, LLC	)	**FE DOCKET NO. 11-161-LNG**

VERIFICATION

County of San Francisco §
§
State of 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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Subscribed and sworn to before me this 14 day of April, 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