CENTER FOR BIOLOGICAL DIVERSITY
FRIENDS OF THE EARTH
GREENPEACE

Petition to the U.S. Department of Commerce for the Promulgation of a Mandatory Rule Generally Prohibiting the Export of Natural Gas Produced in the United States

August 12, 2015

I. NOTICE OF PETITION

With this legal petition ("Petition"), the Center for Biological Diversity, Friends of the Earth and Greenpeace ("the Petitioners"), request that the Department of Commerce ("DOC") immediately promulgate a rule or rules prohibiting the export of all natural gas products (hereinafter "natural gas") from the United States pursuant to Section 103 of the Energy Policy and Conservation Act of 1975 ("EPCA"), as amended. *See* 42 U.S.C. § 6212.

A. LEGAL AUTHORITY

The right of an interested party to petition any Federal agency is a freedom guaranteed by the First Amendment: "Congress shall make no law . . . abridging the . . . right of people . . . to petition the Government for redress of grievances."[1] Under Section 553(e) of the Administrative Procedure Act ("APA"), all citizens have the right to petition for the "issuance, amendment, or repeal" of an agency rule,[2] which is defined as "whole or a part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy."[3] The Petitioners exercise such rights to petition here.

DOC is required to respond to this Petition in a timely manner regardless of the agency's choice of action: "[p]rompt notice shall be given of the denial in whole or in part of a written application, petition, or other request of an interested person made in connection with any agency proceeding."[4]The rule requested of DOC is a non-discretionary duty pursuant to its statutory obligations under EPCA. We petition DOC to promulgate a rule prohibiting exports of natural gas produced in the United States in accordance with Section 103 of EPCA, as later delegated to DOC in E.O.11912,[5] which states: "The President shall . . . promulgate a rule prohibiting the export of crude oil and natural gas produced in the United States . . .."[6] DOC currently is in violation of failing to carry out this non-discretionary duty.

Petitioners also possess legal authority to force agency compliance with EPCA in federal court, irrespective of this petition. We thus expect an expeditious reply to this petition, and do not waive any other rights as a result of it.

B. ACTION REQUESTED

The Petitioners hereby request that DOC promulgate a rule prohibiting the export of natural gas as required by Section 103 of EPCA,[7] which requires that a rule be promulgated "prohibiting the export of crude oil and natural gas produced in the United States." While rules prohibiting the

[1] U.S. Const., amend. I.
[2] 5 U.S.C. § 553(e).
[3] 5 U.S.C. § 551(4).
[4] 5 U.S.C. § 555(e).
[5] *See* Exec. Order No. 11,912,3 C.F.R.114 (1976); 42 U.S.C. § 6212(c).
[6] 42 U.S.C. § 6212(b)(1).
[7] *See* 42 U.S.C. § 6212.

export of *crude oil* were promulgated in a timely manner after the enactment of EPCA, DOC failed its statutory mandate to promulgate a rule prohibiting *natural gas* exports in the forty years since Congress's promulgation and the President's delegation of this duty.[8] In the face of rising natural gas exports and resulting impacts on climate change, wildlife and public health, we urge DOC to fulfill its statutory, non-discretionary duty to "promulgate a rule prohibiting the exports of natural gas produced in the United States"[9] as soon as possible.

C. PETITIONERS

The Center for Biological Diversity is a nonprofit environmental organization dedicated to the protection of imperiled species and their habitats through science, education, policy, and environmental law. The Petitioner has over 900,000 members, supporters and activists dedicated to the conservation of endangered species and wild places, and combating climate change. The Center submits this Petition on its own behalf and on behalf of its members and staff with an interest in protecting our national public lands and the wild habitats they encompass from the damages of further unnecessary natural gas extraction and the damages of climate change.

Friends of the Earth strives for a more healthy and just world. We understand that the challenges facing our planet call for more than half measures, so we push for the reforms that are needed, not merely the ones that are politically easy. We are members of Friends of the Earth International, a global network representing more than two million activists in 74 different countries. We have over 300,000 members, activists and followers. With offices in Washington, D.C., and Berkeley, CA, and members in all 50 states, we urge policymakers to defend the environment and work towards a healthy environment for all people.

Greenpeace uses peaceful protest and creative communication to expose global environmental problems and to promote solutions that are essential to a green and peaceful future. Greenpeace is a non-profit organization, present in over 50 countries across Europe, the Americas, Africa, Asia and the Pacific. We speak for millions of supporters worldwide, who provide the majority of our funding. To maintain independence, Greenpeace does not accept donations from governments or corporations.

In addition to the preferred emails provided below, Petitioners' mailing contact information for the purposes of this Petition is:

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[8] *See* 41 C.F.R. § 44155, 44155 (1976) ("It is anticipated that [review of the Department of Commerce's (DOC's) export control powers] will be completed in the near future and will result in the publication of additional or amended regulations, including regulations relating to exports of natural gas.").
[9] 42 U.S.C. § 6212(b)(1).

Respectfully Submitted,

/s/

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II. EXECUTIVE SUMMARY

The Energy Policy and Conservation Act of 1975 ("EPCA") was passed by Congress in response to the oil embargo crisis with the Arab fossil fuel-producing nations in the early 1970s. An explicit goal of this law, still relevant today, is conserving domestic energy supplies through specific congressionally-mandated programs. One important program central to achieving this goal was, and continues to be, the mandated prohibition of crude oil and natural gas exports originating from the United States. The President was given the duty and power to enact this prohibition, along with any restrictions on other fossil fuels as he saw necessary, which he delegated to the Secretary of Commerce. While the statute did allow for the creation of narrow exemptions to be in the national interest, the prohibition was and still is meant to instate a policy where the permitting of crude oil and natural gas exports is the exception, and not the norm.

DOC responded to its newly appointed duty by quickly implementing a prohibition of crude oil exports, which is still in effect with modifications to this day. Although DOC claimed it was working on such a policy for natural gas in parallel and that it would be released quickly, nearly forty years have passed without a prohibition on natural gas exports being implemented as required by Congress. To justify this failure to act, DOC has claimed that: 1) the Department of Energy ("DOE") possesses authority and responsibility to approve natural gas export license applications; and 2) no one has ever sought a natural gas export license from DOC.

While it is true that DOE possesses the authority to approve specific natural gas export applications via license, such authority neither prevents nor duplicates the statutorily required promulgation of a general prohibition on natural gas exports by DOC. DOC's general prohibition, with certain exemptions identified by statute, serves as a crucial gatekeeper to the overall approval process on oil and gas exports from the U.S. This gatekeeping purpose is precisely why DOE's "public interest" determination under a separate statute is quite different from DOC's "national interest" determination pursuant to 42 U.S.C. § 6212. Further, no one has sought a natural gas export license from DOC's role is not approving licenses but rather authorizing the grant of exemptions from the overarching prohibition on exports. Even if DOC were to grant some individualized exemption to the prohibition, the fact that no entity has applied for any such exemption merely underscores the agency's malfeasance in establishing the mandated regulatory structure sought by this Petition. In sum, the absence of parties seeking DOC export approvals fails to relieve DOC from its mandated statutory responsibilities.

Since the late 1990s, U.S. natural gas exports, mostly in the form of liquefied natural gas ("LNG"), have increased by roughly 1000%. Since 2007, the amount of U.S. natural gas exports has nearly doubled. These numbers are poised to further rise exponentially in the next few years due to the expansion of LNG export terminals, which are in the process of being approved or under construction. See Appendix A. The massive rise in U.S. natural gas exports is driven by the rapid increase in natural gas domestic production largely through the employment of hydraulic fracturing (or "fracking") to extract natural gas deposits. Numerous scientific and technical studies have shown that the practice of fracturing rocks and sediment to reach deeply buried pockets of natural gas is fundamentally counterproductive to human health, public well-

being, wildlife conservation, water quality and quantity, renewable energy production and transmission, geologic stability, toxics reduction, and a host of other societal problems. The recent rise in natural gas exports also contradicts the Obama Administration's stated goals of mitigating climate change, given the still under-reported nature of methane, carbon dioxide and other greenhouse emissions derived from natural gas "fracking", other forms of extraction and corresponding transport activities.

To prevent further negative impacts resulting from natural gas exports, the Secretary of Commerce must act immediately to promulgate an interim final rule, subject to public comment and potential revision, "prohibiting the export of natural gas produced in the United States." 42 U.S.C. § 6212(b)(1). The statute's exemptions provide DOC, and the entire Administration, ample flexibility to prevent any collateral impacts from implementing the necessary general export prohibition rule. The statute's bottom line, however, is that the agency has no choice but to promptly finalize a rule instituting a general prohibition against the export of any natural gas product out of the United States; doing otherwise clearly violates EPCA and related laws

III. LEGISLATIVE AND ADMINISTRATIVE BACKGROUND ON DOC'S OBLIGATIONS WITH RESPECT TO THE PROHIBITION OF NATURAL GAS EXPORTS

A. CONGRESS MANDATED THE PRESIDENT TO PROHIBIT THE EXPORT OF NATURAL GAS UNDER THE ENERGY POLICY AND CONSERVATION ACT OF 1975.

In response to the 1973 oil embargo of the Organization of Arab Petroleum Exporting Countries against U.S. oil exports, Congress enacted EPCA to provide for the creation of substantial petroleum reserves "capable of reducing the impact of severe energy supply interruptions"[10] and to "conserve [U.S.] energy supplies through . . . the regulation of certain energy uses . . . ."[11] While Section 103(a) of EPCA grants discretionary authority to the President to, among many things, restrict exports of natural gas, Section 103(b)(1) specifically directs the President to do the following:

> The President shall exercise the authority provided for in [Section 103(a) of EPCA] to promulgate a rule *prohibiting* the export of crude oil and *natural gas produced in the United States*, except that the President may . . . exempt from such prohibition such crude oil or *natural gas exports* which he determines to be consistent with the national interest and purposes of this Act.[12]

Based on a plain reading of EPCA, it is clear that permitting the export of U.S. natural gas and crude oil is an exception to the rule rather than the norm, placing the burden on the

[10] 42 U.S.C. § 6201(2).
[11] 42 U.S.C. § 6201(4).
[12] 42 U.S.C. § 6212(b)(1) (emphasis added).

government to justify any exemptions on the general prohibition of exportation of natural gas and crude oil. This plain language reading of EPCA is reinforced by the regulatory barriers that EPCA places on permitting natural gas exports; exemptions from any rule prohibiting natural gas exportation must be included in the rule itself or added by amendment thereto, and "may be based on the purpose for export, class of seller or purchaser, country of destination, or any other reasonable classification" that the President finds to be consistent with the "national interest and the purposes of [EPCA]".[13]

In addition to regulatory barriers, the critical importance that Congress placed on prohibiting natural gas exports is further evidenced in the rulemaking procedures permitted under EPCA. While rules on export restrictions are still subject to the rulemaking processes under the APA, Congress under EPCA permits the President to waive the notice and comment periods if he finds that compliance with such requirements "may seriously impair his ability to impose effective and timely prohibitions on exports."[14] This provision further reflects the congressional intent to guard the baseline policy of generally prohibiting natural gas exports, even if it requires bypassing the notice and comment period for timing and effectiveness purposes of export restriction. In sum, the overriding legislative policy goal, evidenced by well-established canons of statutory intent interpreting EPCA, is an export prohibition for natural gas.

B. THE PRESIDENT DELEGATED HIS EPCA OBLIGATION TO PROHIBIT NATURAL GAS EXPORTS TO DOC THROUGH EXECUTIVE ORDER 11912.

In accordance with the congressional mandate to the President in Section 103(b)(1) of EPCA, Executive Order 11912 ("E.O. 11912")—issued on April 13, 1976 by President Gerald Ford—delegated to the Secretary of Commerce (the "Secretary") the functions vested in the President by Section 103 of EPCA—namely, the duty to promulgate a rule prohibiting the export of U.S.-produced natural gas and crude oil.[15] Section 2 of E.O. 11912 states:

> The Secretary of Commerce is designated and empowered to perform without approval, ratification, or other action by the President, the functions vested in the President by Section 103 of the Energy, Policy, and Conservation Act.[16]

[13] 42 U.S.C. § 6212(b)(2).
[14] 42 U.S.C. § 6212(e)(1); *See also* 42 U.S.C. § 6212(e)(2) (In the event the U.S. President waives the notice and comment period under 42 U.S.C. § 6212(e)(1), he is required to afford interest parties the opportunity to comment on that rule at "the earliest practicable date thereafter.")

[15] *See* Exec. Order No. 11,912, 3 C.F.R.114 (1976).; 42 U.S.C. § 6212(c).
[16] Exec. Order No. 11,912, 3 C.F.R.114 (1976).

Under E.O. 11912, DOC now unequivocally possesses the administrative and statutorily-mandated responsibility for the required natural gas export prohibition under EPCA.

C. DOC INITIATED RULEMAKING TO PROHIBIT NATURAL GAS EXPORTS IN ACCORDANCE WITH EPCA BUT FAILED TO PROMULGATE A FINAL RULE.[17]

Following the issuance of E.O. 11912, DOC issued a Federal Register notice, dated July 9, 1976, which stated that DOC was in the process of developing and would later promulgate the regulations required under Section 103 of EPCA. Specifically, this Federal Register notice stated the following:

> . . . [Section 103 of EPCA] grants discretionary authority for the President to control exports of a broad range of energy and energy-related commodities and mandates a prohibition on exports of crude oil and natural gas, except such exports are determined to be in the national interest and consistent with the purposes of that Act [EPCA] . . . . The Department [of Commerce] is currently *developing regulations to implement the provisions of that Act [EPCA] and will promulgate such Regulations [including rules prohibiting natural gas exports] in the near future*. In the interim, the decision announced herein to continue the current controls on petroleum and petroleum products constitutes a finding by the Department [of Commerce] that such controls are appropriate and consistent with the national interest and the purposes of the Energy Policy and Conservation Act.[18]

In a later Federal Register notice, dated October 7, 1976, DOC again notified that its rulemaking process over natural gas export prohibitions was still pending, stating:

> The Department of Commerce continues to have under review its export control policies relevant to petroleum and other energy-related commodities in light of relevant statutory authorities, *including EPCA*, and current and projected supply/demand situations related to such commodities. It is anticipated that such review will be completed *in the near future and will result in the publication of additional or amended regulations, including regulations relating to exports of natural gas*.[19]

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[17] This Federal Register notice was cited by DOC in response to inquiries made by Senator Edward Markey's staff with respect to the status of rulemaking in the area of natural gas exports. *See* Letter from Edward Markey, U.S. Senator for Massachusetts, to Penny Pritzker, Secretary, Dep't of Commerce (Jun. 16, 2014) ("Markey Letter (Jun. 2014)").

[18] 41 C.F.R. § 28,258, 28,258 (1976) (emphasis added).

[19] 41 C.F.R. § 44,155, 44,155 (1976) (emphasis added).

Footnote 1 of the Federal Register notice (Oct. 7, 1976) acknowledged that in addition to the regulations DOC would be promulgating with respect to natural gas exports under EPCA, natural gas exports already required a separate export authorization from the U.S. Federal Power Commission. This footnote stated:

> Natural gas, and liquefied natural gas (L.N.G.) and synthetic natural gas comingled with natural gas (Schedule B No. 341-1010) require export authorization from the U.S. Federal Power Commission [,the predecessor to the Department of Energy].[20]

This clear distinction between DOC's pending rulemaking and DOE's existing natural gas export license clearly evidences DOC's understanding and recognition that two separate systems, each under the DOC and DOE (or its then predecessor), would govern U.S.–produced natural gas exports.

In a Federal Register notice, dated December 15, 1978, DOC made a general policy statement about all U.S. exports. This Federal Register notice does not reference DOC's obligations under EPCA and E.O. 11912, stating only the following regarding exports of natural gas:

> Regulations administered by the U.S. Department of Energy, Washington, D.C. 20545, govern the export of "natural gas" . . . The regulations relating to "natural gas" are issued under the authority of the Natural Gas Act of 1938 . . . .[21]

In sum, DOC never issued any rule prohibiting natural gas exports as referenced in the 1976 Federal Register notice. In response to inquiries made on this matter, the Secretary confirmed that DOC "determined that no further rulemaking [following the Federal Register notice (July 9, 1976)] was necessary to implement the EPCA prohibition on the export of natural gas."[22] Thus, DOC is in violation of its obligations under E.O. 11912 and EPCA to issue a regulation prohibiting natural gas exports.

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[20] *Id.* at 44,155, n.1 .

[21] 43 C.F.R. § 58544, 58544 (1978).

[22] *See* Letter from Penny Pritzker, Secretary, Dep't of Commerce, to Edward Markey, U.S. Senator for Massachusetts (Sept. 16, 2014) ("Pritzker Letter (Sep. 2014)") (responding three months after receipt of Senator Markey's letter inquiring about DOC's lack of regulations concerning the prohibition of natural gas exports). The Secretary stated:

> It seems clear that the Department of Commerce, noting the preexisting export license requirement for natural gas under the Natural Gas Act of 1938 (NGA), determined that no further rulemaking was necessary to implement the EPCA prohibition on the export of natural gas, and that an export license issued under the authority of the NGA was an appropriate basis for exempting the exporter from the requirement for a second export license for the same transaction.

D. DOC'S CURRENT EXPLANATIONS FOR FAILING TO COMPLY WITH ITS PLAIN, UNAMBIGUOUS DUTIES UNDER EPCA AND E.O. 11912.

In response to inquiries regarding DOC's failure to regulate natural gas exports, the agency has thus far manufactured two excuses for failing to carry out its delegated statutory duty under EPCA and E.O. 11912. [23]

1. DOC INCORRECTLY RELIES ON DOE'S NATURAL GAS EXPORT LICENSE REGIME UNDER THE NATURAL GAS ACT TO ABSOLVE DOC OF ITS MANDATORY EPCA OBLIGATIONS.

The Secretary has justified DOC's failure to satisfy its obligations under EPCA and E.O. 11912 by claiming that the existence of the export license requirement for natural gas under the Natural Gas Act of 1938 ("NGA") "was an appropriate basis for exempting the [potential natural gas] exporter from the requirement for a second export license [issued in accordance with EPCA and E.O. 11912] for the same transaction."[24]

The Secretary, unfortunately, has thus far misinterpreted and confused the exemption provision of Section 103(b)(2) of EPCA, which states that exemptions to the natural gas export prohibition may be based on "any other reasonable basis as the President determines to be appropriate and consistent with the national interest and the purposes of [EPCA]."[25] The Secretary appears to argue that the existence of DOE's licensing approval regime under the NGA qualifies as "an appropriate basis for exempting" EPCA's export prohibition obligation from DOC's clear statutory responsibility.[26]

Further, citing its Export Administration Regulations ("EARs"), DOC claims that because it has "consistently informed potential exporters of natural gas that export authorization from the Department of Energy or its predecessor, the Federal Power Commission, is necessary," an export license from DOE is a suitable substitute to DOC regulations prohibiting natural gas exports as mandated under EPCA and E.O. 11912.[27] DOC's recognition of DOE's procedures fails to absolve the department of its legal responsibility. That DOC has announced the obvious— i.e., DOE is another agency that regulates natural gas exports [28] —does not justify the absence of a DOC rulemaking on natural gas exports as statutorily mandated. In sum, EPCA is a different statute than the NGA, with different standards applicable to two distinct agencies.

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[23] *See* Markey Letter (Jun. 2014).
[24] *See* Pritzker Letter (Sept. 2014).
[25] 42 U.S.C. § 6212(b)(2).
[26] *See* Pritzker Letter (Sept. 2014).
[27] *See id*. Secretary Pritzker stated that "[t]he Department of Commerce has, since 1978, continuously maintained a reference in the EAR to the need for a license from the Department of Energy for the export of natural gas," but not providing a citation to this reference.
[28] *See* 15 C.F.R. § 730 Supp. 3 (listing DOE as also responsible for natural gas export regulations).

DOC's response is unjustifiable, and EPCA cannot be written out of existence for agency convenience.

2. DOC Unjustifiably Relies on the Fact that No One has Ever Sought a Natural Gas Export License from DOC To Absolve its Obligations under EPCA and E.O. 11912.

The Secretary also justifies DOC's failure to promulgate a rule by stating "that in the nearly forty years since the passage of EPCA, no party has sought a license from the Department of Commerce for the export of natural gas . . . ."[29] But the absence of export license applications to DOC clearly does not and cannot release the agency from instituting a general prohibition (with applicable exemptions) by rule. EPCA does *not* require DOC to issue "export licenses" for natural gas, but rather to promulgate rules prohibiting such licenses from being issued if they are inconsistent with "*the national interest"* as defined by EPCA.[30]

E. U.S. Natural Gas Exports Have Exploded in Recent Years.

As discussed further in Appendix A, *infra*, the U.S. export of natural gas has risen exponentially over the last several decades, from a low of 48,731 million cubic feet to levels now consistently over 1,500,000 million cubic feet of natural gas.[31] This represents over a three 3000% increase from the early 1980s. Even using the year 2000 as a baseline, current export levels are up over 600% since the turn of the century.[32] These numbers are anticipated to rise further.[33]

In sum, the Secretary has failed to provide any legal justification for DOC's failure to issue rule(s) as mandated under EPCA and E.O. 11912, a reality particularly relevant given the explosion in U.S. natural gas exports over recent years. Simply, DOC is in stark violation of its statutory obligations.

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[29] *See* Pritzker Letter (Sept. 2014).
[30] *See* 42 U.S.C. § 6212(b)(1); 42 U.S.C. § 6212(d) (specifying the national interests to be taken into account when considering exemptions to the prohibition against natural gas exports).
[31] U.S. Energy Information Administration, http://www.eia.gov/dnav/ng/hist/n9130us2a.htm (last visited Jun. 25, 2015).
[32] *Id.*
[33] *See, e.g.*, Davis Burroughs, EIA *Says U.S. Could be Net Energy Exporter by 2019*, Morning Consult (April 14, 2015), http://morningconsult.com/2015/04/eia-says-u-s-could-be-net-energy-exporter-by-2019/.

IV. ARGUMENTS IN SUPPORT OF THE PETITION

A. THE DEPARTMENT OF COMMERCE IS LEGALLY REQUIRED TO PROMULGATE A RULE PROHIBITING NATURAL GAS EXPORTS.

1. THE PLAIN LANGUAGE OF EPCA AND E.O. 11912 COMMAND THAT DOC PROMPTLY ISSUE A RULE PROHIBITING THE EXPORT OF NATURAL GAS.

As explained, *supra*, Section 103 of EPCA unequivocally mandates the President to generally prohibit natural gas from being exported from the United States, a duty that was delegated by the President to DOC under E.O. 11912:[34]

> The [Secretary of Commerce] shall . . . promulgate a rule prohibiting the export of crude oil and natural gas produced in the United States. . . .

However, as acknowledged by the Secretary, DOC has failed to issue any such regulations,[35] and is thus in violation of its obligations under EPCA and E.O. 11912. Like many executive orders, E.O. 11912 was eventually, in part, repealed by a subsequent executive order. President Bill Clinton's E.O. 12919 repealed Sections 7 and 8 of E.O.11912. These sections respectively delegated powers vested in the President by Section 101(c) of the Defense Production Act of 1950 and limited E.O.11790 of June 25, 1974 as it related to these specific powers. These sections, however, did not and do not affect the delegation of EPCA Section 103 powers to the Secretary of Commerce. There is no question that well-established U.S. Supreme Court canons of statutory construction command that DOC follow its statutory duty.

2. THE EXISTENCE OF THE NGA LICENSING REGIME IN NO WAY ABSOLVES DOC OF ITS LEGAL OBLIGATIONS TO PROMULGATE A PROHIBITION RULE ON NATURAL GAS EXPORTS.

As explained, *supra*, DOE possesses authority to issue specific export licenses of natural gas under the NGA. This authority, though not at issue in this Petition, simply does not absolve DOC from any required action on its part under EPCA Section 103 and E.O.11912. EPCA mandates that a general *prohibition*—as opposed to a licensing regime—on natural gas exports must be instituted.[36]

As evidenced in the Federal Register notice (October 7, 1976) in which DOC notified a pending rulemaking on natural gas export prohibition in spite of acknowledging the existing NGA licensing requirements for natural gas exports, DOC recognized that there is a clear difference—and separation—between DOE's NGA-mandated licensing regime and DOC's

[34] *See* 42 U.S.C. § 6212(b)(1); Exec. Order No. 11,912,3 C.F.R.114 (1976).
[35] *See* Pritzker Letter (Sept. 2014).
[36] *See* 42 U.S.C. § 6212.

EPCA-mandated prohibition on natural gas exports.[37] The two schemes neither are equal nor can be substituted for the other.

The NGA, passed June 21, 1938, grants full authority to "approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal" to the Federal Power Commission (FPC), the successor of which is the Federal Energy Regulatory Commission (FERC) in the DOE.[38] The statute goes on to say, however, that "nothing in this chapter is intended to affect otherwise applicable law related to any Federal agency's authorities or responsibilities related to LNG terminals."[39] While FERC continues to have sole discretion on whether to approve or deny the "siting, construction, expansion or operation of an LNG terminal," this sole authority does not detract in any way from DOC's responsibility to promulgate a prohibition on natural gas exports.[40] Further, 15 U.S.C. § 717b(a)'s requirement that exporters acquire authorization from FPC—now, DOE—does not bar a general prohibition on natural gas exports. With the addition of EPCA to the statutory framework, these requirements apply to those who fit within the EPCA 103(b) exceptions, and only those who do so may apply for a DOE-issued export license.

Congress clearly intended for EPCA's policy of prohibition on natural gas exports to co-exist—if not guide—the country's administrative procedure on natural gas exports as a whole. At the time EPCA was passed by Congress, a licensing program of natural gas exports already existed under the Federal Power Commission, the predecessor to DOE.[41] If Congress intended, as DOC has mistakenly interpreted,[42] that a licensing program through a separate agency was sufficient to replace the mandated EPCA Section 103 prohibition on exports of natural gas, then Congress would have had no reason to pass the legislation in the first place, as the Federal Power Commission licensing program would have filled this need under that reasoning.

Overall, DOC's mandatory program of prohibition is intended to be a gatekeeper on natural gas exports and guide natural gas export policy generally. The NGA licensing program administered by DOE is governed by a public interest standard, where DOE approves an export application *unless* the export is found to be against public interest. In contrast, the EPCA-mandated requirements for permitting natural gas exports under EPCA's general prohibition rule yield critically different outcomes to the NGA-mandated licensing program. This ensures DOC's role as a gatekeeper to natural gas exports that subsequently may reach the DOE and FERC licensing stages of approval.

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[37] *See* 41 C.F.R. §. 44,155, 44,158 (1976) (noting that exports of natural gas require a license from the Federal Power Commission and anticipating the publication of regulations relating to the export of natural gas).
[38] 15 U.S.C. § 717(b)(e)(1).
[39] *Id*.
[40] *Id*.
[41] *See* 41 C.F.R. § 44,155, 44,158 (1976) (noting that exports of natural gas require a license from the Federal Power Commission).
[42] *See* Pritzker Letter (Sep. 2014).

3. DOC'S DIFFERENCE OF TREATMENT IN THE PROMULGATION OF REGULATIONS PROHIBITING CRUDE OIL EXPORTS AND NATURAL GAS EXPORTS IS UNEXPLAINED AND UNJUSTIFIED.

The statutory source of DOC's existing authority over crude oil exports is the same as that over natural gas exports, yet the agency has obviously failed to establish any regulatory regime prohibiting the export of natural gas as it has done with crude oil. EPCA, however, clearly directs the promulgation of regulations that restrict *both* crude oil and natural gas exports.

Further, the Export Administration Act of 1979 ("EAA") provides the regulatory framework for enforcement of export restrictions on *both* fuels, which the President delegated to DOC to administer and execute pursuant to E.O.11912, and which Congress then ratified and approved through subsequent legislation, including the EAA. Section 7 of the EAA, for example, establishes "short supply control" rules (Export Administration Regulations, or "EARs") in order to carry out the policy of EAA Section 3(2)(C), which is to "[restrict] the export of goods where necessary to protect the domestic economy from the excessive drain of scarce materials and to reduce the serious inflationary impact of foreign demand."[43] Indeed, "[f]rom the start of the program of controls, the export of crude oil was embargoed. Various refinements have been made to the [Export Administration] Regulations over the years to reflect changes in the statutes, but these changes have not affected the general embargo status of crude oil."[44] DOC's difference in regulatory treatment of natural gas and crude oil exports is both unjustified and unexplained.

B. THE PROJECTED INCREASE OF U.S. NATURAL GAS EXPORTS WILL EXACERBATE CLIMATE CHANGE, HARM HUMAN HEALTH, AND THWART BIODIVERSITY CONSERVATION.

President Obama has recognized that climate change is one of the most important challenges we have ever faced as a nation and that the problem possesses a global reach. But expanding natural gas use is anathema to addressing the climate crisis. Increased production of natural gas has and will continue to increase methane and overall greenhouse gas ("GHG") emissions. Methane is a massively more potent GHG than carbon dioxide and is released at all stages of the exploration, extraction, refinement, liquidification, transportation, and burning processes of natural gas. One 2014 study showed that, while the use of natural gas may rise by as much as 170% by 2050, this rise alone will only reduce carbon dioxide emissions by, at most, 11%.[45] In fact, the majority of projection models used in the study found up to a 7% *increase* in

[43] 50 App. U.S.C. § 2402(2)(C).
[44] 46 C.F.R. § 49,108, 49,109 (1981).
[45] *See* Haewon McJeon, et al., *Limited Impact on Decadale-Scale Climate Change From Increased Use of Natural Gas*, 514 NATURE 482, 482 (Oct. 23, 2014).

human "climate forcing" with the increased use of natural gas.[46] This study concluded that increased market penetration of natural gas was not an alternative to, or means of, climate change mitigation.[47] Contrary to the public marketing spin, natural gas is dirty.

Natural gas data from industry and governments is also notoriously inconsistent. One recent study of natural gas extraction in the Southwest United States found that emissions databases are severely underestimating associated methane releases.[48] The study used satellite observations to map methane emissions in the region and found they are approximately 2 to 3.5 times more than previously estimated.[49] While having a shorter lifetime in the atmosphere than carbon dioxide, methane's effect on climate change is over twenty times greater than that of carbon dioxide over a fixed period of 100 years.[50]

1. NATURAL GAS EXTRACTION EXACERBATES CLIMATE CHANGE AND ADVERSELY IMPACTS AIR QUALITY..

The federal government, specifically the U.S. Environmental Protection Agency ("EPA"), currently *significantly undercounts* the amount of methane being released into the atmosphere by U.S. natural gas and other fossil fuel extraction activities. The annual emissions information reported in the official U.S. GHG Inventory provides key information for individuals, businesses, and decision-makers at all levels as they assess the impact of their activities upon climate change, including pollution from natural gas, particularly methane.[51] Our main concern is that methane emissions as quantified in the Inventory are underestimated and misleading due to (1) the use of an outdated 100-year global warming potential ("GWP") for methane and (2) the omission of data calculated based on a 20-year GWP for methane.

One of the breakthrough insights of the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report ("AR5") is the discovery of a fundamental flaw in previous calculations of GWP: the climate effect of CO_2 intrinsically includes carbon cycle feedbacks, but the GWPs of other greenhouse gases do not.[52] Thus, to compare "apples to apples," it is necessary to include these feedbacks in the estimates of all GHG emissions. The Inventory, however, perpetuates the error by reporting only the lower, non-feedback 100-year GWP values for non-CO_2 gases. This omission causes serious inaccuracies in how the report presents and compares the gases' respective climate change impacts. We appreciate that EPA has included the

[46] *See id*.
[47] *See id*.
[48] *See generally* Eric A. Kort, et al., *Four Corners: The Largest US Methane Anomaly Viewed From Space*, 41 Geophysical Research Letters 6898 (Oct. 16, 2014).
[49] *See id*.
[50] *Methane*, *Climate Change*, *Emissions*, *Overview*, EPA.GOV (Aug. 2, 2014), http://epa.gov/climatechange/ghgemissions/gases/ch4.html.
[51] U.S. EPA, *2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determinations for New or Substantially Revised Data Elements; Final Rule*, 78 Fed. Reg. 71904 (Nov. 29, 2013).
[52] G. Myhre et al., *Anthropogenic and Natural Radiative Forcing*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE IPCC 713 (Cambridge Univ. Press 2013).

AR5 100-year GWP values for all greenhouse gases, as outlined in Annex 6 of the report.[53] It is entirely unrealistic, however, to expect the wide range of Inventory readers to understand the significance of the Annex 6 information, much less to substitute their own calculations in lieu of those provided by EPA. The GHG inventory is relied upon by citizens, businesses, governmental agencies, and policy makers across the country, and they consult its prominently displayed information, especially its executive summary and tables. These *do not display or explain* the significance of the GWPs. As the examples discussed below and the attached appendixes vividly demonstrate, only actually running the numbers and displaying them in tables show their impact and avoid comparing apples to oranges. Thus, we strongly urge EPA to include climate-carbon feedbacks from all GHGs and use the GWPs stated in AR5. To do otherwise is inaccurate and misleading.

Another glaring omission of the EPA and federal government is the failure to compare, and in this case even to mention, GHG emissions based on their 20-year global warming potentials. The selection of a particular time horizon for GWPs influences the policy focus because the analysis and comparison occur only in the selected time frame. Many policy analysts and decision makers, however, believe that a 100-year focus is important for long-term climate stabilization, while a near-term (20 years or less) focus is equally crucial because the next few decades will determine whether catastrophic and irreversible damage can be avoided before tipping points are crossed. Decision makers and the public should be presented with the 20-year effects of GHGs to focus attention on short-term solutions that may abate immediate harm sufficiently to allow us to reach climate stability on a time scale of 100 years and beyond.

The time-based distinction between GWPs is of key importance for a GHG like methane. Methane is a short-lived GHG that remains in the atmosphere a little over a decade; by contrast, CO_2 has an atmospheric lifetime of a century and beyond. Methane has exerted the second largest warming influence since the Industrial Revolution, behind only CO_2.[54] And crucially, *the AR5 value for its 20-year GWP (86) is approximately 2.5 times higher than its 100-year GWP (34).* The implications of this difference for responsive action are tremendous, and reporting both GWPs for methane is therefore critical.

To illustrate these points, we excerpted Table ES-2 from the Inventory and presented both AR5 100-year and 20-year GWPs (with climate-carbon feedbacks) for all GHGs.[55] The results are striking: *on a 20-year GWP basis, total U.S. methane emissions are approximately equivalent to the heating influence of CO_2 generated by the entire electricity generating sector in the country.* The policy implications of this finding are critical. In recent years, EPA has embarked on a ground-breaking effort to create standards for power plants. However, since methane is an equivalent contributor to near-term climate change, EPA should place an equally

[53] U.S. EPA, *Draft Inventory of US Greenhouse Gas Emissions: 1990-2013*, Annex 6 at A-403 (Feb. 15, 2015).
[54] G. Myhre et al., *Anthropogenic and Natural Radiative Forcing*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE IPCC Figure 8.17 at 698 (Cambridge Univ. Press 2013).
[55] *See* Box A.

high priority on methane mitigation strategies. Overall, on a 20-year basis, methane emissions constitute *approximately 27% of total U.S. greenhouse gas emissions*--instead of only about 10% as reported in Table ES-2. Put another way, reporting only an (incorrect) 100-year methane GWP results in a ratio between warming from methane and warming from CO_2 of about 1 to 10 (10%), while reporting the most accurate 20-year methane GWP shifts that ratio to 4 in 10 (40%). Presenting an accurate short-term comparison is thus critically important, and omission of these facts is highly misleading.

Box A. Excerpt from Table ES-2 ("Recent Trends in U.S. Greenhouse Gas Emissions and Sinks") in the Draft GHG Inventory for 1990-2013 at ES-5.

Gas/Source	2013 (Inventory GWP) MMT CO2eq	2013 (AR5 100-yr GWP) MMT CO2eq	2013 (AR5 20-yr GWP) MMT CO2eq	Percent total GHG emissions (GHG Inventory)	Percent total GHG emissions (AR5 100-yr)	Percent total GHG emissions (AR5 20-yr)
CO2	**5,556.0**	**5,556.0**	**5,556.0**	**82.4**	**79.4**	**66.8**
Fossil Fuel Combustion	5,195.5	5,195.5	5,195.5	77.1	74.2	62.5
Electricity Generation	2,040.5	2,040.5	2,040.5	30.3	29.2	24.6
Transportation	1,754.0	1,754.0	1,754.0	26.0	25.1	21.1
Industrial	817.3	817.3	817.3	12.1	11.7	9.8
Residential	329.9	329.9	329.9	4.9	4.7	4.0
CH4	**654.1**	**911.9**	**2,259.1**	**9.7**	**13.0**	**27.2**
Enteric Fermentation	164.5	223.7	565.9	2.4	3.2	6.8
Natural Gas Systems	159.9	230.3	556.5	2.4	3.3	6.7
Landfills	114.6	155.9	394.2	1.7	2.2	4.7
Total	**6,742.2**	**7,000.0**	**8,311.5**			

Excerpt from Box A. Entries for source categories are directly from Table ES-2 ("Recent Trends in U.S. Greenhouse Gas Emissions and Sinks") in the Draft GHG Inventory for 1990-2013 at ES-5. Data column 1 is a replicate of the last column in Table ES-2, which contains 2013 data. Data columns 2 and 3 in this table were compiled using IPCC AR5 100-year and 20-year GWPs. These GWPs include climate-carbon feedbacks, as recommended by the AR5. Methane GWPs: column 1 = 25; column 2 = 34 (biogenic) or 36 (fossil); column 3 = 86 (biogenic) or 87 (fossil). Data columns 4 through 6 reflect the percentage of total emissions (prior to removal of sinks) for each gas/source.

A compounding factor is that the methane emissions from certain sources are likely under-represented by EPA's analysis method. For instance, a number of peer-reviewed scientific studies suggest that methane leakage from natural gas systems could be as much as double what

EPA assumes.[56] Likewise, methane leakage from landfills is notoriously difficult to monitor and may also be much larger than EPA's calculations assume. In sum, not only does the Inventory fail to include critical information about methane's influence over the next 20 years, but even the corrected values we calculate here are likely a considerable underestimation of actual methane emissions.

Furthermore, in addition to the GHG emission leakage problems associated with the entire natural gas extraction process writ large, other harmful air pollutants are emitted from these processes as well. For example, a typical natural gas production facility (*i.e.* wellpads) emits leaked hazardous air pollutant (HAP) emissions at a rate of 0.671 tons per year, equating to roughly 200,000 tons per year for the entire country, given that there are nearly one million gas wells in the U.S. and conservatively assuming that the average wellpad has three producing gas wells.[57] This number, which far exceeds EPA's estimates of total fossil fuel industry emission of 127,000 tons a year, does not take into account leaks from any other infrastructure such as storage facilities, transportation infrastructure, or gathering and boosting facilities, all of which exhibit leakage as well.[58]

Among the numerous HAPs emitted by the natural gas production industry are toluene, hexane, benzene, mixed xylenes, formaldehyde, mercury, arsenic, ethylene glycol, methanol, ethylbenzene, and 2,2,4-trimethylpentane.[59] Exposure to any of these HAPs can be detrimental,

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[56] *See, e.g.,* D. R. Caulton et al., *Toward a Better Understanding and Quantification of Methane Emissions from Shale Gas Development,* PROC. NATL. ACAD. SCI. DOI 10.1073/pnas.1316546111 (2014), *available at* http://www.pnas.org/content/111/17/6237.full.pdf+html; S. M. Miller et al., *Anthropogenic Emissions of Methane in the United States*, PROC. NATL. ACAD. SCI. 100, 20018 (2013), *available at* http://www.pnas.org/content/110/50/20018.full.pdfull.pdf ; G. Pétron et al., *Hydrocarbon Emissions Characterization in the Colorado Front Range: A pilot study*, J. GEOPHYS. RES. 117, D04304 (2012), *available at* http://onlinelibrary.wiley.com/doi/10.1029/2011JD016360/full; R. W. Howarth et al., *Methane and the Greenhouse Gas Footprint of Natural Gas from Shale Formations,* CLIMATIC CHANGE DOI 10.1007/s10584-011-0061-5 (2011), *available at* http://link.springer.com/article/10.1007%2Fs10584-011-0061-5.

[57] *See* Memorandum from Bradley Nelson & Heather Brown, EC/R Incorporated, to Greg Nizich & Bruce Moore, EPA, *Re: Equipment Leak Emission Reduction and Cost Analysis for Well Pads, Gathering and Boosting Stations, and Transmission and Storage Facilities Using Emission and Cost Data from the Uniform Standards* 6 Tbl. 2 (April 17, 2012), Document ID No. EPA-HQ-OAR-2010-0505-4496; U.S. DEP'T OF ENERGY, U.S. ENERGY INFO. ADMIN., Number of Producing Natural Gas Wells, http://www.eia.gov/dnav/ng/ng_prod_wells_s1_a.htm (updated Dec. 31, 2014) If the average wellpad is assumed to contain two wells, the estimated leaked HAP emissions go up to roughly 300,000 per year.

[58] *See* Carbon Limits, *Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras*, 11 Fig. 5, CL report CL-13-27 (March 2014), http://www.catf.us/resources/publications/files/Carbon_Limits_LDAR.pdf; Environmental Integrity Project, *Accident Prone: Malfunctions and "Abnormal" Emission Events at Refineries, Chemical Plants, and Natural Gas Facilities in Texas, 2009-2011* http://www.environmentalintegrity.org/news_reports/07_18_2012.php ; Memorandum from Bradley Nelson & Heather Brown, EC/R Incorporated, to Greg Nizich & Bruce Moore, EPA, *Re: Equipment Leak Emission Reduction and Cost Analysis for Well Pads, Gathering and Boosting Stations, and Transmission and Storage Facilities Using Emission and Cost Data from the Uniform Standards* 6 Tbl. 2 (April 17, 2012), Document ID No. EPA-HQ-OAR-2010-0505-4496.

[59] EPA, *Regulatory Impact Analysis: Final New Source Performance Standards and Amendments to the National Emission Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry* 4-13 to 4-14 (Apr. 2012), Document ID No. EPA-HQ-OAR-2010-0505-4544 (hereinafter *HAPs RIA*).

as all are known to cause significant harmful effects to human health. EPA has described benzene as one of the two "key pollutants that contribute most to the overall cancer risks" to people across the country.[60]

Benzene is a carcinogen through "all routes of exposure," resulting in leukemia as well as many serious non-cancer effects such as preleukemia, aplastic anemia, and depression of lymphocyte levels in the blood.[61] While most of the non-cancer effects result from long-term exposure, research has recently suggested "that biochemical responses are occurring at lower levels of benzene exposure than previously known," and there is evidence that early-life exposure may cause a greater carcinogenic response than exposures of equal amounts of working-age adults, leading California state to list it as causing developmental toxicity.[62] One Texas study has found that "maternal exposure to ambient levels of benzene is associated with the prevalence of spina bifida among offspring."[63] Formaldehyde is the other of the two "key pollutants" determined by EPA to "contribute most to the overall cancer risks," and is also known as a potent respiratory irritant "associated with decrements in lung function and elevated respiratory symptoms in children."[64]

Even low emissions of mercury can pose significant harm to human health, as it bioaccumulates in the food chain as methylmercury once released into the environment in elemental form.[65] Mercury is found in natural gas deposits—some reported as high as 5,000µg/m^3—[66]and may enter the environment either through emission into the air or by entering the water system.

Arsenic is a known carcinogen, has been listed by California as known to cause developmental toxicity, and is a persistent toxin.[67] As determined by the EPA Office of Water, "[a]rsenic . . . is a chemical that bioaccumulates in tissues of aquatic organisms,"[68] not only poisoning those organisms, but the animals (including humans) that feed on those organisms as well.

Toluene is known to cause serious neurological and developmental effects.[69] Even low levels of acute exposure to toluene via inhalation have been "frequently observed" to cause

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[60] *Id*. at 4-9.
[61] *Id.* at 4-15.
[62] *Id.*; *See* CAL. EPA, OEHHA, *Chemical Summary: Benzene. Prioritization of Toxic Air Contaminants – Children's Environmental Health Protection Act* 19 (2001).
[63] *See* Philip J. Lupo, et al., *Maternal Exposure to Ambient Levels of Benzene and Neural Tube Defects in Offspring: Texas, 1999–2004*, 119(3) ENVTL. HEALTH PERSPECTIVES 397 (2011).
[64] *HAPs RIA*, *supra* note 70 at 4-9; CAL. EPA, OEHHA, *Chemical Summary: Formaldehyde. Prioritization of Toxic Air Contaminants – Children's Environmental Health Protection Act* 13 (2001).
[65] *See* Olsen, S.D., *Literature Study Concerning Mercury and Arsenic Distribution in Petroleum and Geothermal Systems, Rogaland Research. Report RF-98/032Olson*, 20 Tbl. 1 (1998).
[66] *See id*.
[67] *See* CAL. EPA, *Safe Drinking Water And Toxic Enforcement Act of 1986: Chemicals Known To The State To Cause Cancer Or Reproductive Toxicity* (2011).
[68] EPA, *Technical Summary of Information Available on the Bioaccumulation of Arsenic in Aquatic Organisms* 2 (2003), Document ID No. EPA-822-R-03-032.
[69] *See HAPs RIA*, *supra* note 70, at 4-16.

central nervous system dysfunction and narcosis.[70] In higher levels of toluene with more chronic exposures, depression of the central nervous system occurs, resulting in symptoms such as "ataxia, tremors, cerebral atrophy, [involuntary eye movements], and impaired speech, hearing, and vision."[71] Non-central nervous system related effects of chronic exposure include upper respiratory tract and eye irritation, dizziness, chronic headaches, and difficulty sleeping.[72]

Based on studies which have shown ethylbenzene to cause carcinogenic and developmental effects on animals, the International Agency for Research on Cancer has classified it as "possibly carcinogenic" to humans.[73] Chronic exposure to ethylbenzene is known to cause eye and lung irritation and have "possible effects on the blood."[74]

Inhalation of xylenes at acute levels can cause "irritation of the nose and throat, nausea, vomiting, gastric irritation, mild transient eye irritation, and neurological effects," while chronic inhalation effects include "headaches, dizziness, fatigue, tremors, and impaired motor coordination."[75] Acute exposure via inhalation of n-hexane can cause "dizziness, giddiness, slight nausea, and headache."[76] Chronic exposure causes nervous system effects as well, including "numbness in the extremities, muscular weakness, blurred vision, headache, and fatigue."[77] Both of these HAPs have been classified by EPA as "not classifiable as to human carcinogenicity" due to the limited data on human exposure.[78]

A 2011 study of Marcellus Shale regional air pollutants in Pennsylvania estimated that VOC emissions from transport, well drilling and hydraulic fracturing, production, and compression station operations in the region amounted to 2,500–11,000 metric tons per year.[79] The study estimated NO_x to be 17,000–28,000 metric tons per year, $PM_{2.5}$ to be 460–1,400 metric tons per year, PM_{10} to be 460–1,400 metric tons per year, and SO_x to be 12–540 metric tons per year as well.[80] The study found estimated damages to the region from this air pollution to be $320,000–$810,000 for total regional transport pollution costs during well development; $2,200,000–$4,700,000 for total costs of well drilling and hydraulic fracturing pollution during development; $290,000–$2,700,000 for ongoing costs from production pollution; and $4,400,000–$24,000,000 for ongoing costs from compression station pollution.[81] Aggregated together, these costs are ranging from $7.2 million to $32 million.[82] The study points out that, while costs during development are one-time costs, the majority of the costs from a single well

[70] *Id*.
[71] *Id*.
[72] *See id*.
[73] *See id.* at 4-17 to 4-18.
[74] *Id.* at 4-17.
[75] *Id.* at 4-18.
[76] *Id.* at 4-19.
[77] *Id.*
[78] *Id.* at 4-18 and 4-19.
[79] *See* Nicholas Burger, et al., *Estimation of Regional Air-Quality Damages from Marcellus Shale Natural Gas Extraction in* Pennsylvania, 8 ENV'L RESEARCH LETTER 5 (2013).
[80] *See id*.
[81] *See id*.
[82] *See id*.

will reoccur annually until the well is capped.[83] While 66% of total damage in 2011 (the year of the study) were attributable to long-term activities, "at the high end, more than [80%] of damages occur in the years after the well is developed."[84]

Ozone is another product of the natural gas production process, which leads to smog and an increase in severity of asthma-related symptoms. Ozone is created when VOCs chemically react with NO_x—both of which are emitted during natural gas production—when they mix in sunlight.[85] While high ozone levels have typically been considered an urban air quality problem, increased rural natural gas development has caused this to become a growing problem in rural areas as well, especially in remote areas of the Western states.[86] Many of these areas are designated by the Clean Air Act as Class I areas—international parks, national wilderness areas that exceed 5,000 acres in size, and national parks that exceed 6,000 acres in size.[87] These remote locations create situations in which ozone can be created that are not present in urban areas, such as "NOx emissions from an internal combustion engine at a gas well . . . react[ing] with terpenes (a reactive VOC) emitted from pine forests and form[ing] [ozone] in an area where the right mix of precursors was previously not available for this reaction to take place."[88] Increased natural gas production has even caused many remote Class I areas to exceed their national ambient air quality standard limitations (NAAQS).[89] The NAAQS for ozone is currently seventy-five parts per billion (ppb), but EPA is currently formulating final rules that will lower the NAAQS to, at the most, seventy ppb. The EPA Clean Air Science Advisory Committee has suggested on multiple occasions that a standard between sixty and seventy ppb is necessary to protect human health.

2. NATURAL GAS EXTRACTION LEADS TO WILDLIFE AND NATURAL RESOURCES DEPLETION.

Natural gas extraction and related transportation activities raise a multitude of wildlife, water and natural habitat problems that state governments and the federal government continue to struggle with under statutes such as the federal National Environmental Policy Act ("NEPA"). Species listed or soon to be listed under the federal Endangered Species Act ("ESA") are harmed, taken and jeopardized by fracking and related operations. Numerous clean water and water allocation problems are created by fracking. This subsection provides an overview of some of the literature on these topics.

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[83] *See id*. at 6.
[84] *Id*. at 6–7.
[85] *See* Michael G. Barna, et al., *Regional Impacts of Oil and Gas Development on Ozone Formation in the Western United States*, 59 Journal of Air & Waste Management Association 1111, 1111 (2009).
[86] *See id*.
[87] *See id*.
[88] *See id*. at 1112.
[89] *See id*. at 1116.

The direct loss of wildlife habitat (and ESA critical habitat) to natural gas development is a cause of serious concern; a relatively small infrastructure land occupation can have reverberating effects on the surrounding habitat. For instance, a study of 250 drilling pads on the Marcellus shale of Pennsylvania showed that, while an average of 8.8 acres of forest had been cleared for each fracking drilling pad, each drilling station actually affected 30 acres of forest, impacting area-sensitive species.[90] In another example of this expanded area affect, oil and gas production-related roads, pipelines, pads, and wastepits occupy only 4% of the total area in the Big Piney-LaBarge field of Wyoming, but 97% of the total area falls within one-quarter mile of this infrastructure, adversely impacting all the greater sage-grouse habitat in the area and much of the elk population's habitat as well.[91]

One U.S. Forest Service study aimed to document the impacts of natural gas development on the natural and scientific resources of the Fernow Experimental Forest in West Virginia.[92] Observed impacts that were expected included: permanent deforestation of the well pad, access road, and pipeline right of way; the reshaping and contouring of the site which led to the removal of all ground vegetation within the perimeter; significant soil erosion associated with the construction—which was documented as being "underestimated" at 2.1 metric tons of eroded material per hectare—and the introduction of 3,000 meters of hard edge by the pipeline which increased fragmentation, was believed likely to change the microclimate, and was believed likely to change the rates of nest predation and increase the dispersal of invasive exotic plants and animals.[93] Many unexpected impacts were observed as well, including: extensive forest and soil damage from drill pit fluids in three different locations; heavier than expected road damage due to heavy equipment use which caused the collapse of drainage ditches and significant road erosion; and equipment failures, truck accidents, and last-minute changes to pipeline installation procedures across a tributary and wetland which all caused harm as well.[94]

Moreover, many instances of wildlife avoiding areas where natural gas is extracted have been observed. Such behavior obviously limits the habitat available to the animals and can have a dividing effect among populations. Female pronghorn—the country's longest terrestrial migrant—have demonstrated an outright abandonment of areas with the greatest habitat and industrial footprint, indicating a decline in the availability of high-quality habitat for pronghorn due to the behavioral impacts of habitat alteration associated with gas field development.[95]

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[90] *See* N. Johnson, *Pennsylvania Energy Impacts Assessment: Report 1: Marcellus Shale Natural Gas and Wind*, NATURE CONSERVANCY (2010).
[91] *See* C. Weller, et al., *Fragmenting Our Lands: The Ecological Footprint from Oil and Gas Development*, THE WILDERNESS SOCIETY 80221(303) 1 (2002).
[92] *See* M. B. Adams, et al., *Effects of Development of a Natural Gas Well and Associated Pipeline on the Natural and Scientific Resources of the Fernow Experimental Forest: General Technical Report NRS-76*, U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE, NORTHERN RESEARCH STATION (2011).
[93] *See id*.
[94] *See id*.
[95] *See* J. P. Beckmann, et al., *Human-Mediated Shifts in Animal Habitat Use: Sequential Changes in Pronghorn Use of a Natural Gas Field in Greater Yellowstone*, 147(1) BIOLOGICAL CONSERVATION 222–23 (2012).

Rocky Mountain elk have also been observed demonstrating a strong avoidance of the industrial development footprint in gas fields during the day to the extent that human activity played a larger role than maternal status in shaping the elks' resource use.[96] In 2006, the Bureau of Land Management found that mule deer suffered indirect habitat loss up 63% more often in areas where gas well pads were present than in areas with no well pads.[97] As observations such as these and of other animals such as the greater sage grouse[98] have shown, "[a]s density of wells, roads, and facilities increase, the effectiveness of adjacent habitats can decrease until most animals no longer use these areas."[99] What's more, animals that remain within the affected zones are put under more stress, which combines with the avoidance response to impair habitat function by "reducing the capability of wildlife to use the habitat effectively."

Noise pollution from industrial infrastructure—for instance, natural gas compressors—has been found to have a significant impact on animal behaviors, especially those of certain species of birds. Male sage grouse attendance at leks—groups of males who perform mating rituals for on-looking females—was found to be decreased by up to 73% in groups exposed to intermittent anthropogenic sounds associated with natural gas drilling and related roads.[100] Greater sage grouse have also been found to experience higher stress levels in high noise pollution areas, which effects mating behaviors as well.[101] Ovenbirds have also shown lower pairing success rates in noise polluted areas around natural gas compressor stations.[102] Songbirds have shown a tendency to avoid areas near noise-producing gas production sites such as compressor stations, with areas near noiseless energy facilities—such as wellpads—in the boreal forest of Alberta, Canada, having a songbird density 1.5 times higher than that near noise-producing sites.[103]

Separately, the health of an aquatic ecosystem depends not only on the activity in its immediate area, but on conditions of the entire watershed including uplands, riparian corridors, and the stream channel as well.[104] Because of this wide area of dependence, "impacts to the upland plant community and environment can have a very immediate impact on an aquatic

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[96] *See* M. R. Dzialak, et al., *Prioritizing Conservation of Ungulate Calving Resources in Multiple-Use Landscapes*, 6(1) PLOS ONE e14597 (2011).
[97] *See* H. Sawyer, et al., *Influence of Well Pad Activity on Winter Habitat Selection Patterns of Mule Deer*, 73 JOURNAL OF WILDLIFE MANAGEMENT 1052, 1058 (2010).
[98] *See* K. E. Doherty, et al., *Greater Sage-Grouse Winter Habitat Selection and Energy Development*, 72 JOURNAL OF WILDLIFE MANAGEMENT 187 (2008).
[99] *See* Wyoming Game and Fish Department, *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats*, WYOMING GAME AND FISH DEPARTMENT 10 (2010).
[100] *See* J. L. Blickley, et al., *Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks*, 26 CONSERVATION BIOLOGY 461 (2012).
[101] *See* J. L. Blickley, et al., *Experimental Chronic Nouse is Related to Elevated Fecal Corticosteroid Metabolites in Lekking Male Greater Sage-Grouse (Centrocercus urophasianus)*, 7(11) PLoS ONE e50462 (2012).
[102] *See* L. Habib, et al., *Chronic Industrial Noise Affects Pairing Success and Age Structure of Ovenbirds Seiurus aurocapilla*, 44(1) JOURNAL OF APPLIED ECOLOGY 176 (2007).
[103] *See* E. M. Bayne, et al., *Impacts of Chronic Anthropogenic Noise from Energy-Sector Activity on the Abundance of Songbirds in the Boreal Forest*, 22(5) CONSERVATION BIOLOGY 1186 (2008).
[104] *See* Wyoming Game and Fish Department, *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats*, WYOMING GAME AND FISH DEPARTMENT 11 (2010).

system."[105] A direct impact of the inherent high-volume water needs of fracking is the depletion of stream water levels, which also affects the overall health of the aquatic ecosystem.[106] As gas companies have been caught withdrawing water from water sources without permission, and at least one shale drilling company has illegally filled in an acre of exceptional wetland, enforcement of the varying state regulations is called into question as well, further posing questions about whether natural gas development is properly permitted given the grave effects on aquatic ecosystems.[107]

In addition, at least one controlled study of fracking operations has shown that natural gas development activities and associated disturbances may facilitate the establishment of non-native plants.[108] The spread of invasive exotic species is one of the leading causes of endangered species, wildlife and biodiversity decline in the United States (and world-wide).

Further, wastewater from the natural gas extraction processes has detrimental effects on the wildlife and entire ecosystems that it comes in contact with. The illegal dumping of wastewater has continually been a problem with the natural gas extraction industry, with devastating results. In 2007, one company in Kentucky contaminated nearly the entire ecosystem of the Acorn Fork creek with hydrochloric acid and other chemicals by illegally discharging fracking fluids into the stream.[109] "[T]he discharges killed virtually all aquatic wildlife . . ." including many Blackside Dace, a species of fish listed as threatened under Federal law.[110] The dissolved metals and hydrochloric acid from the fracking fluid effluent, which overflowed retention pits directly into Acorn Fork, significantly reduced the stream's pH, as well as creating a thick orange-red flocculent, killing or displacing fish and aquatic invertebrates for months in an over 2.7 kilometer stretch of the stream.[111]

Wastewater spills have also been a persistent problem with the natural gas industry, causing mass deaths of wild and domesticated animals alike. From pipelines accidentally discharging thousands to millions of gallons of wastewater into nearby streams,[112] to fracking

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[105] *Id*.
[106] *See* Anthony Licata, *Natural Gas Drilling Threatens Trout in Pennsylvania (And Other Appalachian States)*, FIELD AND STREAM (July 24, 2009) http://www.troutrageous.com/2009/08/field-stream-pa-natural-gas-drilling.html.
[107] *See id*.; Department of Environmental Protection, Commonwealth of Pennsylvania, *DEP Fines Seneca Resources Corp. $40,000 for Violations at Marcellus Operation in Tioga County*, STATE.PA.US, Newsroom (July 10, 2010) http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=14655&typeid=1.
[108] *See* E. Bergquist, et al., *Invasive Species and Coal Bed Methane Development in the Powder River Basin, Wyoming*, 128 ENV. MONIT. ASSESS. 381 (2007).
[109] *See* U.S. Fish and Wildlife Service, Office of Law Enforcement, *Case at a Glance: U.S. v. Nami Resources Company, LLC*, FISH AND WILDLIFE SERVICE.GOV (2009) http://www.fws.gov/home/feature/2009/pdf/NamiInvestigation.pdf.
[110] *Id*.
[111] *See* D. M. Papoulias, A. L. Velasco, *Histopathological Analysis of Fish From Acorn Creek, Kentucky, Exposed to Hydraulic Fracturing Fluid Releases*, 12 (Special Issue 4) SOUTHWESTERN NATURALIST 92 (2013).
[112] *See* Department of Environmental Protection, Commonwealth of Pennsylvania, *Inspection Report* (May 27, 2009) http://www.marcellus-shale.us/pdf/CC-Spill_DEP-Insp_Rpt.pdf (accidental discharge of wastewater causes death of fish and invertebrates); C. Michaels, et al., *Fracture Communities, Case Studies of the Environmental Impacts of Industrial Gas Drilling*, RIVERKEEPER (2010) http://www.riverkeeper.org/wp-

fluid spills,[113] to trucks running off the road and spilling their wastewater cargo,[114] wastewater spills have been responsible for the killing of sometimes hundreds of animals at a time.[115] Unnatural deaths and contaminations at these magnitudes upset precariously balanced ecosystems, negatively impacting food stocks and disrupting the food chain.

Accidental or illegal wastewater dumping and spills, however, are not the only source of harms caused by natural gas wastewater exposure. Permitted wastewater disposal has also been recorded as having strong negative effects on wildlife. In the Susquehanna River basin of Pennsylvania, for example, over fifteen water treatment plants accepted wastewater from hydraulic fracturing activity and subsequently discharged it into streams.[116] After these discharges started, 40% of observed adult smallmouth bass within one river section exhibited black spots and lesions, and in some cases, ninety to one hundred percent of observed fish were cases of intersex, possibly due to endocrine disruption.[117] Short- and long-term damage to forest trees, vegetation, and surface soil have also been reported after wastewater was applied to the Fernow Experimental Forest in West Virginia—as allowed by state regulations—causing severe damage and mortality of ground vegetation.[118] Two years after the application of fracking wastewater to the area, 53% of the trees were dead.[119] Whether disposed of through aquatic or land dispersal means, natural gas wastewater has detrimental and long lasting effects on any ecosystem that it comes in contact with.

Sudden death is a common impact to wildlife when exposed to natural gas production infrastructure.[120] It has been found that young greater sage grouse have lower reproductive

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content/uploads/2010/09/Fractured-Communities-FINAL-September-2010.pdf (accidental blowout contaminates high-quality fishery);

[113] *See* MIT Energy Initiative, *The Future of Natural Gas, An Interdisciplinary MIT Study* (2011) http://web.mit.edu/mitei/research/studies/natural-gas-2011-shtml (drilling fluid and fracking fluid spills cause wildlife mortality); Department of Environmental Protection, Commonwealth of Pennsylvania, *DEP Fines Talisman Energy USA for Bradford County Drilling Wastewater Spill, Polluting Nearby Water Resource*, (Aug. 2, 2010) http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=13249&typeid=1 (4,200–6,300 gallons of natural gas drilling fluids spill into wetland and coldwater fishery).

[114] *See* Kathie O. Warco, *Fracking Truck Runs Off Road; Contents Spill*, The Observer-Reporter (Oct. 21, 2010) http://www.observer-reporter.com/OR/Story/10-21-2010-fracking-truck-rolls (spill from truck accident causes mass deaths of minnows).

[115] *See* MIT Energy Initiative, *The Future of Natural Gas, An Interdisciplinary MIT Study* (2011) http://web.mit.edu/mitei/research/studies/natural-gas-2011-shtml (citing one fracking fluid spill in Hopewell Township which contaminated a stream, killing over 100 fish).

[116] *See* Betsey Piette, *BP Oil Spill, Fracking Cause Wildlife Abnormalities*, WORKERS WORLD (April 27, 2012) http://www.workers.org/2012/us/bp_oil_spill_fracking-0503/.

[117] *See id*.; Pennsylvania Fish & Boat Commission, *Ongoing Problems with the Susquehanna River Smallmouth Bass, a Case for Impairment*, *Fish*, PENNSYLVANIA.US (May 23, 2012) http://www.fish.state.pa.us/newsreleases/2012press/senate_susq/SMB_ConservationIssuesForum_Lycoming.pdf.

[118] *See* M. B. Adams, *Land Application of Hydrofracturing Fluids Damages a Deciduous Forest Stand in West Virginia*, 40 JOURNAL OF ENVIRONMENTAL QUALITY 1340 (2011).

[119] *See id*.

[120] *See* M. Bamberger, R. E. Oswald, *Impacts of Gas Drilling on Human and Animal Health*, 22(1) NEW SOLUTIONS 51 (2012).

success and lower survival rates when reared near this infrastructure.[121] Multiple threats to several species of bats exist as well, including water withdrawal, water contamination and toxic exposure, and habitat loss and degradation.[122]

Low-level ozone is a strong oxidant that damages plant tissue at relatively low concentrations. As natural gas infrastructure emits VOCs and NO_x, which chemically react in sunlight to form ozone, plants in areas of natural gas production are at greater risk for damage and are expected to be generally less hearty than equivalent foliage away from this infrastructure.[123]

All of the previously covered impacts—habitat loss, harm from wastewater, and mortality—combine to create an overall decline in the density and abundance of wildlife surrounding natural gas production infrastructure. What's more, the more dense the gas development, the bigger an impact this infrastructure has on wildlife populations.[124] The threatened greater sage grouse, mule deer, various sensitive species of fish, and a variety of song birds have all been documented as suffering significant impacts from natural gas production development.[125] In sum, entire ecosystems suffer a decline in diversity and abundance where natural gas infrastructure is developed.

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[121] *See* M. J. Holloran, *Yearling Greater Sage-Grouse Response to Energy Development in Wyoming*, 74(1) JOURNAL OF WILDLIFE MANAGEMENT 65 (2010).

[122] *See* C. D. Hein*, Potential Impacts of Shale Gas Development on Bat Populations in the Northeastern United States*, Bat Conservation International, Austin, Tx (2012) (unpublished).

[123] *See* Michael G. Barna, et al*.*, *Regional Impacts of Oil and Gas Development on Ozone Formation in the Western United States*, 59 Journal of Air & Waste Management Association 1111, 1111 (2009).

[124] *See* M. M. Gilbert, A. D. Chalfoun, *Energy Development Affects Populations of Sagebrush Songbirds in Wyoming*, 75(4) THE JOURNAL OF WILDLIFE MANAGEMENT 816 (2011); S. M. Harju, *et al., Thresholds and Time Lags in Effects of Energy Development on Greater Sage-Grouse Populations*, 74 JOURNAL OF WILDLIFE MANAGEMENT 437 (2011); B. C. Dale, et al*.*, *Abundance of Three Grassland Songbirds in an Area of Natural Gas Infill Drilling in Alberta, Canada*, 4 PROCEEDINGS OF THE FOURTH INTERNATIONAL PARTNERS IN FLIGHT CONFERENCE: TUNDRA TO TROPICS 194 (2008); L. E. Hamilton, et al., *Effects of Disturbance Associated with Natural Gas Extraction on the Occurrence of Three Grassland Songbirds*, 6 AVIAN CONSERVATION AND ECOLOGY 7 (2011); F. Ingelfinger, A. Anderson, *Passerine Response to Roads Associated with Natural Gas Extraction in a Sagebrush Steppe Habitat*, 64 WESTERN NORTH AMERICAN NATURALIST 385 (2004).

[125] *See id*.; M. M. Gilbert, A. D. Chalfoun, *Energy Development Affects Populations of Sagebrush Songbirds in Wyoming*, 75(4) THE JOURNAL OF WILDLIFE MANAGEMENT 816 (2011); S. M. Harju, et al*.*, *Thresholds and Time Lags in Effects of Energy Development on Greater Sage-Grouse Populations*, 74 JOURNAL OF WILDLIFE MANAGEMENT 437 (2011); B. C. Dale, et al., *Abundance of Three Grassland Songbirds in an Area of Natural Gas Infill Drilling in Alberta, Canada*, 4 PROCEEDINGS OF THE FOURTH INTERNATIONAL PARTNERS IN FLIGHT CONFERENCE: TUNDRA TO TROPICS 194 (2008); L. E. Hamilton, et al., *Effects of Disturbance Associated with Natural Gas Extraction on the Occurrence of Three Grassland Songbirds*, 6 AVIAN CONSERVATION AND ECOLOGY 7 (2011); Wyoming Game and Fish Department, *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats*, WYOMING GAME AND FISH DEPARTMENT 12 (2010).

3. NATURAL GAS EXTRACTION IS DIRECTLY LINKED TO INCREASED SEISMIC ACTIVITY.

Fracking and the disposal of oil and gas wastewater into injection wells have now been documented to induce earthquakes.[126] The underground injection of wastewater generated as a byproduct of fracking has been linked to dramatic increases in earthquake activity in many states where fracking has proliferated, including some of the largest quakes ever recorded in those regions.[127]

Earthquake activity has increased dramatically in the central and eastern U.S. in recent years as a direct result of oil and gas wastewater injection from fracking. The earthquake rate began to increase in 2009 and skyrocketed to more than 30 times the background rate in 2014: 659 earthquakes of magnitude 3.0 and larger struck in 2014 compared with an average rate of 21 per year from 1973 to 2008.[128] U.S. Geological Survey scientists recently identified 17 regions within eight states as having significantly increased rates of human-induced earthquakes linked to oil and gas wastewater injection from fracking activity.[129]

The largest earthquake that has been attributed to fracking wastewater injection was a magnitude 5.7 earthquake in 2011 near Prague, Oklahoma, outside of Oklahoma City—the biggest in the state's history.[130] It injured two people, destroyed 14 homes, and caused millions of dollars' worth of damage to homes and buildings near the epicenter.[131]

Other large earthquakes attributed to wastewater injection include a damaging magnitude 4.8 quake in Texas,[132] 5.3 in southern Colorado and northern New Mexico,[133] 4.7 in Arkansas,[134] 4.0 in Alberta, Canada,[135] and 3.9 in Ohio.[136] Magnitude 2.5 earthquakes and larger can be felt at

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[126] *See* W. L. Ellsworth, *Injection-Induced Earthquakes*, 341 SCIENCE 6142 (2013) http://www.sciencemag.org/content/341/6142/1225942.

[127] *See* K. M. Keranen, et al., *Sharp Increase in Central Oklahoma Seismicity Since 2008 Induced by Massive Wastewater Injection*, 345 SCIENCE 448 (2014) http://www.sciencemag.org/content/345/6195/448; Ellsworth *supra* note 137.

[128] *See* USGS, *Earthquake Hazards Program, Induced Earthquakes,* Accessed 15 May 2015, http://earthquake.usgs.gov/research/induced/.

[129] *See* M. D. Petersen, et al., *Incorporating Induced Seismicity in the 2014 United States National Seismic Hazard Model — Results of 2014 Workshop and Sensitivity Studies*, U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT 2015–1070 (2015) http://pubs.usgs.gov/of/2015/1070/pdf/ofr2015-1070.pdf.

[130] *See* Keranen, *supra* note 138.

[131] *See id*.

[132] *See* C. Frohlich, et al., *The 17 May 2012* M*4.8 Earthquake Near Timpson, East Texas: An Event Possibly Triggered by Fluid Injection*, 119 JOURNAL OF GEOPHYSICAL RESEARCh 581 (2014) http://onlinelibrary.wiley.com/doi/10.1002/2013JB010755/abstract.

[133] *See* J. Rubinstein, et al., *The 2001-Present Induced Earthquake Sequence in the Raton Basin of Northern New Mexico and Southern* Colorado, 104 BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA (2014) http://pubs.er.usgs.gov/publication/70126809.

[134] *See* S. Horton, *Disposal of hydrofracking waste fluid by injection into subsurface aquifers triggers earthquake swarm in Central Arkansas with potential for damaging earthquake,* 83 SEISMOLOGICAL RESEARCH LETTERS 250 (2011) http://srl.geoscienceworld.org/content/83/2/250.extract.

[135] *See* R. Schultz, et al., *An Investigation of Seismicity Clustered Near the Cordel Field, West Central Alberta, and its Relation to a Nearby Disposal Well*, 119 JOURNAL OF GEOPHYSICAL RESEARCH 3410 (2014) http://onlinelibrary.wiley.com/doi/10.1002/2013JB010836/abstract.

the surface, while earthquakes at magnitude 4 and larger can cause damage to structures and cause human injuries.

Oklahoma's earthquake activity is now 600 times greater than it was prior to 2008 according to the Oklahoma Geological Survey.[137] Earthquakes swarms are occurring over a large portion of Oklahoma covering about 15% of the state's area.[138] Scientific studies have attributed this exponential increase to the massive amounts of wastewater disposal resulting from fracking.[139]

Several regions of Texas have been hit by earthquakes in areas where no previous seismic activity has been recorded. Scientists have linked increased earthquake activity to wastewater injection near Timpson where a damaging magnitude 4.8 earthquake in May 2012 caused significant structural damage,[140] Azle and Reno,[141] the heavily populated Dallas-Fort Worth region,[142] and Cleburne.[143]

In California—where fault lines are more numerous and more active than in other parts of the country—the potential harm from induced seismic activity is of particular concern. A survey of the state found that over half of California's injection wells are located within 10 miles of a recently active fault.[144] 6% are within a mile.[145]

Fracking itself has also been documented to induce earthquakes. Researchers determined that a magnitude 4.4 earthquake and as many as 100 aftershocks were likely caused by hydraulic fracturing near Fox Creek, Canada in January 2015.[146] One study found that 77 earthquakes in northeastern Ohio in 2014 between magnitude 1.0 and 3.0 were likely caused by nearby fracking

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[136] *See* W-Y Kim, *Induced Seismicity Associated with Fluid Injection into a Deep well in Youngstown, Ohio*, 118 JOURNAL OF GEOPHYSICAL RESEARCH 3506 (2013) http://onlinelibrary.wiley.com/doi/10.1002/jgrb.50247/abstract.
[137] Oklahoma Geological Survey. *Statement on Oklahoma Seismicity* (April 21, 2015) http://wichita.ogs.ou.edu/documents/OGS_Statement-Earthquakes-4-21-15.pdf.
[138] *See id*.
[139] *See* Keranen, *supra* note 138.
[140] *See* Frohlich, *supra* note 143.
[141] *See* M. J. Hornbach, et al., *Causal Factors for Seismicity Near Azle, Texas*, 6 NATURE COMMUNICATIONS 6728 (2015) http://www.nature.com/ncomms/2015/150421/ncomms7728/full/ncomms7728.html.
[142] *See* C. Frolich, et al., *The Dallas–Fort Worth Earthquake Sequence: October 2008 through May 2009*, 101 BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA (2011) http://www.bssaonlie.org/content/101/1/327.short.
[143] *See* A. H. Justinic, et al., *Analysis of the Cleburne, Texas, Earthquake Sequence from June 2009 to June 2010*, BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA 2013 http://www.bssaonline.org/content/early/2013/10/03/0120120336.abstract.
[144] *See* Earthworks, Center for Biological Diversity, and Clean Water Action, *On Shaky Ground: Fracking, Acidizing, and Increased Earthquake Risk in California*, (March 2014) http://www.shakyground.org/wp-content/uploads/2014/02/ShakyGround-FINAL1.pdf.
[145] *See id*.
[146] *See* Howell, D., *Researchers Study Aftershocks of Fox Creek Earthquake Possibly Linked to Fracking*, EDMONTON JOURNAL, (February 3, 2015) http://www.edmontonjournal.com/Researchers+study+aftershocks+Creek+earthquake+possibly+linked+fracking/10781866/story.html.

activity.[147] Other studies have reported that fracking has caused earthquakes in Oklahoma,[148] Harrison County in northeastern Ohio,[149] England,[150] and two regions of British Columbia with the largest registering at magnitude 3.8.[151]

4. STATE "POLICE POWER" AND PUBLIC PROTEST REFLECT INCREASED DEMAND TO ADDRESS FRACKING PROBLEMS AND DANGERS

In late May 2015, the state legislature of Maryland passed a multi-year fracking moratorium approved by the governor. Numerous cities, towns and municipalities are passing similar bans or moratoria, each with impressive records of support. A groundswell of democratic activity aimed at halting natural gas extraction and transportation has erupted in this country.

In early 2015, the state of New York—after a lengthy environmental impact evaluation process—came to the conclusion that fracking is too dangerous to the communities and wildlife habitats of the state to be allowed to be conducted within New York's boarders. Once the New York State Department of Health ("NYSDOH") reviewed the studies in the environmental impact statement ("EIS"), it recommended that fracking should not proceed within the state until adequate scientific data was available to determine the level of risk the process posed to New Yorkers. [152] The New York Department of Environmental Conservation (NYDEC)", which conducted the EIS, agreed with NYSDOH's conclusions citing a number of risks, including:

> 1) air impacts that could affect respiratory health due to increased levels of particulate matter, diesel exhaust, or volatile organic chemicals; 2) climate change impacts due to methane and other volatile organic chemical releases to the atmosphere; 3) drinking water impacts from underground migration of methane

[147] *See* R. Skoumal, et al., *Earthquakes Induced by Hydraulic Fracturing in Poland Township, Ohio*, 105 BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA (2015) http://bssa.geoscienceworld.org/content/early/2015/01/01/0120140168.abstract.

[148] *See* A. Holland, *Earthquakes Triggered by Hydraulic Fracturing in South Central Oklahoma* 103 BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA 1784 (2013) http://www.bssaonline.org/content/103/3/1784.abstract?mtoc.

[149] *See* P. A. Friberg, et al., *Characterization of an Earthquake Sequence Triggered by Hydraulic Fracturing in Harrison County, Ohio*, SEISMOLOGICAL RESEARCH LETTERS (2014) http://srl.geoscienceworld.org/content/early/2014/10/09/0220140127.extract.

[150] *See* UK Department of Energy & Climate Change, *Fracking UK Shale: Understanding Earthquake Risk* 2 (2014); H. Clarke, et al., *Felt seismicity associated with shale gas hydraulic fracturing: The first documented example in Europe,* 41 GEOPHYSICAL RESEARCH LETTERS 8308 (2014) http://onlinelibrary.wiley.com/doi/10.1002/2014GL062047/full.

[151] *See* BC Oil and Gas Commission, *Investigation of Observed Seismicity in the Horn River Basin* (2012) http://www.bcogc.ca/node/8046/download?documntID=1270; A. M. Farahbod, et al. *Investigation of Regional Seismicity Before and After Hydraulic Fracturing in the Horn River Basin, Northeast British Columbia*, 52 Canadian Journal of Earth Sciences 112 (2014) http://www.nrcresearchpress.com/doi/abs/10.1139/cjes-2014-0162?src=recsys.

[152] *See* New York Department of Environmental Conservation, *Final Supplemental Generic Environmental Impact Statement, Executive Summary* 2 (2015) (quoting the New York State Department of Health).

> and/or fracturing fluid chemicals associated with faulty well construction or seismic activity; 4) surface spills potentially resulting in soil, groundwater, and surface water contamination; 5) surface water contamination resulting from inadequate wastewater treatment; 6) earthquakes and creation of fissures induced during the hydraulic fracturing stage; and 7) community character impacts such as increased vehicle traffic, road damage, noise, odor complaints, and increased local demand for housing and medical care.[153]

While NYDEC suggested a number of mitigation measures that would limit the use of fracking,[154] after reviewing NYDEC's findings, the governor saw no other choice than to ban fracking from the state until such time that the practice could be proven safe. The Federal Bureau of Land Management released its own proposed rules concerning fracking on public lands in early 2015 as well.[155] DOC is in a statutorily-mandated position to prohibit natural gas exports, thereby addressing public demand to mitigate the inherent dangers and issues related to fracking and natural gas extraction.

C. THE GLOBAL OVER-ABUNDANCE OF CHEAP NATURAL GAS WILL IMPEDE CLEAN ENERGY DEVELOPMENT.

A recent study led by the Northwest National Laboratory found that a very real possibility exists that a global abundance of cheap natural gas—such as would be increasingly available with the planned rise of U.S. exports—could lead to the stunting of emerging renewable energy sources such as wind and solar.[156] As opposed to an increase in natural gas-fired electricity generation, renewable energy sources deployed at a large-scale level would not only double the world's electricity supply by 2050, but will also likely decrease, or at the least stabilize, global GHG emissions.[157] Illegally permitting the export of natural gas is a subsidized incentive that drains both public and private funds away from viable sources of power, such as solar, that receive a pittance of the federal subsidies given to natural gas and other fossil fuels.[158] Indeed, in a very similar factual context to this one, increased carbon pollution from growing

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[153] *Id*.
[154] *See id*. at 7-1–7-146.
[155] *See generally* Department of Interior, Bureau of Land Management, *Oil and Gas: Hydraulic Fracturing on Federal and Indian Lands*, 80 C.F.R. § 16128 (2015).
[156] *See generally* Haewon McJeon, et al., *Limited Impact on Decadale-Scale Climate Change From Increased Use of Natural Gas*, 514 NATURE 482 (Oct. 23, 2014).
[157] *See* Edgard G. Hertwich, et al., *Integrated Life-Cycle Assessment of Electricity-Supply Scenarios Confirms Global Environmental Benefit of Low-Carbon Technologies, Early Edition*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA (Oct. 2, 2014) http://www.pnas.org/content/early/2014/10/02/1312753111.
[158] *See* Oil Change International, http://priceofoil.org/2014/11/11/fossil-fuel-bailout-g20-subsidies-oil-gas-coal-exploration/ (last visited June 9, 2015).

exports of U.S. gasoline and diesel already exceeds cuts made from recent U.S. fuel efficiency standard improvements.[159]

D. THE EXPORT OF NATURAL GAS NEGATIVELY IMPACTS THE NATION'S ECONOMIC AND DEMOCRATIC INTERESTS.

Exporting natural gas will have negative impacts on the country's economy for multiple reasons. While U.S. producers of natural gas will be able to reap more profits from the sale of their product, the majority of Americans will suffer higher energy costs, which, in turn, will pull money away from other sectors of the economy. In addition, the worsening of climate change--due to a global acceleration of natural gas use--increases the costs of responding to climate change.

The EIA, for example, has projected that an increase in natural gas exports would cause a 4 to 11% increase in domestic natural gas prices.[160] This would cause an increase of at least $7 billion of costs for residential, commercial, and industrial consumers per year by 2020 and up to $14 billion per year by 2040.[161] Further, responding to the effects of climate change—increased storm damages, sea level rise, drought, crop failure, flooding, increased wildfires—has already hobbled the federal government considerably. In his recent fiscal year 2016 budget proposal, President Obama drove home this point, citing direct costs of $300 billion over the past decade due to extreme weather and wildfires alone.[162] $176 billion was spent on domestic disaster response and relief; $24 billion on flood insurance; $61 billion on crop insurance; and $34 billion on wildfire management.[163] These numbers are expected to rise dramatically over the coming years.

In a review of a number of scientific studies, the Government Accountability Office found a predicted increase of fourteen to 47% in inflation-adjusted U.S. hurricane losses alone by 2040.[164]By 2100, losses are projected to rise up to 110%.[165] It should be noted as well that these costs could be amplified by a major event or a series of major events "affect[ing] the solvency of an industry, municipality, or State."[166]

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[159] *See, e.g.,* Dina Cappiello, AP/Denver Post, Fuel Exports Outpace Domestic Emissions Reductions (December 9, 2014).
[160] *See* Allison Cassady, *Potential Consumer Price Impacts of Efforts to Rapidly Expand Exports of Liquified Natural Gas*, *Issues*, *Energy and Environment*, AMERICANPROGRESS.ORG (Jan. 27, 2015) https://www.americanprogress.org/issues/green/report/2015/01/27/105441/potential-consumer-price-impacts-of-efforts-to-rapidly-expand-exports-of-liquefied-natural-gas/.
[161] *See id*.
[162] *See* Office of the President, *Budget of the United States Government, Fiscal Year 2016* 353 (Feb. 2, 2015) http://www.whitehouse.gov/sites/default/files/omb/budget/fy2016/assets/ap_24_climate_risk.pdf.
[163] *See id*.
[164] *See id*. at 354.
[165] *See id*.
[166] *Id*.

The National Flood Insurance Program is designed to provide an insurance-based alternative to disaster relief costs to meet rising flood costs and to offset these paid costs with premium payments.[167] Catastrophic events, however, can have impacts with costs that far exceed any premium collections for that year. For example, 2005's Hurricane Katrina and 2012's Hurricane Sandy caused such an excess of damage that the National Treasury has accrued paid losses of $24 billion above collected premiums.[168] Such catastrophic natural disasters are expected to increase in the future, as well as their area of effect. Nationwide, Special Flood Hazard Areas—those areas of land which have a 1% or greater chance of flooding in any given year—are expected to expand by 40 to 45% by 2100, due largely by the effects of climate change.[169] As a result, the average loss-cost per policy is expected to rise ten to 15% by 2020 and fifty to 90% by 2100.[170] This rise in costs will be compounded by a projected eighty to one hundred percent growth in policyholders.[171]

Both crop insurance costs and wildfire response costs have grown by an incredible amount in recent years, and are projected to continue to grow. The federal government's total exposure for crop insurance—which covers loss of crop yields from natural causes—is currently $110 billion, nearly double the total exposure of $7 billion in 2007.[172] On average, federal wildfire fighting costs have risen by 25% per year over the past two decades; costs going from 16% of the total budget of the U.S. Forestry Service in 1995 to 42% in 2014.[173]

The federal government's climate change related risk exposure, however, reaches far beyond the direct costs. Indirect costs related to healthcare, property management, national security, species recovery, and lost revenue will rise as a result of across the board climate-driven changes.[174] Healthcare costs will be impacted by increased exposure to extreme weather events, wildfires, worsened air quality, and spread of illnesses transmitted by food, water, and disease-carrying insects such as mosquitoes and ticks.[175] The most vulnerable members of society to the health-related impacts of climate change—children, low-income individuals, and the elderly—are the ones directly covered by federal healthcare via Medicare, Medicaid, and the Children's Health Insurance Program, which cost the federal government an aggregate of $815 billion in 2014 alone. Federal property management costs will rise as well; these properties suffer the same vulnerabilities to climate change as any other similarly situated properties.[176]

Further, threats to national security are projected to grow with the severity of climate change. Climate change is considered by the Department of Defense to be a "threat multiplier"

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[167] *See id*.
[168] *See id*.
[169] *See id.*
[170] *See id.*
[171] *See id*.
[172] *See id*. at 355.
[173] *See id*.
[174] *See id.*
[175] *See id.*
[176] *See id*. at 356.

and will almost certainly "intensify the challenges of global instability, hunger, poverty, conflict, pandemic disease, disputes over refugees and resources, and destruction by natural disaster."[177] Future missions of the armed forces will change in frequency, scale, and complexity, and the military may be called upon more frequently to support civil authorities.[178] Climate change is altering and constraining the execution of military missions, impacting supply chains, and changing critical equipment needs.[179]

Climate change also threatens a large proportion of species with extinction due to changing ecosystems, rising temperatures, drought, and flooding, and, therefore, is expected to increase Federal species recovery costs as well.[180] Finally, climate change is expected to hamper economic production in the U.S. and around the world, which means lost revenues for the federal government.[181] Global temperature rise could cause economic damages of more than 4% per year to the global gross domestic product by the year 2100.[182]

V. PROPOSED ACTION

DOC is legally required to fulfill its mandate under Section 103 of EPCA and E.O.11912 to immediately promulgate a final natural gas export prohibition rule. Our proposed language for the agency: "All exports of domestically produced natural gas, whether in liquid or gaseous form, are prohibited, as required by 42 U.S.C. § 6212(b)(1)." Further, an injunction should be placed on all U.S. natural gas exports until a rule with lawful exemptions[183] is in effect.

[177] *Id*.
[178] *See id*.
[179] *See id*.
[180] *See id*.
[181] *See id*. at 357.
[182] *See id*.
[183] The statute identifies three instances where 1975-level natural gas exports should be "uninterrupted or unimpaired", 42 U.S.C. § 6212(d)(1)-(3), and provides a transparent administrative process for the promulgation of any subsequent exemptions. 42 U.S.C. § 6212(b), (e).

APPENDIX A

BACKGROUND AND TRENDS ON U.S. NATURAL GAS EXPORT MARKET

The exportation of natural gas from the U.S. is ongoing, wide-spread, and is slated to grow exponentially in the near future. The U.S. is already a major exporter of natural gas, sending trillions of cubic feet of natural gas across our borders each year. While most natural gas exports travel along pipelines to Canada and Mexico, plans are in place to grow liquefied natural gas (LNG) exports tremendously over the next 5- to 10-year horizon.

A. UNITED STATES NATURAL GAS EXPORTING TRENDS

1. 1990–2015 NATURAL GAS EXPORTS

In the early 1980s, U.S. exports of natural gas were relatively minimal. In 1980, the United States exported 49 billion cubic feet (Bcf) of natural gas.[184] By 1990, this number had nearly doubled to 86 Bcf of natural gas.[185] While a significant increase over a ten-year period of time, this pales in comparison to the trillions of cubic feet exported from the U.S. every year in the past five years.[186] The amount of natural gas exported by the United States today is 32 times the amount exported in 1980.[187]

Over the past five years, natural gas exports from the U.S. have grown at an extraordinary pace. From 2010 to 2011 alone, natural gas exports experienced an increase of 33%, or approximately 400 Bcf[188], bringing the total net exports of natural gas—both domestically produced and re-exported—to 1,507 Bcf.[189] This dramatic increase was largely due to increased pipeline exports to Canada and Mexico, which accounted for 95% of total U.S. natural gas exports.[190] Domestically produced LNG exports, however, decreased by 41% due to the closing of the Kenai, Alaska LNG terminal, the only terminal that exported LNG to any countries on the Pacific Rim.[191] In 2012, the U.S. saw another bump in exports, which rose by 8% to 1,619 Bcf, with an 11% increase in pipeline exports to Mexico and Canada, offsetting decreases in LNG

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[184] *See* U.S. GOVERNMENT PRINTING OFFICE, STATISTICAL ABSTRACT OF THE UNITED STATES, VOLUME 129, PART 2010 575 (2010).
[185] *See Natural Gas Export and Import by Country 1990-2010*, KNOEMA.COM (Aug. 2014), http://knoema.com/pbodqjb/natural-gas-export-and-import-by-country-1990-2010.
[186] *See id*.
[187] *See id*. (citing 2013 exports as 1,572 Bcf); U.S. GOVERNMENT PRINTING OFFICE, STATISTICAL ABSTRACT OF THE UNITED STATES, VOLUME 129, PART 2010 575 (2010) (citing 1980 exports as 49 Bcf). 1,572 divided by 49 equals 32. 082.
[188] *See* United States Energy Info. Admin., *U.S. Natural Gas Imports & Exports 2011*, U.S. DEP'T OF ENERGY 8 (2012).
[189] *See id*.
[190] *See id*.
[191] *See id*.

exports and re-exports.[192] 2013 saw the only recent decline in natural gas exports for the United States, dropping by a negligible 3% to 1,572 Bcf, with the majority of natural gas being transported by pipeline (over 98%) to Canada or Mexico.[193]

2. FUTURE PROJECTIONS FOR UNITED STATES' NATURAL GAS EXPORTS

EIA has projected further exponential growth for natural gas exports from the U.S. in the coming decade due to the increased production from shale wells. With the construction of multiple LNG export facilities set to be completed in 2015 and 2016, EIA is projecting that the U.S. will become a net-exporter of natural gas by 2017.[194] Furthermore, with the growth of LNG exports set to continue to expand with further proposed LNG export facilities, EIA projects that the nation will be a net-exporter of all natural gas by 2018.[195] The growth in natural gas exports will continue after 2017, with net exports in 2040 ranging from 3 trillion cubic feet (Tcf) to 13.1 Tcf.[196]

B. EXISTING AND PLANNED EXPORT INFRASTRUCTURE

A detailed list of the information on existing, approved, and proposed LNG export terminals discussed in this Petition is in Appendix B. In addition to these LNG terminals, a number of pipelines carrying natural gas in its gaseous form cross the United States' borders with both Mexico and Canada, which currently carry the majority of U.S. natural gas exports.[197]

1. EXISTING LNG IMPORT/EXPORT TERMINALS

Significant LNG import/export infrastructure already exists within the U.S. As of Jan. 6, 2015, 11 import/export terminals were operational, all along the east coast or on the Gulf of

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[192] *See U.S. Natural Gas Imports & Exports 2012*, *Natural Gas*, U.S. ENERGY INFORMATION ADMINISTRATION (July 23, 2013) http://www.eia.gov/naturalgas/importsexports/annual/archives/2013/#tabs-supply-2.
[193] *See U.S. Natural Gas Imports & Exports 2013*, *Natural Gas*, U.S. ENERGY INFORMATION ADMINISTRATION (May 28, 2014) http://www.eia.gov/naturalgas/importsexports/annual/#tabs-supply-2.
[194] *See id*.; *infra* Appendix A.
[195] *See* Energy Information Administration, *Annual Energy Outlook 2014*, *Analysis & Projections*, EIA.GOV (May 7, 2014) http://www.eia.gov/forecasts/aeo/MT_naturalgas.cfm; *infra* Appendix A.
[196] *See* Energy Information Administration, *Annual Energy Outlook 2015, with Projections to 2040*, EIA.GOV 20 (April, 2015) http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf.
[197] *See supra* notes 193-4.

Mexico.[198] The capacity of these facilities totals 18.85 Bcf daily, the majority of which, however, is currently used for LNG imports.[199]

2. APPROVED LNG EXPORT TERMINALS

DOE has approved a number of LNG export terminals for operation. Four facilities on the east coast and the Gulf of Mexico have been approved and are under construction.[200] One additional facility on the Gulf of Mexico has been approved by DOE, but as of Jan. 6, 2015 was not yet under construction.[201] The total capacity of these approved facilities will be 9.22 Bcf daily once all facilities are fully operational.[202]

3. PROPOSED BUT NOT YET APPROVED LNG EXPORT TERMINALS

As of the date of this Petition, 14 export terminals had been proposed to DOE for construction.[203] While the majority of these terminals are planned to be constructed on the east coast, two would be located on the west coast in Oregon.[204] With a total capacity of 15.835 Bcf daily, the approval and construction of all of these terminals would bring the United States' LNG export-exclusive capacity to 25.055 Bcf daily.[205] If each export-exclusive terminal operated at an average of 75% capacity every day, this would mean an approximate total of 6,858.81 Bcf of LNG exports would pass through U.S. terminals annually, dwarfing 2013's total natural gas exports four times over.[206] The likelihood of such a situation is high, as every proposed LNG export operation since 2010 has either been approved or is still under DOE review. [207]

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[198] *See* Office of Energy Products, United States Energy Info. Admin., *North American LNG Import/Export Terminals: Existing* (Jan. 6, 2015) (listing and mapping out all existing import and export terminals with each terminal's capacity and owner). Note that the source did not delineate between LNG import and export facilities, although it is assumed that the majority of the capacity is for LNG imports, as very few of the nation's exports were LNG in the past years. *See U.S. Natural Gas Imports & Exports 2013*, *Natural Gas*, U.S. ENERGY INFORMATION ADMINISTRATION (May 28, 2014) http://www.eia.gov/naturalgas/importsexports/annual/#tabs-supply-2.
[199] *See id*.; *infra* Appendix A, Table 1.
[200] *See* Office of Energy Products, United States Energy Info. Admin., *North American LNG Import/Export Terminals: Approved* (Jan. 6, 2015).
[201] *See id*.
[202] *See infra* Appendix A, Table 2.
[203] *See* Office of Energy Products, United States Energy Info. Admin., *North American LNG Export Terminals: Proposed* (Jan. 6, 2015).
[204] *See id*.
[205] *See infra* Appendix A, Tables 2 & 3.
[206] *See supra* note 23 and accompanying text.
[207] *See* Dep't of Energy, *Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States* (Dec. 14, 2014).

APPENDIX B

LIQUID NATURAL GAS (LNG) IMPORT AND EXPORT FACILITIES: ACTIVE, PLANNED AND APPROVED, AND PROPOSED.[208]

TABLE 1.

EXISTING LNG IMPORT/EXPORT TERMINALS*

Location	**Capacity (billion cubic feet daily)**	**Financial Backer & Operation's Name**
Everett, MA	1.35	GDF SUEZ – DOMAC
Cove Point, MD	1.8	Dominion – Cove Point LNG
Elba Island, GA	1.6	El Paso – Southern LNG
Lake Charles, LA	2.1	Southern Union – Trunkline LNG
Offshore Boston, MA	0.8	Excelerate Energy – Northeast Gateway
Freeport, TX**	1.5	Cheniere/Freeport LNG Dev.
Sabine, LA**	4.0	Cheniere/Sabine Pass LNG
Hackberry, LA**	1.8	Sempra – Cameron LNG
Offshore Boston, MA	0.4	GDF SUEZ – Neptune LNG
Sabine Pass, TX	2.0	ExxonMobil – Golden Pass
Pascagoula, MS	1.5	El Paso/Crest/Sonangol – Gulf LNG Energy LLC
TOTAL CAPACITY:	18.85 Bcf Daily	

*Source is unclear as to the exact balance between imports and exports at these facilities, but given the total amount of exports of LNG is minimal, it is assumed that most of this capacity is to imports.

[208] *See* Office of Energy Products, United States Energy Info. Admin., *North American LNG Import/Export Terminals: Existing* (Jan. 6, 2015); Office of Energy Products, United States Energy Info. Admin., *North American LNG Import/Export Terminals: Approved* (Jan. 6, 2015); Office of Energy Products, United States Energy Info. Admin., *North American LNG Export Terminals: Proposed* (Jan. 6, 2015).

** Authorized to re-export delivered LNG.

TABLE 2.

APPROVED LNG EXPORT TERMINALS

Location	**Capacity (billion cubic feet daily)**	**Financial Backer & Operation's Name**
Sabine, LA	2.76	Cheniere/Sabine Pass LNG
Hackberry, LA	1.7	Sempra – Cameron LNG
Freeport, TX	1.8	Freeport LNG Dev./Freeport LNG Expansion/FLNG Liquefaction
Cove Point, MD	.82	Dominion – Cove Point LNG
Corpus Christi, TX*	2.14	Cheniere – Corpus Christi LNG
TOTAL CAPACITY:	9.22 Bcf Daily	

* Approved but not yet under construction.

TABLE 3.

PROPOSED LNG EXPORT TERMINALS

Location	**Capacity (billion cubic feet daily)**	**Financial Backer & Operation's Name**
Coos Bay, OR	0.9	Jordan Cove Energy Project
Lake Charles, LA	2.2	Southern Union – Trunkline LNG
Astoria, OR	1.25	Oregon LNG
Lavaca Bay, TX	1.38	Excelerate Liquefaction
Elba Island, GA	0.35	Southern LNG Company
Sabine Pass, LA	1.4	Sabine Pass Liquefaction
Lake Charles, LA	1.07	Magnolia LNG
Plaquemines Parish, LA	1.07	CE FLNG
Sabine Pass, TX	2.1	ExxonMobil – Golden Pass
Pascagoula, MS	1.5	Gulf LNG Liquefaction
Plaquemines Parish, LA	0.3	Louisiana LNG
Robbinston, ME	0.45	Kestrel Energy – Downeast LNG
Cameron Parish, LA	1.34	Venture Global
Jacksonville, FL	0.075	Eagle LNG Partners
TOTAL CAPACITY:	15.385 Bcf Daily	