United States Government Accountability Office

Report to the Ranking Member, Committee on Energy and Natural Resources, U.S. Senate

September 2014

NATURAL GAS

Federal Approval Process for Liquefied Natural Gas Exports

GAO-14-762

September 2014

NATURAL GAS

Federal Approval Process for Liquefied Natural Gas Exports

GAO Highlights

Highlights of GAO-14-762, a report to the Ranking Member, Committee on Energy and Natural Resources, U.S. Senate

Why GAO Did This Study

Technological advances in hydraulic fracturing and horizontal drilling have resulted in a dramatic increase in the amount of natural gas that can be produced domestically. DOE is responsible for reviewing applications to export LNG—natural gas cooled to a liquid state for transport—and, under the Natural Gas Act, must approve an application unless it finds that approval is not consistent with the public interest. Since 2010, DOE has received 35 applications to export LNG that must address the public interest question. In addition, under NEPA, FERC is required to assess how LNG export facilities may affect the environment and is responsible for granting approval to build and operate export facilities. Since 2010, FERC has received 17 applications to construct export facilities.

GAO was asked to report on the federal process for reviewing applications to export LNG. This report describes (1) the status of applications to export LNG and DOE's process to review them and (2) the status of applications to build LNG export facilities and FERC's process to review them.

GAO reviewed laws, regulations, and guidance; examined export approvals; visited LNG facilities; and interviewed federal and state agency officials and industry representatives, including LNG export permit applicants.

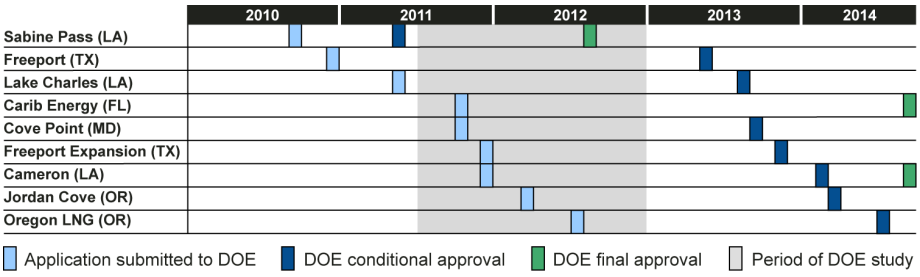
GAO is not making any recommendations in this report.

View GAO-14-762. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

What GAO Found

Since 2010, of 35 applications it has received that require a public interest review, the Department of Energy (DOE) has approved 3 applications to export liquefied natural gas (LNG) and 6 applications are conditionally approved with final approval contingent on the Federal Energy Regulatory Commission's (FERC) issuance of a satisfactory environmental review of the export facility. DOE considers a range of factors to determine whether each application is in the public interest. After the first application was conditionally approved in 2011, DOE commissioned a study to help it determine whether additional LNG exports were in the public interest. Since the 16-month study was published in December 2012, DOE issued 7 conditional approvals (one of which became final) and 1 other final approval (see fig. below). In August 2014, DOE suspended its practice of issuing conditional approvals; instead, DOE will review applications after FERC completes its environmental review.

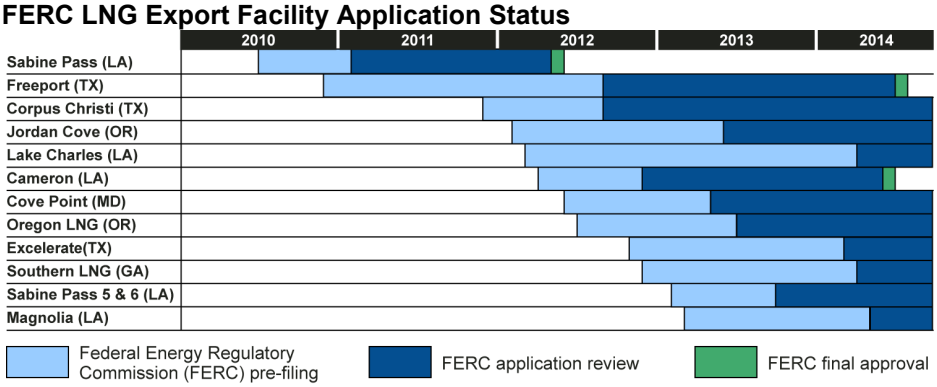
DOE LNG Export Application Status



Source: GAO analysis of DOE data. | GAO-14-762

Since 2010, FERC has approved 3 LNG export facilities for construction and operation, including 2 facilities in 2014, and is reviewing 14 applications (see fig. below). FERC's review process is, among other things, designed to fulfill its responsibilities under the National Environmental Policy Act (NEPA). Before submitting an application to FERC, applicants must enter an initial stage called pre-filing to identify and resolve potential issues during the earliest stages of a project. Of the 14 applications, 5 are in the pre-filing stage at FERC and not shown in the figure below. FERC conducts an environmental and safety review with input from other federal, state and local agencies.

FERC LNG Export Facility Application Status



Source: GAO analysis of FERC data. | GAO-14-762

Contents

Abbreviations

CAA	Clean Air Act
Coast Guard	U.S. Coast Guard
Corps	U.S. Army Corps of Engineers
DOE	Department of Energy
DOT	Department of Transportation
EA	environmental assessment
EIA	Energy Information Administration
EIS	environmental impact statement
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FTA	free trade agreement
LNG	liquefied natural gas
MARAD	Maritime Administration
MMBtu	million British thermal unit
NEPA	National Environmental Policy Act
NERA	NERA Economic Consulting
NGA	Natural Gas Act of 1938
NSR	new source review
PHMSA	Pipeline and Hazardous Materials Safety Administration

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

September 26, 2014

The Honorable Lisa Murkowski
Ranking Member
Committee on Energy and Natural Resources
United States Senate

Dear Senator Murkowski:

Technological advances in hydraulic fracturing and horizontal drilling have dramatically increased the amount of natural gas that can be extracted domestically. This increase has helped reduce natural gas prices in the United States, although prices remain significantly higher overseas. To take advantage of overseas prices, energy companies have applied to the federal government for permission to export natural gas. Natural gas, like crude oil, requires federal approval before it can be exported.[1] To transport natural gas by ship, the natural gas is cooled to a liquid state called liquefied natural gas (LNG). This cooling process requires expensive processing and liquefaction facilities that do not currently exist in the contiguous United States.[2]

The Department of Energy (DOE) and Federal Energy Regulatory Commission (FERC) are two federal agencies with primary responsibility for approving LNG exports. Under the Natural Gas Act of 1938 (NGA), as amended,[3] DOE is responsible for reviewing LNG export applications and, for countries that do not have a free trade agreement (FTA) with the United States, determining whether approval of such applications is

[1] Section 3 of the Natural Gas Act (NGA) (15 U.S.C. § 717b) requires federal approval of natural gas exports. For crude oil exports, the Energy Policy and Conservation Act of 1975 (42 U.S.C. § 6212(b)) directs the President to "promulgate a rule prohibiting the export of crude oil" produced in the United States. The Department of Commerce administers export licenses for crude oil.

[2] The Kenai LNG export facility in Nikiski, Alaska, has been authorized to export LNG to Japan for the last 45 years. According to DOE, because there is no pipeline interconnection between Alaska and the lower 48 states, those LNG markets are generally viewed as distinct.

[3] Pub. L. No. 75-688, §3, 52 Stat. 822, codified as amended at 15 U.S.C. § 717b.

consistent with the public interest.[4] In this report, we discuss non-FTA applications that require a public interest review. FERC is responsible for authorizing the construction and operation of facilities located onshore or within state waters that liquefy natural gas and load the LNG onto ships for export.[5] FERC conducts an environmental review of the facility to help with this decision.[6] Until May 2014, DOE granted approvals—known as conditional approvals—on the condition that FERC completed a satisfactory environmental review of the associated export facility. DOE granted final approvals only after it had the opportunity to consider and adopt the FERC-led review. In May 2014, DOE proposed suspending its practice of issuing conditional approvals and instead proposed reviewing applications only after FERC has completed the environmental review, and DOE has sufficient information to determine the public interest of an application.[7] In August 2014, DOE finalized this proposal after a public comment and review period.[8] Since 2010, DOE has received 35 applications to export LNG that require a public interest review, and FERC has received 17 applications to construct LNG export facilities.[9]

[4] In 1992, Congress amended the NGA to require DOE to treat applications to export LNG to FTA countries as consistent with the public interest. Unless otherwise indicated, the DOE applications discussed in this report are non-FTA applications.

[5] In 1984 DOE delegated to FERC the authority to approve or deny LNG facilities. DOE Delegation Order No. 0204-112, 49 Fed. Reg. 6684, 6690 (Feb. 22, 1984). FERC also authorizes the construction and operation of associated pipelines under section 7 of the NGA.

[6] For facilities located offshore beyond state waters, the Maritime Administration (MARAD) within the Department of Transportation authorizes construction pursuant to the Deepwater Port Act. According to a DOE official, MARAD serves as the lead agency for the environmental review of offshore LNG facilities beyond state waters. According to this official, DOE has received two applications to export LNG from these offshore facilities, but MARAD has not received applications to construct the associated facilities.

[7] 79 Fed. Reg. 32261 (June 4, 2014).

[8] 79 Fed. Reg. 48132 (Aug. 15, 2014). Applications that DOE has conditionally approved still require a final approval from DOE after DOE has reviewed FERC's environmental document. The revised process applies only to the lower 48 states.

[9] For the purposes of this report, we will refer to companies that apply to DOE or FERC for export or facility approvals as "applicants." As of late August 2014, in addition to 35 applications to non-FTA countries, DOE has received 42 applications to export LNG to FTA countries. These totals are for the lower 48 states. In July 2014, DOE also received an application to export LNG from a proposed facility in Alaska to FTA and non-FTA countries.

You asked us to report on DOE's and FERC's processes for reviewing applications for LNG exports and export facilities, respectively. This report describes (1) DOE's process for reviewing applications to export LNG and the status of those applications and (2) FERC's process for reviewing applications to build LNG export facilities and the status of those applications.

To describe the process and status of application reviews at DOE and FERC, we reviewed DOE and FERC approval documents and spoke with agency officials. To describe DOE's process for reviewing applications to export LNG, we examined relevant federal laws, regulations, and policy documents. We reviewed DOE approvals to export LNG, including one final and seven conditional approvals. We also interviewed DOE officials responsible for reviewing applications to export LNG to discuss the review process and how they determine whether an application is in the public interest. To describe FERC's process for reviewing applications to build LNG export facilities, we examined relevant federal laws, regulations and FERC guidance. We also interviewed FERC officials to discuss the export facility review process. We reviewed FERC environmental documents relating to LNG export facilities. We also interviewed other federal and state agencies involved in the review process—including the U.S. Coast Guard (Coast Guard), the Pipeline and Hazardous Materials Safety Administration (PHMSA) within the Department of Transportation (DOT), the U.S. Army Corps of Engineers (Corps), the Maryland Public Service Commission, the Louisiana Department of Environmental Quality, and the Texas Commission on Environmental Quality—to describe their roles in FERC's review process. To describe the applicants' experience, we interviewed a nonprobability sample of applicants from the Sabine Pass, Freeport, Lake Charles, Cove Point, and Jordan Cove facilities. We also visited a nonprobability sample of LNG facilities at Lusby, Maryland; Brazoria County, Texas; and Cameron Parish, Louisiana.[10] We selected these facilities because they applied to FERC and were approved or conditionally approved for export by DOE. To describe how the public is involved in the review process, we interviewed representatives of organizations that have commented on applications, such as America's Energy Advantage, the Sierra Club, the American Public Gas Association, and the Industrial Energy Consumers of America.

[10] Because these were nonprobability samples, the information collected during site visits cannot be generalized to all LNG facilities but provides illustrative examples.

We conducted this performance audit from September 2013 to September 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

This section describes the factors affecting recent LNG activities in the United States, the liquefaction process, DOE's responsibilities for authorizing export applications, FERC's responsibilities for authorizing export facilities, and positions of those supporting or opposing the export of LNG.

Factors Affecting Recent LNG Activities in the United States

According to the Congressional Research Service, in the early 2000s, natural gas production in the United States was declining as energy demand was increasing and, as recently as the mid-to-late 2000s the United States was projected to be a growing natural gas importer.[11] In addition to four onshore import terminals that were already operational, natural gas companies built five LNG onshore import facilities in the latter half of the 2000s to meet the expected need for natural gas imports.[12] However, technology enhancements improved the extraction of natural gas from shale formations and resulted in a dramatic increase in domestic natural gas production. These technology enhancements allow companies to extract natural gas from shale formations that were previously considered to be inaccessible because traditional techniques did not yield sufficient amounts for economically viable production.[13] According to Energy Information Administration (EIA) data,[14] between 2007 and 2013, domestic natural gas withdrawals increased by 22

[11] CRS, *U.S. Natural Gas Exports: New Opportunities, Uncertain Outcomes R42074 (April 8, 2013).*

[12] There are currently six onshore import facilities on the Gulf Coast and three on the East Coast. In addition, there are two offshore import facilities on the East Coast.

[13] In particular, the application of horizontal drilling techniques and hydraulic fracturing—a process that injects a combination of water, sand, and chemical additives under high pressure to create and maintain fractures in underground rock formations that allow oil and natural gas to flow—have increased U.S. natural gas and crude oil production.

[14] EIA is a statistical agency within the DOE that collects, analyzes, and disseminates independent information on energy issues.

percent, driven primarily by increased withdrawals from shale formations.[15] According to EIA, increases in natural gas supplies generally cause prices to drop. Specifically, between 2007 and 2013, the price of natural gas in the United States decreased by nearly 50 percent.[16] As the price of natural gas in the United States declined, prices in Europe and Asia remained considerably higher. In July 2014, FERC estimated that prices of LNG imported to Europe and Asia during August of 2014 would be about 100 and 250 percent higher than prices in the United States, respectively.[17] These price differences have motivated U.S companies to apply to export natural gas.

The Liquefaction Process

The majority of U.S. trade in natural gas is by pipeline with Canada and Mexico; however, over long distances separated by water, natural gas is generally converted to LNG and transported by specialized tanker ship.[18] To convert natural gas to LNG, companies pretreat the natural gas to remove components that would freeze during the liquefaction process and contaminate the LNG.[19] After the gas is pretreated, it is processed through a complex system called a liquefaction train that cools the natural gas to -260 degrees Fahrenheit, converting it to a liquid state. This process reduces the volume of the gas by 600 times. Once liquefied, the

[15] Withdrawals from other natural gas sources such as gas wells, oil wells, and coalbed wells decreased over this period.

[16] From 2007 to 2013, the average annual Henry Hub price of natural gas decreased from $6.97 per million British thermal unit (MMBtu) to $3.73 per MMBtu. The Henry Hub is a major gas trading center in the Gulf of Mexico and the delivery point for natural gas futures contracts on the New York Mercantile Exchange.

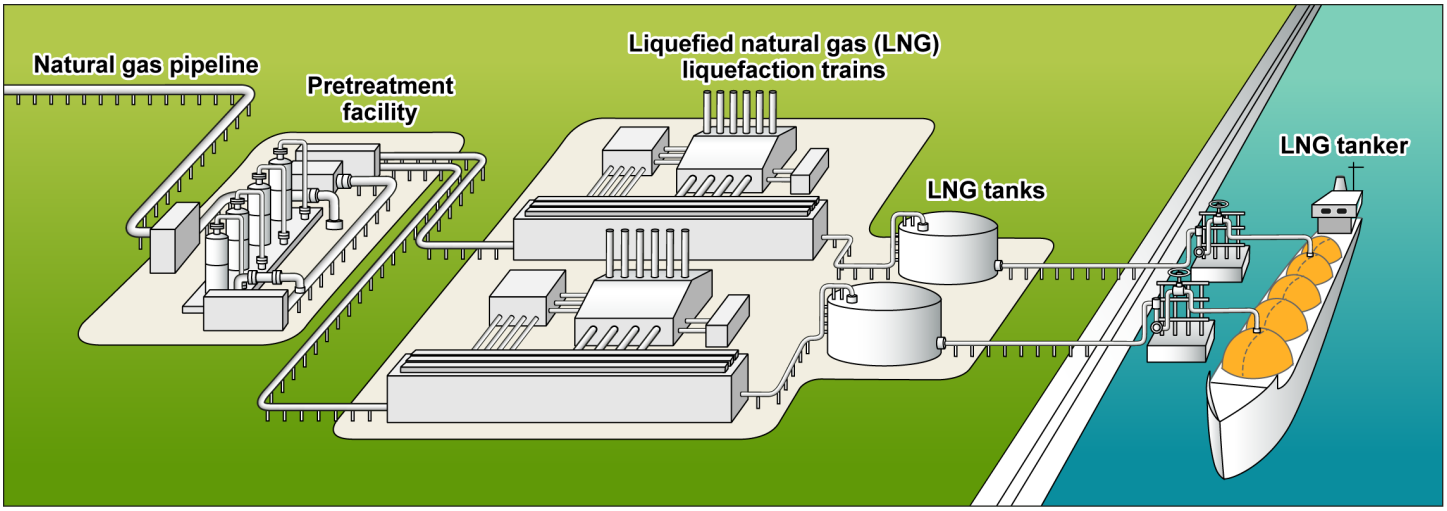
[17] In July 2014, FERC estimated the following landed prices of natural gas for August 2014: at the Cove Point import facility in Maryland - $3.27 per MMBtu; in the United Kingdom - $6.59 per MMBtu; in India- $11.20 per MMBtu, and in Japan $11.35 per MMBtu. The landed price represents the price of LNG at an import facility, before it has been converted back to a gas.

[18] LNG can also be stored in specialized containers and transported on cargo vessels. LNG exports by container are generally much smaller volumes than exports on an LNG tanker. For example, Carib Energy, 1 of the 3 export applications approved by DOE, was approved to export 0.04 billion cubic feet per day of natural gas in liquid form in these containers. For comparison, Sabine Pass, the first LNG export application approved by DOE for export by LNG tanker, was approved to export 2.2 billion cubic feet per day.

[19] Natural gas transported by pipeline contains, among other contaminants, small amounts of water, carbon dioxide, hydrogen sulfide, and mercury, as well as hydrocarbons such as pentane and hexane that could freeze and contaminate the liquefaction process.

natural gas is stored in large tanks until it is offloaded to a ship for transport. Once the ship reaches its destination, it is offloaded to tanks for storage or converted to natural gas for distribution by pipeline.[20] Figure 1 illustrates some of the common components of an LNG export facility.

Figure 1: LNG Export Facility



Sources: GAO analysis of industry documents. | GAO-14-762

DOE's Responsibilities

Under Section 3 of the NGA, the import or export of LNG and the construction or expansion of LNG facilities requires authorization from DOE.[21] In 1984, DOE delegated the responsibility to approve or deny applications for LNG facilities to FERC.[22] Under Section 3, an authorization is to be granted unless DOE finds that approving the export or import is inconsistent with the public interest. According to DOE, Section 3(a) of the NGA creates a rebuttable presumption that a proposed export of natural gas is in the public interest—that is, it places the burden on those opposing an application to demonstrate that an

[20]The United States exports a small amount of LNG that has been shipped to the United States, stored in LNG tanks at import facilities, and then reexported when it makes economic sense for the companies involved.

[21] 15 U.S.C. § 717b.

[22] DOE Delegation Order 0204-112, 49 Fed. Reg. 6684, 6690 (Feb. 22,1984).

export is inconsistent with the public interest. The NGA also authorizes DOE to attach terms and conditions necessary to protect the public interest. DOE evaluates public interest under Section 3, and can conduct studies or other reviews to support its public interest determination.

In the Energy Policy Act of 1992, Congress amended the NGA to require DOE to use a different standard for the review of applications for export to countries with FTAs with the United States (FTA countries).[23] Specifically, under Section 3(c) of the NGA, DOE must treat applications to export LNG to FTA countries as consistent with the public interest, and DOE is to approve these applications without modification or delay.[24] These FTA applications therefore do not require the same public interest review as non-FTA applications. DOE started to receive applications to export LNG in 2010 and, since then, it has approved 37 of 42 applications to export LNG to FTA countries. During this same period, DOE approved 9 (3 final and 6 conditional) of 35 applications to export LNG to non-FTA countries.[25] Most major importers of LNG are non-FTA countries such as Japan and India, among others. As previously mentioned, this report discusses DOE's process to review applications to export to non-FTA countries.

FERC's Responsibilities

In keeping with its obligation to authorize LNG facility siting and construction under the NGA, FERC reviews applications to construct and operate LNG export facilities. FERC's review is considered a federal action and subject to the National Environmental Policy Act (NEPA).[26]

[23] Countries that have FTAs with the United States and can trade natural gas without restrictions are Australia, Bahrain, Canada, Chile, Colombia, the Dominican Republic, El Salvador, Guatemala, Honduras, Jordan, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, South Korea, and Singapore.

[24] 15 U.S.C. § 717b(c).

[25] As of late August 2014, DOE has approved 37 applications to export LNG to FTA countries, amounting to nearly 38 billion cubic feet per day of natural gas in the form of LNG. In addition, DOE has approved 10.56 billion cubic feet per day in conditional or final export approvals to non-FTA countries.

[26] Enacted in 1970, NEPA has as its purpose, among others, to promote efforts to prevent or eliminate damage to the environment. NEPA requires an agency to prepare a detailed statement on the environmental effects of any "major federal action" significantly affecting the environment. Regulations promulgated by the Council on Environmental Quality implementing NEPA generally require an agency to prepare either an environmental assessment (EA) or an environmental impact statement (EIS), depending on whether or not a proposed action could significantly affect the environment.

NEPA requires federal agencies to assess the projected effects of major federal actions that significantly affect the environment. Prior to the NEPA review, the law requires applicants to communicate with FERC for a minimum of 6 months—known as pre-filing—before submitting an application.[27] FERC acts as the lead agency for the environmental review required by NEPA, prepares the NEPA environmental documentation, and coordinates and sets the schedule for all federal authorizations.[28] The outcome of this review is an environmental document, also called the NEPA document, which provides the commissioners with staff's assessment of the environmental impacts from facility construction and operation.[29]

Positions Surrounding the Export of Natural Gas

DOE and FERC consider comments from the public during the application review process, and these comments reflect a range of perspectives on the potential benefits or harm from exports. Proponents maintain that LNG exports are consistent with U.S. free trade policies and will provide an economic boon for the United States, resulting in increased employment and an improved trade balance among other things.[30] They assert that the increased availability of natural gas resources will prevent a significant increase in natural gas prices. Opponents have expressed numerous environmental and economic concerns about LNG exports. For example, opponents have expressed concern that exports will increase hydraulic fracturing and its associated environmental effects, as well as increase greenhouse gas emissions from the production and consumption of natural gas.[31] Other opponents have expressed concern that exports will increase domestic natural gas prices, hurting the public and the growing industrial and manufacturing sectors that are sensitive to natural gas prices. Opponents have also stated that the primary beneficiaries of LNG exports will be a small segment of society involved in natural gas development and trade, and that most segments of society

[27] 15 U.S.C. § 717b-1(a).

[28] DOE's review is also considered a federal action and subject to NEPA, and DOE uses FERC's NEPA document and its own analysis to fulfill its NEPA responsibility.

[29] FERC is overseen by a commission of up to five Presidential appointees who serve 5-year terms.

[30] DOE also notes that U.S. LNG exports will diversify international supply options and improve energy security for many allies and trading partners of the United States.

[31] Opponents have identified numerous concerns related to hydraulic fracturing, including the potential for groundwater contamination.

will lose economically. Evaluating whether exports of LNG to non-FTA countries are consistent with the public interest is beyond the scope of this report.

DOE Has Approved 9 Applications to Export LNG through a Review Process That Considers a Range of Factors to Determine Whether Approval Is in the Public Interest

Since 2010, DOE has granted final approval to 3 applications and conditional approval to 6 others. DOE considers a range of factors to determine whether approving an export application is in the public interest.

DOE Has Approved 3 Applications and Conditionally Approved 6 Others

As of mid-September 2014, DOE has granted 3 final approvals for applications to export LNG, including the Sabine Pass application in 2012 and the Cameron LNG and Carib Energy applications in September 2014. Sabine Pass is the only LNG export facility currently under construction in the United States and is expected to begin operations in late 2015.[32] In August 2011, after DOE conditionally approved exports from Sabine Pass, DOE commissioned a study of the cumulative effects of additional LNG exports on the economy and the public interest.[33] DOE did not approve any conditional applications during the 16-month period of the

[32] The Sabine Pass application was fully approved by DOE in August 2012 following FERC's facility approval in April 2012. FERC approved applications to construct the Cameron and Freeport facilities in June and July of 2014, respectively. According to FERC officials, the Cameron facility was given notice to proceed with site preparation activities for its facility in July 2014. LNG exports under the Carib Energy application will not pass through an LNG export facility; instead, LNG will be processed at a natural gas liquefaction and storage facility where it will be loaded into specialized containers and transported by truck to various ports for export on cargo vessels.

[33] When DOE conditionally approved the Sabine Pass application in May 2011, it had received 2 other LNG export applications and expected more. DOE received 13 other non-FTA applications during the period of the two-part study.

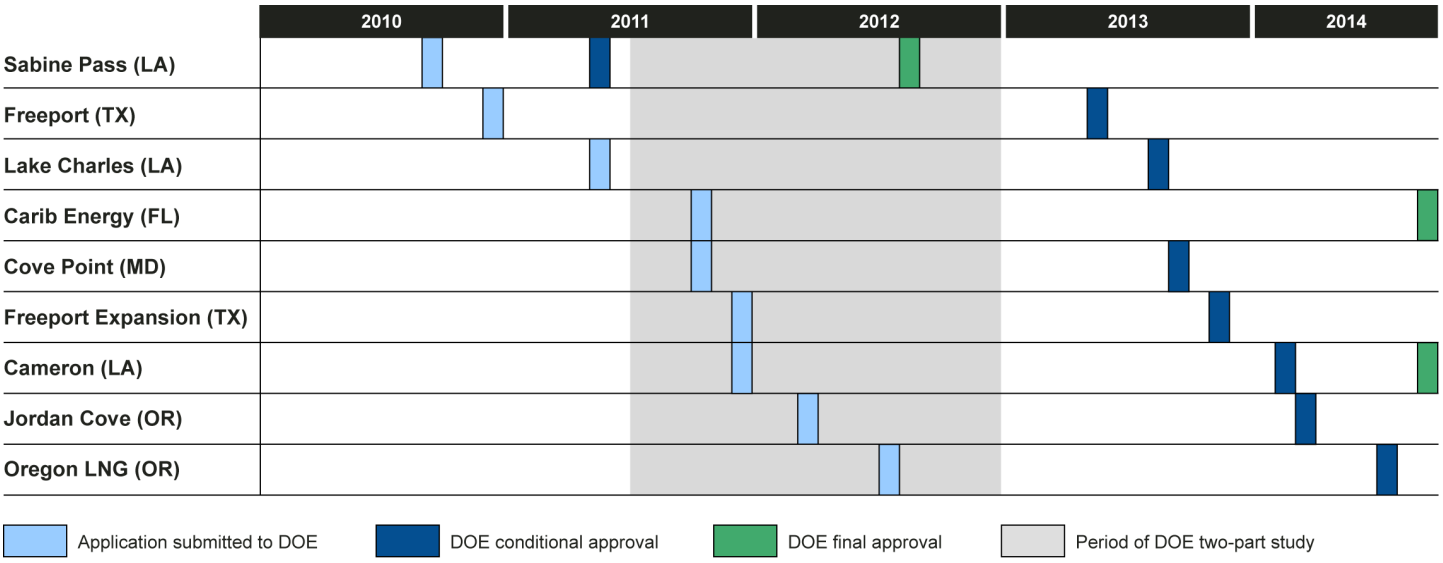
study.[34] The study was completed in December 2012. Since then, DOE has conditionally approved 7 applications, including the Cameron LNG application that it granted final approval in September 2014 (See fig. 2).[35] DOE also approved the Carib Energy application in September 2014.[36] DOE's export approvals, as of late August 2014, amount to 10.56 billion cubic feet of natural gas per day in the form of LNG; for comparison, Qatar, the world's largest exporter of LNG, exported about 10 billion cubic feet per day in 2012.

[34] The study consisted of two parts, a study from the EIA and a study from NERA Economic Consulting (NERA). EIA study, *Effect of Increased Natural Gas Exports on Domestic Energy Markets;* NERA study, *Macroeconomic Impacts of LNG Exports from the United States.*

[35] DOE conditionally approved applications to export from the following facilities: Freeport, Texas (two separate applications); Lake Charles and Cameron, Louisiana; Cove Point, Maryland; and Jordan Cove and Oregon LNG, Oregon.

[36] DOE issued a final approval for the Carib Energy application because it found that FERC had already completed a NEPA review of the LNG liquefaction and storage facility that Carib Energy proposed to use; DOE determined that FERC's environmental review addressed all of the reasonably foreseeable activities likely to arise from Carib Energy's proposed use of the facility. More specifically, DOE determined that the Carib Energy application qualified for a categorical exclusion, which it issued on May 30, 2014. An agency may generally exclude categories of actions from the requirement to prepare a NEPA document if it has determined that the actions do not individually or cumulatively have a significant impact on the environment and that there are no extraordinary circumstances that might cause significant environmental effects.

Figure 2: Status of Applications Submitted to DOE to Export LNG



Source: GAO analysis of DOE data. | GAO-14-762

Notes: DOE has received 26 other applications since the beginning of 2010 that DOE has not approved and are not displayed.

The export amount that DOE conditionally approved for the Freeport and Freeport Expansion applications is accounted for in a single Freeport facility application to FERC.

DOE Reviews Each Application Separately and Considers a Range of Factors to Determine if Approval Is in the Public Interest

According to DOE, when determining whether approval of an application is in the public interest, DOE focuses on (1) the domestic need for natural gas, (2) whether the proposed export threatens the security of domestic natural gas supplies, and (3) whether the arrangement is consistent with DOE's policy of promoting market competition along with other factors bearing on the public interest, such as environmental concerns.[37] In passing the NGA, Congress did not define "public interest;" however, in 1984, DOE developed policy guidelines establishing criteria that the agency uses to evaluate applications for natural gas imports.[38] The guidelines stipulate that, among other things, the market—not the government—should determine the price and other contract terms of

[37] *See* Sabine Pass Liquefaction LLC, FE Docket No. 10-111-LNG, DOE/FE Order No. 2961, p. 27-29; May 20, 2011.

[38] 49 Fed. Reg. 6684 (Feb. 22, 1984).

imported natural gas. In 1999, DOE began applying these guidelines to natural gas exports.[39]

DOE's review of export applications is not a standardized process, according to agency officials; rather, it is a case-by-case deliberation, where each application is considered separately from others.[40] DOE's review process begins when an applicant submits documentation to DOE requesting permission to export LNG. DOE examines applications one at a time, and it issues a notice of application in the Federal Register to invite persons interested in the application to comment, protest, or intervene.[41] Applicants are then given an opportunity to respond to comments. DOE's internal review includes an examination of the application and analysis of public interest using public comments and applicant responses, the criteria outlined in its policy guidelines, the NGA, DOE's study of the effects of additional LNG exports, and past DOE authorizations. As discussed above, the NGA authorizes DOE to attach terms and conditions necessary to protect the public interest. To further inform its public interest review, DOE commissioned the study of the

[39] *Phillips Alaska Natural Gas Corporation and Marathon Oil Company*. DOE Order No. 1473, Order Extending Authorization to Export Liquefied Natural Gas from Alaska (Apr. 2, 1999).

[40] DOE officials said that, although reviews are handled on a case-by-case basis, each deliberation considers the cumulative effects from prior approvals.

[41] Any member from the public can comment on or protest applications during a 60-day comment period. In addition, an entity can file a motion or notice to intervene with DOE. Intervenors become participants in the proceeding and can request a rehearing after DOE issues an order. DOE officials examined and considered almost 200,000 public comments on its commissioned study in its review of the applications for Freeport, Lake Charles, Cameron, Cove Point, Jordan Cove, and Oregon LNG. When reviewing public comments, DOE officials said they consider the merits of the issue addressed, not the volume of comments submitted.

potential effects of additional exports on the economy.[42] Since the study was released in December 2012, DOE has used it to support its public interest review for each of its application approval documents, including referencing the study's conclusion that LNG exports would have a net positive effect on the economy.[43]

After considering the evidence, DOE issues an order denying the application or granting the application on condition of a satisfactory completion of the NEPA review by FERC.[44] DOE includes the reasoning behind its decision in each order. DOE may also modify the request in an order, such as by limiting the approved export amount or duration.[45] Once DOE conditionally approves an application, it does not grant a final approval until it has reviewed FERC's NEPA document and reconsidered its public interest determination in light of relevant environmental information. Under NEPA, DOE must give appropriate consideration to

[42] 77 Fed. Reg. 73627 (Dec. 11, 2012). The study consisted of two parts. The first part of the study was conducted by EIA and examined the potential effect of 6 to 12 billion cubic feet per day of natural gas exports on domestic energy consumption, production, and prices under various scenarios. This part of the study found that natural gas prices would rise gradually under most study conditions. The second part of the study, conducted by NERA, evaluated the macroeconomic effects of LNG exports on the U.S. economy using the results of the EIA study. This part of the study found that LNG exports would have net economic benefits in all cases. One concern of export opponents was that NERA used data from EIA's 2011 Annual Energy Outlook, which did not reflect more recent EIA reports that projected greater increases in domestic demand for natural gas. In February 2014, in response to a request from Cheniere, NERA updated its study using data from EIA's 2013 Annual Energy Outlook and found that its conclusions from the original study were still valid.

[43] Additionally, in December 2012, DOE established a precedence order for reviewing applications. Under this order, DOE prioritized applications from companies that had already entered the filing process with FERC, and moved those applications ahead of others that had not started the process with FERC.

[44] According to a DOE official, MARAD would lead the NEPA review for offshore facilities beyond state waters.

[45] DOE conditionally approved an export application for Freeport for 0.4 billion cubic feet per day of natural gas rather than the 1.4 billion cubic feet per day that the applicant requested. DOE approved the lesser quantity because the facility application Freeport submitted to FERC was not capable of handling the full amount of natural gas proposed to DOE.

the environmental effects of its decisions; FERC's NEPA document provides the basis for this consideration.[46]

On May 29, 2014, DOE proposed that it would no longer approve applications for export on the condition of a satisfactory completion of the environmental review by FERC and the resulting NEPA document; instead, it would review applications for export only after FERC issues the NEPA document.[47] On August 15, DOE issued a final decision to implement this procedural change, suspending its practice of issuing conditional orders.[48] DOE also announced on May 29 that it would request another economic study to further examine whether additional exports are in the public interest.[49] At the same time, DOE released two reports on environmental issues for public review—an action prompted by public comments and the number of applications DOE has received since 2010.[50] DOE officials said that, after DOE receives and responds to public

[46] DOE is a cooperating agency for FERC's NEPA review of LNG export projects and contributes to the development of the NEPA document.

[47] 79 Fed. Reg. 32261 (June 4, 2014). The change would also supersede the precedence order. According to the DOE notice, DOE could still choose to implement the policy of issuing conditional orders at a later date. According to DOE officials, this change would allow them to use agency resources more efficiently because they would conduct a single review of each application instead of separate reviews for conditional and final approvals. In addition, the proposal would allow projects that are more commercially advanced to be reviewed by DOE once FERC has issued a NEPA document.

[48] 79 Fed. Reg. 48132 (Aug. 15, 2014). According to DOE officials, the benefits of this change include DOE being able to ensure prompt action on applications that are otherwise ready to proceed, and to better allocate departmental resources by reducing the likelihood that the DOE would be forced to act on applications with little prospect of proceeding.

[49] According to the DOE notice, DOE requested that the EIA update its 2012 study, which had been included as part 1 of DOE's LNG export study. DOE requested that EIA evaluate the effect of increased natural gas demand—reflecting possible exports of U.S. natural gas—on domestic energy markets using the modeling analysis presented in its 2014 Annual Energy Outlook as a starting point. DOE officials said that they commissioned the new study to include updated data and consider export scenarios ranging from 12 to 20 billion cubic feet per day. In addition to the EIA study, DOE officials said they planned to commission an outside contractor to conduct a macroeconomic review using EIA's results.

[50] 79 Fed. Reg. 32258, 32260 (June 4, 2014). The goal of the two studies, according to the DOE notice, was to provide the public with further information on the 1) effect of LNG exports on greenhouse gas emissions and 2) potential environmental impacts from increased development of unconventional natural gas resources, particularly production that involves hydraulic fracturing.

comments on these reports, it will use the reports and NEPA document to complete its environmental responsibilities under NEPA

FERC Has Approved 3 Facility Applications and Is Reviewing 14 Others Using a Technically Complex Process That Involves Other Agencies

Since 2010, FERC approved 3 facility applications, including 2 in 2014, and is currently reviewing 14 applications. FERC's reviews of LNG export facility applications are a multiyear analysis of the potential environmental and safety effects of the facility that involves other federal, state, and local agencies.

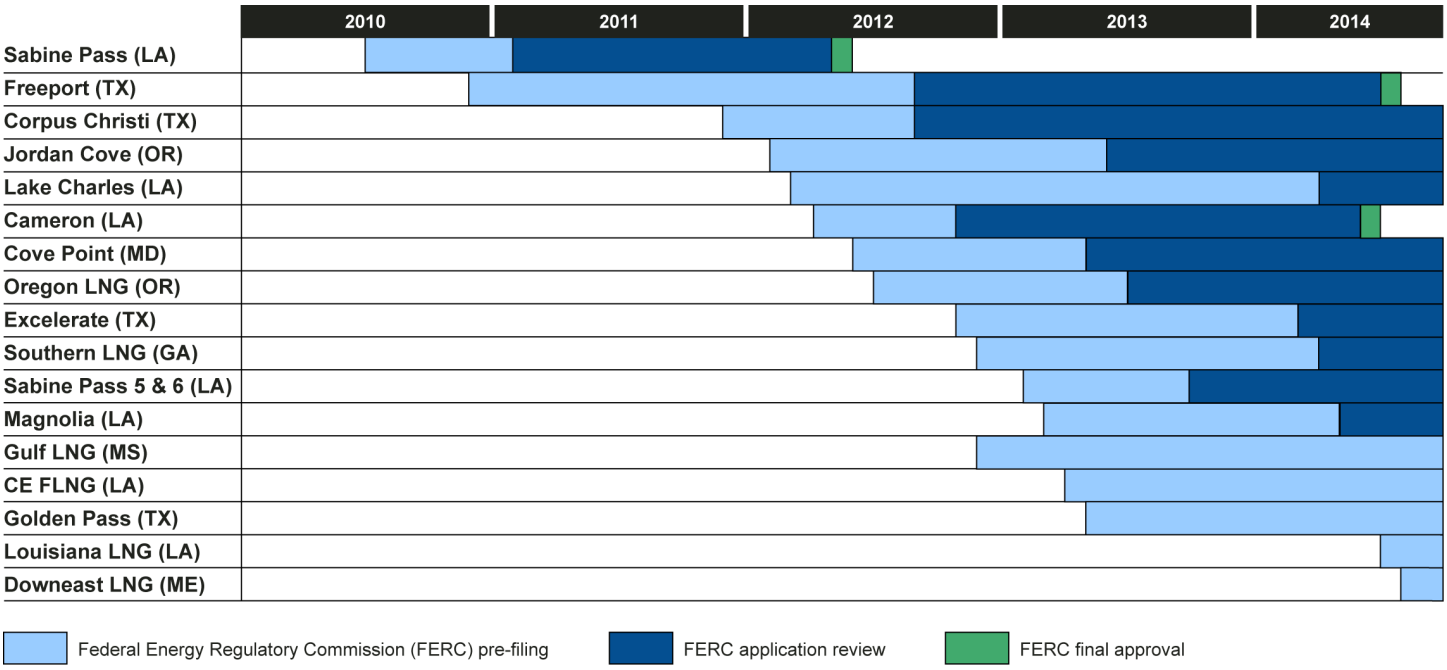
FERC Approved 3 Facility Applications and Is Reviewing 14 Applications

FERC approved applications to construct and operate the Sabine Pass LNG export facility in April 2012, the Cameron facility in June 2014, and the Freeport facility in July 2014. As of late August 2014, FERC was reviewing 14 applications (See fig. 3). FERC has issued three final NEPA documents in 2014, including for the Cameron and Freeport facilities, and expects to complete one more by the end of 2014.[51] FERC officials said that they could not discuss when the Commission would act on these facility applications.[52]

[51] FERC has issued three final NEPA documents in 2014. These include the Cameron final EIS, issued April 30, 2014 (facility approved by the Commission on June 19, 2014); the Freeport final EIS, issued June 16, 2014 (facility approved by the Commission on July 30, 2014); and the Cove Point EA, issued on May 15, 2014. FERC also issued a draft EIS for Corpus Christi on June 13, 2014.

[52] FERC staff are restricted by regulation from discussing the nature or timing of future Commission actions. 18 C.F.R. §3c.2(b) 2014.

Figure 3: Status of Applications Filed with FERC to Build and Operate LNG Export Facilities



Source: GAO analysis of FERC data. | GAO-14-762

Note: FERC also approved an application to construct and operate a natural gas liquefaction and storage facility in 2008. This facility was identified as the source of LNG to be exported in containers under the Carib Energy application to DOE.

As shown above, FERC's review of applications to construct LNG export facilities can take 2 to 3 years or more.[53] FERC officials said that these reviews are lengthy because of the complexity of the facilities and number of permits and reviews required by federal and state law. For example, applicants must model the effects of LNG spills from pipes and storage tanks on areas around the facility under a variety of scenarios. One of the applicants we spoke with said that the number of variables involved in modeling a single scenario could require up to a week of computer processing.

[53] Application estimates based on the duration of FERC's completed and pending applications.

FERC's Reviews of Applications to Construct LNG Export Facilities Are Technically Complex

FERC's review process is technically complex and includes the following three phases.

Pre-filing. According to FERC officials, the pre-filing phase is intended to allow applicants to communicate freely with FERC staff and stakeholders to identify and resolve issues before the applicant formally files an application with FERC.[54] Under Commission regulations issued pursuant to the Energy Policy Act of 2005, applicants are required to pre-file with FERC a minimum of 6 months before formally filing. The pre-filing phase can vary significantly depending on project specifics; the Freeport and Lake Charles applications were in the pre-filing phase for over 19 months, while the Cameron application was in the pre-filing phase for about 7 months. FERC officials said that the duration of each phase can vary depending on the site specific characteristics of the proposed facility and responsiveness of the applicant to requests for information from FERC.[55] The pre-filing period also involves public outreach by the applicant and FERC, and FERC allows public comments during this period.[56] An applicant completes the pre-filing period when it has submitted the required documentation to FERC and formally filed. This documentation includes a series of 13 resource reports that consist of, among other things, detailed information on project engineering and design, air and water quality, and fish and wildlife, as well as a description of the anticipated environmental effects of the project and proposed mitigation measures. One applicant told us that the resource reports it submitted to FERC consisted of over 12,000 pages.

Application review. The application review phase includes FERC's review of the application and development of the environmental document required by NEPA. FERC officials told us that they start the review phase after an applicant has successfully completed the pre-filing process and

[54] Once an applicant formally files, FERC ex parte regulations require all communications between an applicant and FERC to be on the record.

[55] FERC officials told us that the applicant generally determines how long pre-filing will last. After the 6-month minimum pre-filing period has been reached and the applicant has submitted the appropriate documentation, FERC staff cannot prevent the applicant from ending the pre-filing phase by filing an application.

[56] According to FERC officials, a public scoping period typically occurs for 30 days after FERC issues a notice in the *Federal Register* announcing its intent to prepare an environmental document. The goal of this period is to determine the scope of issues to be addressed and to identify significant issues related to a proposed action.

submits an application.[57] FERC reviews, among other things, facility engineering plans and safety systems identified by the applicant; environmental effects from the construction and operation of the facility; and, potential alternatives to the proposed project.[58] FERC develops a NEPA document with input from relevant agencies that elect to participate, called cooperating agencies, as well as other stakeholders.[59] FERC officials told us that, depending on the location of the proposed facility and amount of construction, FERC prepares either an environmental impact statement (EIS) or environmental assessment (EA). FERC will prepare an EA if it believes the review will find no significant impact on the environment from the project. For example, FERC prepared an EA for the Sabine Pass facility because the proposed facility was within the footprint of an existing LNG import facility and previously the subject of an EIS.[60] FERC officials told us that the agency generally prepares an EIS for proposed facilities that would extend beyond the footprint of an existing import facility. After an EIS or EA is drafted, FERC solicits comments from federal agencies and the public on the document.[61] FERC reviews agency and public comments and integrates those into a final EIS or EA, as necessary. The final EIS or EA will recommend any environmental and safety mitigation measures to be

[57] According to FERC officials, the public has the opportunity to intervene and become a party to the proceeding for a period specified in FERC's notice in the *Federal Register* announcing that an application has been filed (typically 21 days). Parties have the right to seek court review of Commission orders.

[58] For example, one aspect of this review includes an analysis of liquefaction systems, fire suppression and alarm systems, instrumentation, transfer piping, and dikes and sumps to ensure that the effects of any LNG spill stay within the facility boundary.

[59] Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis. According to FERC officials, the Coast Guard, the Corps, DOT, DOE, and the Environmental Protection Agency are typically cooperating agencies for FERC LNG facility reviews. According to these officials, a state or local agency or American Indian tribe may also become a cooperating agency under certain conditions.

[60] FERC must conduct an EIS after an EA if the EA determines that significant impacts are likely.

[61] FERC issues a draft and final document for an EIS. According to FERC officials, the public has the opportunity to comment, typically for 45 days after FERC issues a draft EIS, and FERC addresses those comments in the final EIS. EA's do not include a draft document; the public has the opportunity to comment, typically for 30 days after the EA is completed. FERC addresses these comments in the Commission order. The public may also file a motion to intervene during these comment periods.

completed during various stages of the project. FERC staff submits the final NEPA document and other staff analyses to FERC commissioners for consideration.[62] FERC commissioners consider the entire record of the proceeding, including the NEPA document, to determine whether to approve a project.

Post-authorization. The post-authorization phase includes FERC oversight of plant construction and operations. After FERC approves a project but before an applicant can start construction, the applicant must develop a plan describing how it will meet any conditions and mitigation measures identified in FERC's approval. FERC oversees construction and ensures that these conditions are met. The Coast Guard and DOT also oversee construction to ensure compliance with their respective regulations. FERC conducts compliance and site inspections during construction at least every 8 weeks. Following construction, the applicant must receive written authorizations from the Commission to begin operations at the facility. Once the facility is operational, FERC conducts annual inspections and requires semiannual status reports from the facility operator.

FERC's Review Process Involves Other Federal, State, and Local Agencies

As the lead agency responsible for the environmental and safety review of LNG export facilities under NEPA, FERC works with federal, state, and local agencies to develop the NEPA document. In some cases, such as with the Corps and DOE, agencies will adopt and use the NEPA document in issuing their respective permits related to the export facility. In addition, FERC regulations require applicants to consult with the appropriate federal, state, and local agencies to ensure that all environmental effects are identified.[63] FERC ensures that the applicant obtains the appropriate federal permits or consultations with these agencies. Major federal participants in FERC's LNG facility review include the following:

- **Coast Guard.** The Coast Guard requires applicants to assess the effects of a new facility on a bordering waterway. The applicant

[62] After a final EIS or EA is issued, federal agencies or agencies with delegated federal responsibilities are to issue a final decision on the applicant's request for the federal authorization within 90 days, unless a schedule is otherwise established by federal law. 18 C.F.R. §157.22.

[63] 18 C.F.R. §380.3 (b)(3),(4).

provides the assessment to the Coast Guard for validation and review before filing its FERC application, and the Coast Guard advises FERC on the suitability of the waterway for the LNG marine traffic associated with the facility. The Coast Guard and DOT also assist FERC's review of safety and security of the facility.[64]

- **PHMSA.** PHMSA is an agency within DOT responsible for establishing national policy relating to pipeline safety and hazardous material transportation, including the authority to establish and enforce safety standards for onshore LNG facilities. To assist FERC's assessment of whether a facility would affect public safety, FERC regulations require applicants to show that their facility design would comply with PHMSA regulations for hazardous liquids vapor dispersion and fires.[65] Applicants submit models of vapor dispersion to FERC, and FERC consults with PHMSA to ensure that the models comply with PHMSA regulations.[66]

- **The Corps.** Under section 404 of the Clean Water Act, operations that discharge dredged or fill material into U.S. waters are required to obtain a permit from the Corps.[67] Discharges under this permit must have a state certification to ensure the discharge meets water quality standards.[68] In addition, under section 10 of the Rivers and Harbors Act of 1899, the Corps has regulatory authority to oversee construction activities within the navigable waters of the United

[64] In 2004, to help ensure coordination between federal agencies, FERC, DOT, and the Coast Guard entered an interagency agreement that defined responsibilities among the agencies regarding the safety and security at waterfront LNG facilities.

[65] Some applicants told us that, in August 2013, PHMSA asked them for more information for its review of vapor models than previously required, and that PHMSA took more time to review the models. Some applicants also told us that staffing shortages at PHMSA caused delays in these reviews. PHMSA officials we spoke to said staff has been added to address these delays.

[66] PHMSA has indicated that these regulations are out of date and do not reflect modern modeling technology. PHMSA officials told us that the agency plans to revise these regulations accordingly, and that it has issued guidance to help with interpretation of these regulations.

[67] 33 U.S.C. §1344. EPA may prohibit, withdraw, deny, or restrict section 404 permits.

[68] 33 U.S.C. §1341. EPA may review the water quality certifications issued by state agencies.

States, and applicants may be required to obtain a permit from the Corps.[69]

- **Environmental Protection Agency** (EPA)**.** Applicants may be required under the Clean Air Act (CAA) to receive air permits for the construction and operation of LNG facilities.[70] State environmental agencies generally issue these permits, but EPA can issue the permits if a state is not authorized to issue permits, or under other limited circumstances.[71] EPA also comments on the FERC draft and final EIS, as required by the CAA.[72]

Applicants may also be required by law to consult with these and other federal agencies, such as the National Oceanic and Atmospheric Administration and the Fish and Wildlife Service, to ensure their applications comply with federal laws such as the Endangered Species Act,[73] the Migratory Bird Treaty Act,[74] the Magnuson-Stevens Fishery

[69] 33 U.S.C §403. The Rivers and Harbors Act regulates any work or structures that potentially affect the navigable capacity of a body of water.

[70] According to EPA, potentially applicable CAA requirements include prevention of significant deterioration, nonattainment new source review (NSR), minor source NSR, title V, new source performance standards, hazardous air pollutants, and other state air regulations.

[71] The majority of states are authorized or approved to implement the relevant CAA permitting programs relevant to LNG facilities.

[72] 42 U.S.C. §7609(a).

[73] The Endangered Species Act, Pub. L. No. 93-205, codified as amended at 16 U.S.C. §§1531-1543, has as its purpose, to conserve threatened and endangered species and the ecosystems upon which they depend. Under section 7 of the act, federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a species protected under the act.

[74] The Migratory Bird Treaty Act, act of July 3, 1918, ch. 128, codified as amended at 16 U.S.C. §§ 703-712, implements various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds.

Conservation and Management Act,[75] and the Fish and Wildlife Coordination Act.[76]

In addition to federal permits and consultations, applicants may also be required to obtain other permits under state and local law. Because of the wide variety of projects, locations, and state and local laws, permitting requirements vary by project. The applicant is responsible for identifying the necessary permits and consultations and reporting these to FERC as part of the pre-filing process. In addition to issuing most air permits and water quality certifications, states and local agencies have other permitting and consultation responsibilities, such as to consult with applicants to ensure compliance with the Coastal Zone Management Act[77] and the National Historic Preservation Act.[78]

Agency Comments

We provided a draft of this product to FERC and the DOE for their review and comment. DOE and FERC provided technical comments, which we incorporated throughout the report as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 5 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Chairman of FERC, the Secretary of Energy, and other interested parties. In addition, this report will be available at no charge on the GAO website at http://www.gao.gov.

[75] The Magnuson-Stevens Fishery Conservation and Management Act, Pub. L. No. 94–265 (1976), codified as amended at 16 U.S.C. §1801 et seq., provides the statutory framework for the protection and management of the nation's marine fishery resources.

[76] The Fish and Wildlife Coordination Act, Act of March 10, 1934, ch. 55, codified as amended at 16 U.S.C. §§ 661-666 provides the basic authority for the Fish and Wildlife Service's involvement in evaluating impacts to fish and wildlife from proposed water resource development projects.

[77] The Coastal Zone Management Act of 1972, Pub. L. No. 92-583 (1972), codified as amended at 16 U.S.C. §§ 1451-1466, promotes comprehensive and coordinated planning for coastal zone development and preservation between states and the federal government.

[78] The National Historic Preservation Act, Pub. L. No. 89-665 (1966), codified as amended at 16 U.S.C. §§ 470 to 470x-6 requires, among other things, that federal agencies consider the effects of any federally funded or permitted project on any historic site, building, structure, or other object that is listed on the National Register of Historic Places.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix II.

Sincerely yours,

Frank Rusco
Director, Natural Resources and Environment

Appendix I: Application Names Used by the GAO

For the purposes of this report, GAO developed table 1 below to allow us to use a single name to refer to related applications to the Federal Energy Regulatory Commission (FERC) and the Department of Energy (DOE). Table 1 lists (1) the names of applicants that submitted requests to FERC to construct liquefied natural gas (LNG) export facilities, (2) the names of applicants that submitted requests to DOE to export LNG from those facilities[1], and (3) the name GAO used to refer to these applications. In some cases, multiple companies filed jointly for one application.

Table 1: Names of Applications Referred to In This Report, Based on Associated Applications to FERC and DOE

FERC applicant name	DOE applicant name	GAO application name
Sabine Pass[a]	Sabine Pass Liquefaction LLC	Sabine Pass (LA)
Freeport LNG Development LP	Freeport LNG Expansion LP & FLNG Liquefaction LLC	Freeport (TX)
Trunkline LNG Export LLC & Trunkline LNG Company LLC[b]	Lake Charles Exports LLC	Lake Charles (LA)
Dominion Cove Point LNG LP	Dominion Cove Point LNG LP	Cove Point (MD)
N/A[c]	Freeport LNG Expansion LP & FLNG Liquefaction LLC	Freeport Expansion (TX)
Cameron LNG LLC[d]	Cameron LNG LLC	Cameron (LA)
Jordan Cove Energy Project LP	Jordan Cove Energy Project LP	Jordan Cove (OR)
Corpus Christi Liquefaction LLC	Cheniere Marketing LLC	Corpus Christi (TX)
Oregon LNG[e]	LNG Development Company LLC	Oregon LNG (OR)
Excelerate Liquefactions Solutions	Excelerate Liquefactions Solutions I, LLC	Excelerate (TX)
Elba Liquefaction Company LLC & Southern LNG Company LLC	Southern LNG Company LLC	Southern LNG (GA)
Sabine Pass	Sabine Pass Liquefaction LLC	Sabine Pass Trains 5 & 6 (LA)
Magnolia LNG LLC	Magnolia LNG LLC	Magnolia LNG (LA)
Gulf LNG Liquefaction Company LLC	Gulf LNG Liquefaction Company LLC	Gulf LNG (MS)
CE FLNG LLC & CE Pipeline LLC	CE FLNG LLC	CE FLNG (LA)
Golden Pass Products LLC & Golden Pass Pipeline LLC	Golden Pass Products LLC	Golden Pass (TX)
Louisiana LNG Energy LLC	Louisiana LNG Energy LLC	Louisiana LNG (LA)
Downeast LNG, Inc.	N/A[f]	Downeast LNG (ME)

[1] DOE has received over 20 other applications to export LNG from companies that have not filed with FERC and are not listed here.

FERC applicant name	DOE applicant name	GAO application name
N/A[g]	Carib Energy (USA) LLC	Carib Energy (FL)

Sources: GAO analysis of FERC and DOE documents. | GAO-14-762

[a] The application was submitted by Sabine Pass Liquefaction Expansion LLC, Sabine Pass Liquefaction LLC, and Sabine Pass LNG LP, to which FERC collectively refers as "Sabine Pass."

[b] FERC also included in the application the Pipeline Modification Project submitted by Trunkline Gas Company LLC. The project coincides with the construction of the LNG export facility.

[c] There was effectively a single application to FERC to construct the Freeport LNG export facility. DOE received two applications to export LNG for this facility.

[d] FERC also included in the application the Pipeline Project submitted by Cameron Interstate Pipeline LLC. The project coincides with the construction of the LNG export facility.

[e] FERC also included in the application to modify the pipeline route submitted by Oregon Pipeline Company LLC. The project coincides with the construction of the LNG export facility.

[f] As of late August 2014, Downeast LNG had not submitted an application to DOE to export LNG.

[g] The Carib Energy application to DOE requested approval to export LNG via specialized container. The LNG will be processed and loaded into containers at a small liquefaction and storage facility that has multiple uses, and is not identified by FERC as an LNG export facility.

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

Frank Rusco, (202) 512-3841 or ruscof@gao.gov

Staff Acknowledgments

In addition to the individual named above, Christine Kehr (Assistant Director), Cheryl Harris, and David Messman made key contributions to this report. Important contributions were also made by Mark Braza, Michael Kendix, Alison O'Neill, Dan Royer, and Barbara Timmerman.