Federal Energy Regulatory Commission
Office of Energy Projects, Division of Gas-Environment & Engineering

DOE/EA - 2036
DOE/FE Docket No. 15-63-LNG
Adopted 03/11/2016

ENVIRONMENTAL ASSESSMENT REPORT

Name of Applicant: Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.

Date Filed: 10/25/13	**Docket No:** CP14-12-000
Type: Section 3(a) - Amendment	**Cost:** Not Provided

Facilities:

Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P. (collectively "Sabine Pass") filed an application for a limited amendment to the Commission's authorization issued in an Order on April 16, 2012 in Docket No. CP11-72-000, and amended in Order on August 2, 2013 in Docket No. CP13-2-000, which authorized the Sabine Pass Liquefaction Project, currently under construction in Cameron Parish, Louisiana (Liquefaction Project). Under this application Sabine Pass seeks Commission authorization to increase the total LNG production capacity of the Liquefaction Project from the currently authorized 2.2 billion cubic feet (Bcf) per day to approximately 2.76 Bcf per day, which is the estimated maximum LNG production capacity of the Liquefaction Project. The maximum LNG production capacity would be accomplished with no additional construction of new facilities or the modification of the previously authorized facilities. This would be accomplished by calculating the capacity level based on the final, optimized design of the Liquefaction Project under less conservation operating conditions. The Liquefaction Project would achieve its maximum LNG production level and remain in full compliance with all applicable air emission and other regulatory requirements.

Environmental Impact -- Conclusions:

___ **Categorical Exclusion**

___ **Environment Not Involved**

_X_ **Environment Complete**

___ **Deficiency Letter Required**

_X_ **EA/EIS Required**

_X_ **No NOI Required**

___ **NOI Required**

Environmental Considerations or Comments:

Environmental Assessment for the proposed action is attached.

Prepared by:	**Date:**	**Approved by Branch Chief:**	**Date:**
/s/Shahid M. Anis	1/24/14	/s/ James Martin	1/24/14

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ENVIRONMENTAL ASSESSMENT

A. PROPOSED ACTION

On October 25, 2013, Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P. (collectively, Sabine Pass)[1] filed an application for a limited amendment (Amendment) with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP14-12-000 to amend the Commission's April 16, 2012 Certificate Order in Docket No. CP11-72-000 (2012 Order)[2], as amended by the Commission's August 2, 2013 Order (2013 Order)[3]. The 2012 Order authorized Sabine Pass to construct and operate facilities for the liquefaction and export of domestically-produced natural gas at the existing Sabine Pass Liquefied Natural Gas (LNG) terminal (Liquefaction Project), in Cameron Parish, Louisiana. The Liquefaction Project includes four LNG process trains (trains 1 through 4), each with an authorized nominal liquefaction capacity of approximately 4.0 million metric tons per annum (mtpa), feed-gas metering, flares, refrigerant storage, boil-off gas and water handling systems, new buildings, and new utility and power generation facilities. Construction of the Liquefaction Project is currently underway. The 2013 Order authorized certain modifications (Modification Project) to the authorized facilities and an accelerated construction of the Liquefaction Project, but did not authorize an increase from the originally authorized LNG production capacity of 16 mtpa total.

In this application, amending the 2012 and 2013 Orders, Sabine Pass requests an increase in the combined, authorized LNG production capacity for the four LNG trains from the currently authorized 2.2 billion cubic feet per day (Bcf) to about 2.76 Bcf per day. Sabine Pass explains that the requested 2.76 Bcf per day production capacity authorization represents the maximum or peak LNG production and export capability under optimal operating conditions. Sabine Pass states that the maximum LNG production capacity is derived by calculating the capacity level based on the

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1 Sabine Pass LNG, L.P. and Sabine Pass Liquefaction, LLC are subsidiaries of Cheniere LNG, Inc., which is a subsidiary of Cheniere Energy, Inc.

2 Order Granting Section 3 Authorization, *Sabine Pass.*, 139 FERC ¶ 61,039 (2012).

3 The 2013 Order authorized modifications including the addition of: (1) a heavies removal unit, condensate storage, metering and send-out facilities, and feed-gas pipeline meter stations; (2) additional workspaces and parking areas; and (3) additional water supply lines and natural gas liquids truck loading facilities.

final, optimized design of the Liquefaction Project and requires no additional construction or modification of previously authorized facilities. For the purpose of calculating the maximum LNG production capacity, Sabine Pass assumes optimal operating conditions such as cooler ambient temperatures that increase turbine power to produce more LNG and implementation of enhanced operations and maintenance processes that promote production efficiencies. Sabine Pass further states that the Liquefaction Project can achieve its maximum LNG production level while remaining in full compliance with applicable air emission and other regulatory requirements. Sabine Pass acknowledges that the export of quantities beyond the U.S. Department of Energy's (DOE) previously authorized 16 mtpa is subject to its receipt of additional LNG export authorization from DOE.

The original liquefaction capacity of about 2.2 Bcf per day or 16 mtpa authorized in the 2012 Order was based on the combined nameplate or nominal capacity of the four LNG trains (4.0 mtpa per LNG train) and was based on a conservative estimate of the expected average annual output over the anticipated lifetimes of the four LNG trains. During the final design phase of the Liquefaction Project, more precise information was obtained concerning equipment specifications. In addition, Sabine Pass has implemented certain design optimizations that would result in higher LNG production. For example, design changes and optimizations approved through the Commission's implementation plan review process[4] include: (1) the addition of inlet air humidification to the gas turbines driving the refrigerant compressors, thus increasing their power at high ambient temperatures to produce more LNG; (2) optimization of refrigerant gas compressors through better definition of certain design characteristics, such as the impeller design, resulting in increased efficiency and higher LNG production; and (3) sizing of piping and equipment to minimize pressure drop and otherwise optimize equipment and systems to perform more efficiently. These previously approved design optimizations will remove bottlenecks and result in more LNG production using the same power provided by the turbines.

The design changes and optimizations increase efficiency and provide a wider range of conditions that allow more effective use of the power available. Compressor optimizations make the refrigerant compressors driven by the gas turbine operate more efficiently. The more refrigerant that can flow through the compressor produces more LNG without increasing the maximum power for the turbine. The optimizations reduces pressure drop and increases the efficiency of the liquefaction process. Therefore, more refrigerant, natural gas, and other process fluids can be

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[4] Letter Order Granting Approval to Construct Final Design, *Sabine Pass Liquefaction, LLC and Sabine Pass LNG, L.P.*, FERC Docket No. CP11-72-000 (June 7, 2013).

circulated using the same available power from the gas turbines and more LNG can be produced without affecting emissions. Inlet air humidification lowers the temperature of the inlet air used by the gas turbine, and the turbine is able to produce more power when the inlet air is cold. This assumes that allows more LNG production on hot days, thus increasing the annual production. Because there are no design or operational changes made to the gas turbines, there would be no increase in fuel gas usage.

In addition to the design optimizations discussed above, Sabine Pass is also able to increase its annual LNG production by making less conservative assumptions on downtimes for maintenance and degradation of gas turbine performance over time. This assumes that Sabine Pass would produce more LNG when planned and unplanned shutdowns are minimized, the gas turbines are at the beginning of their maintenance cycle, and that ambient and other conditions that affect LNG production are favorable.

B. ENVIRONMENTAL ANALYSIS

The FERC's Notice of Application for Docket No. CP14-12-000 was issued on October 31, 2013. On November 14, 2013, the Sierra Club filed a motion to intervene, protest, and comments.

The Sierra Club contends that the proposal would result in an increase in air emissions that would be associated with an increase of the total LNG production capacity of the Liquefaction Project. The Sierra Club argues that increasing LNG output from trains 1-4 would cause a corresponding increase in emissions of air pollutants from the liquefaction process and the same increase in environmental impacts from induced gas production, pipeline transportation, and tanker shipping. Sierra Club further argues that there is a direct correlation between the Liquefaction Project's LNG production capacity and the air emissions associated with such production (i.e., a 25 percent increase in LNG production capacity yields a 25 percent increase in air pollution from the Liquefaction Project). The Sierra Club further indicated that the proposed action would increase greenhouse gases and pollutants; and adversely affect the environment considering the cumulative impact of other projects in the area. The Sierra Club comments are addressed in this environmental assessment.

The Sierra Club also raises many of the same arguments that the Commission rejected in its 2012 Order authorizing construction of the Liquefaction Project. These issues include whether the application would induce additional natural gas production, particularly from hydraulic fracturing of shale gas sources, causing environmental harms associated with such production on air, water, and recreational resources; and increase domestic natural gas prices, increase unemployment, and

reduce manufacturing. These issues were discussed in the Liquefaction EA issued on December 28, 2011, and there is no need to restate in detail the Commission's rejection of these assertions here.

The Sierra Club contends that the Commission's National Environmental Policy Act (NEPA) review should consider connected actions and the cumulative impacts in a single environmental document of Sabine Pass' pending applications for interrelated liquefaction and pipeline projects. The Sierra Club points out that in Docket No. CP13-552-000 Sabine Pass is proposing additional liquefaction trains 5 and 6, and in Docket No. CP13-553-000, Cheniere Creole Trail L.P. is proposing to construct a compressor station and 104.3 miles of pipeline to deliver natural gas to the Liquefaction Project. The Commission is aware of these pending applications but has not completed its environmental review of the proposed facilities.

Our[5] analysis indicates that because Sabine Pass' Amendment in this docket does not require the construction of new facilities or the modification of previously-authorized facilities it would not affect the following resources:

- ground water, springs, or aquifers;
- wetlands or waterbodies;
- surface water, water intakes, or sources water protection areas;
- cultural;
- forested lands and vegetation;
- residential or commercial areas;
- wildlife including federally threatened and/or endangered species;
- geologic resources;
- soils;
- noise; and
- state or national parks, forests, recreation areas, or refuge areas.

Based on the comments received, we provide a review and impact analysis of air quality.

Under the requirements of the NEPA, the Commission staff performed an analysis of the Liquefaction Project and the subsequent Modification Project; environmental assessments (EAs) were issued on December 28, 2011 and April 24, 2013, respectively. The Liquefaction Project EA identified the potential annual emissions for criteria pollutants and hazardous air pollutants for both the Liquefaction Project and the existing Sabine Pass LNG Terminal (SPLNG) in tables

[5] The pronouns "we," "us," and "our" refer to environmental staff of the FERC's Office of Energy Projects (OEP).

2.7-7 and for potential annual greenhouse gas emissions in table 2.7-8.[6] The emission data included in this EA was based on US Environmental Protection Agency (USEPA) emission factors obtained AP-42, applicable federal and/or state regulatory emission limitation, and manufacturer-supplied emissions factors. Potential to emit is based on continuous operation (8,760 hours per year) at 100 percent load for trains 1-4 except for standby engines, for which potential to emit is based on 500 hours per year of operation.[7]

The Sierra Club contends Sabine Pass' Amendment would increase emissions from shipping vessels. The Liquefaction Project EA clearly states that no increase in ship traffic is anticipated for the Liquefaction Project.[8] Because loading rates proposed for the Liquefaction Project are the same as the unloading rates for the SPLNG Terminal, no increase in ship traffic is anticipated. Emissions in Louisiana and Texas from 400 ships per year (up to 250,000 cubic meters in size) were analyzed in the Liquefaction Project EA which included LNG carrier cruising, transit hoteling, and unloading. The Amendment is not requiring any changes to the number of vessels, dredging to the area to accommodate larger vessels, a relocation of the berthing area, or changes to the unloading/unloading rate for the vessels. The vessel emissions were evaluated in the EA for the Liquefaction Project[9] and the Amendment would not cause a change in total facility and marine emissions.

The Liquefaction Project EA performed a modeling[10] analysis to demonstrate that the Liquefaction Project would be in compliance with National Ambient Air Quality Standards. Operating at the "maximum design capacity" in a particular year, as currently proposed in the Amendment, would not alter any of the design parameters used in the previous air quality modeling analysis. We conclude this because there are no changes to the factors that influence air modeling (e.g. emission rates, air/fuel ratios, exit stack temperatures, exit flow rates, etc.) and modeling was performed on continuous operation of the gas turbines (and other emissions sources) at their maximum design rate for 8,760 hours a year.

Sabine Pass has obtained all necessary air permits for the Liquefaction Project which were issued by the Louisiana Department of Environmental Quality (LDEQ). On December 6, 2011, LDEQ issued Title V Permit 0560-00214-V3 and Prevention of Significant Deterioration (PSD) Permit PSD-LA-703 (M3) authorizing the continued operation of the Sabine Pass LNG Terminal and the operation of the Liquefaction Project (Trains 1 through 4 and associated equipment). On March 22,

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[6] Liquefaction Project EA, pages 2-55 through 2-57.
[7] *Id*
[8] Liquefaction Project EA, page 1-9.
[9] *Id*
[10] Liquefaction Project EA, page 2-60.

2013, LDEQ issued a modified Title V Permit 0560-00214-V4 and PSD Permit PSD-LA-703 (M4) in connection with certain modifications to the Liquefaction Project authorized, in part, by the Commission in the 2013 Order. Operating at the 'maximum design capacity" in any particular year would not alter any of the design parameters used to demonstrate the Liquefaction Project's compliance with the National Ambient Air Quality Standards and the permits authorize continuous operation of the gas turbines (other emission sources) at their maximum design rate for 8,760 hours a year. The Amendment does not require any changes to operating load, fuel consumption, or fuel specification.

Our analysis indicates that increasing the total LNG production capacity of the Liquefaction Project from the currently authorized 2.2 Bcf per day to 2.76 Bcf per day would not require any construction, and would be in compliance with applicable air emissions and other regulatory requirements.

Cumulative impacts may result when the environmental effects associated with a proposed action are added to impacts associated with projects in the past, present, or reasonably foreseeable future that occur in the same region. As identified in this EA, the proposed action involves no new construction or modification of facilities. Consequently, the proposed action would add no impacts to other past, present, or reasonably foreseeable projects in the project region.

Under the no-action alternative, Sabine Pass would not be authorized to increase the total LNG production capacity of the Liquefaction Project from the currently authorized 2.2 Bcf per day to 2.76 Bcf per day, which is the estimated maximum LNG production capacity of the Liquefaction Project. The equipment for the Liquefaction Project is already authorized. The Commission has already determined under the 2012 Order that the Liquefaction Project meets the public interest standard of NGA Section 3, and has also previously approved design changes and optimizations. Therefore, the no-action alternative is not recommended over the proposed action based on the environmental analysis of this EA.

C. Conclusions

Based on the analysis in this EA, the OEP staff has determined that if Sabine operates the proposed facilities in accordance with its application and supplements, approval of the Amendment would not constitute a major federal action significantly affecting the quality of the human environment.