Draft
Environmental Assessment

Energía Costa Azul, S. de R.L. de C.V.

ECA Large-Scale Project: Design Increase

Office of Resource Sustainability

Office of Fossil Energy and Carbon Management

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ACRONYMS & ABBREVIATIONS

AEO	Annual Energy Outlook
ASEA	Agencia Nacional de Seguridad Industrial y de Protección al Medio Ambiente del Sector Hidrocarburos/National Agency for Industrial Security and Environmental Protection for the Hydrocarbon Industry [Mexico]
Bcf	Billion cubic feet
Bcf/d	Billion cubic feet per day
Bcf/yr	Billion cubic feet per year
CCS	Carbon Capture and Storage
CO_2	Carbon dioxide
CO_2-e	Carbon dioxide-equivalent
CRE	Comisión Reguladora de Energía/Energy Regulatory Commission [Mexico]
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERA	Environmental Risk Assessment [Mexico]
EViS	Evaluación de Impacto Social/Social Impact Assessment [Mexico]
FECM	Office of Fossil Energy and Carbon Management
FERC	Federal Energy Regulatory Commission
FTA	Free Trade Agreement
GWP	Global Warming Potential
IEA	International Energy Agency
INAH	Instituto Nacional de Antropología e Historia/National Institute of Anthropology and History [Mexico]
LGEEPA	Ley General del Equilibrio Ecológico y la Protección al Ambiente/General Law of Ecological Balance and Environmental Protection [Mexico]
LNG	Liquefied Natural Gas
MIA	Manifestación de Impacto Ambiental [Mexico review process - Environmental Impact Assessment]
MWh	Megawatt hour
MMcf	Million cubic feet
NETL	National Energy Technology Laboratory
SEMARNET	Secretaría de Medio Ambiente y Recursos Naturales/Ministry of Environmental and Natural Resources [Mexico]
SENER	Secretaría de Energía/Ministry of Energy [Mexico]
NEPA	National Environmental Policy Act
NGA	Natural Gas Act
PHMSA	Pipeline and Hazardous Materials Safety Administration
ROI	Region of Influence
Tcf	Trillion cubic feet
Tj	Terajoule

1 Introduction

1.1 Background

The Department of Energy (DOE) Office of Fossil Energy and Carbon Management (FECM) received an application[1] from Energía Costa Azul, S. de R.L. de C.V. (ECA) on September 18, 2020 (2020 Application). In the 2020 Application, ECA requests long-term, multi-contract authorization to export domestically-produced natural gas from the United States to Mexico through existing and future cross-border pipeline facilities and, after liquefaction in Mexico, to re-export[2] the U.S.-sourced natural gas in the form of liquefied natural gas (LNG) to other countries. Previously, on September 27, 2018, ECA submitted an application[3] for export authorization (2018 Application) that was granted in DOE/FE Order Nos. 4318[4] and 4365[5].

The Natural Gas Act (NGA) directs approval of certain types of applications to export natural gas from the United States, and the NGA requires a public interest review of other applications. Specifically, section 3(c) of the NGA[6] requires that proposed imports and/or exports of natural gas, including LNG, in applications to FECM requesting authorization of imports and/or exports from and/or to nations with which there are in effect free trade agreements (FTA) requiring national treatment for trade in natural gas

[1] Energía Costa Azul, S. de R.L. de C.V., Application to Amend Long-Term, Multi-Contract Authorizations to Export Natural Gas to Mexico and to Export Liquefied Natural Gas from Mexico to Free Trade Agreement and Non-Free Trade Agreement Nations (ECA Large-Scale Project) (Design Increase), Docket No. 18-145-LNG (Sept. 18, 2020), https://www.energy.gov/sites/prod/files/2020/09/f79/Energia%20Costa%20Azul%20-%20Design%20Increase%2018-145-LNG.pdf.

[2] For purposes of this Environmental Assessment, "re-export" means to ship or transmit U.S.-sourced natural gas in its various forms (gas, compressed, or liquefied) subject to DOE's jurisdiction under section 3 of the Natural Gas Act, 15 U.S.C. § 717b, from one foreign country (*i.e.*, a country other than the United States) to another foreign country.

[3] Energía Costa Azul, S. de R.L. de C.V., Application for Long-Term, Multi-Contract Authorizations to Export Natural Gas to Mexico and to Export Liquefied Natural Gas From Mexico to Free Trade Agreement and Non-Free Trade Agreement Nations (ECA Large-Scale Project), Docket No. 18-145-LNG (Sept. 27, 2018), https://www.energy.gov/sites/prod/files/2018/10/f56/18-145-LNG.pdf.

[4] *Energía Costa Azul, S. de R.L. de C.V.,* DOE/FE Order No. 4318, Docket No. 18-145-LNG, Order Granting Long-Term, Multi-Contract Authorization to Export Natural Gas to Mexico and to Other Free Trade Agreement Nations (ECA Large-Scale Project) (Jan. 25, 2019), *amended by* DOE/FE Order No. 4318-A (Dec. 10, 2020) (extending export term), https://www.energy.gov/sites/prod/files/2019/03/f60/ord4318.pdf, https://www.energy.gov/sites/prod/files/2020/12/f81/Energia%20Costa%20Azul%2018-145-LNG%20Ext.%20Order.pdf

[5] *Energía Costa Azul, S. de R.L. de C.V.,* DOE/FE Order No. 4365, Docket No. 18-145-LNG, Opinion and Order Granting Long-Term Authorization to Re-Export U.S.-Sourced Natural Gas in the Form of Liquefied Natural Gas from Mexico to Non-Free Trade Agreement Countries (ECA Large-Scale Project) (Mar. 29, 2019), *amended by* DOE/FE Order No. 4365-A (Dec. 10, 2020) (extending export term), https://www.energy.gov/sites/prod/files/2020/08/f77/ord4365.pdf, https://www.energy.gov/sites/prod/files/2020/12/f81/Energia%20Costa%20Azul%2018-145-LNG%20Ext.%20Order.pdf

[6] 15 U.S.C. § 717b(c).

(FTA countries), be deemed consistent with the public interest and granted without modification or delay.[7] In addition, all LNG imports are deemed to be consistent with the public interest by section 3(c).[8]

In the case of applications to export LNG to non-FTA countries,[9] section 3(a) of the NGA[10] requires DOE to conduct a public interest review and grant authority to export unless DOE finds that the proposed exports would not be consistent with the public interest. In addition, DOE's decision whether to authorize natural gas exports to non-FTA countries must comply with the National Environmental Policy Act (NEPA).[11] This environmental assessment (EA), prepared pursuant to NEPA, informs DOE's public interest analysis under the NGA. DOE's review of the 2020 Application falls under NGA section 3(a).

1.2 Purpose and Need

1.2.1 Applicant

ECA states that the proposed project is designed to meet LNG demand and emphasizes its focus on markets in the Pacific basin. ECA states that "[t]he ECA Large-Scale Project is designed to meet the growing global demand for North American-sourced LNG over the next few decades,"[12] adding that "[t]he location along the West Coast of North America will provide access to markets in the Pacific Basin including Asia, the Middle East, and South America."[13]

1.2.2 Department of Energy

DOE's purpose is to review the 2020 Application under NGA section 3(a), and to authorize the natural gas exports requested unless it finds that the proposed exports would not be consistent with the public interest.

1.3 Alternatives

DOE evaluated the Proposed Action of granting the requested authorization to ECA and a No Action Alternative in which the requested authorization would not be granted.

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[7] DOE is required by section 3(c) of the Natural Gas Act to authorize liquefied natural gas (LNG) exports to FTA countries. Section 3(c) provides that all such exports are "deemed to be consistent with the public interest" and that their authorization "shall be granted without modification or delay." Therefore, because DOE lacks discretion with respect to such approvals, the approvals do not require environmental analysis under NEPA. The U.S. Trade Representative maintains a list of countries with which the United States has free trade agreements at https://ustr.gov/trade-agreements/free-trade-agreements.

[8] LNG imports to be authorized by DOE must also be from countries with which trade is not prohibited by U.S. law or policy.

[9] Non-FTA countries are those that do not have an FTA requiring national treatment for trade in natural gas, and with which trade is not prohibited by U.S. law or policy.

[10] 15 U.S.C. § 717b(a).

[11] 42 U.S.C. 4321 *et seq*.

[12] 2020 Application at 17.

[13] *Id*.

1.3.1 Proposed Action

1.3.1.1 Project Description

The application in question requests authorization to export approximately 182 billion cubic feet per year (Bcf/y) through existing or future cross border pipelines, of which about 21 Bcf/yr is to be used as fuel for pipeline operation or liquefaction processes, and 161 Bcf/yr as feedstock (to be liquefied) for ECA's proposed Large-Scale Project (Project) facility near Ensenada, Mexico (Facility).The volumes requested in the 2020 Application are in addition to the FTA and Non-FTA volumes DOE previously authorized for the Project on January 25, 2019, on March 29, 2019, and on June 11, 2021 (Table 1). Accordingly, ECA requests that it now be authorized to export from the Project a total of 727 Bcf/yr to FTA countries and 636 Bcf/yr to non-FTA countries.

Order	Approval Date	Docket No.	Project	Total Volume (Bcf/y)	Feed Volume (Bcf/y)	Fuel (Bcf/y)	LNG to FTA Countries (Bcf/y)	LNG to Non-FTA Countries (Bcf/y)
4318	1-25-19	18-145-LNG	ECA Large-Scale	545		70	545	
4365	3-29-19	18-145-LNG	ECA Large-Scale	475	475			475
4318 B	6-11-21	18-145-LNG	ECA Large-Scale	182		21	182	
Application under review		Amendment to 18-145-LNG	ECA Large-Scale	161	161			161

Table 1. Summary of application details for ECA Large-Scale Project

The proposed ECA Large-Scale Project (Project) would receive, process, and liquefy natural gas into LNG, which would be stored on location and loaded onto ocean-going vessels for export to foreign countries. The Project requires various permits from regulatory entities in Mexico, as well as authorization from DOE for the export of U.S.-sourced gas for the Project and for the re-export of LNG from the Project to FTA and non-FTA nations. At the point of application to DOE, ECA anticipated commencing construction activities associated with the ECA Large-Scale Project in the first part of 2024 and commencing commercial operations of the first train no later than 2028-2029. In its 2020 Application, ECA emphasizes its advantages in serving markets in the Pacific Basin.

1.3.1.2 DOE's Proposed Action

DOE's proposed action is to authorize the exports described in the 2020 Application if DOE determines that such exports are not inconsistent with the public interest.

1.3.2 No Action Alternative

If the 2020 Application is not granted, DOE assumes, for the purposes of this EA, that the Facility would not be built and the potential environmental impacts from the Project would not occur. However, global demand for natural gas, including demand for LNG, is expected to experience growth, even accounting for transition away from fossil fuels.[14] DOE therefore believes it is likely that some or all of the demand for LNG that the Project is intended to serve would be met by other LNG facilities.

1.4 Scope of the Environmental Assessment

1.4.1 Extraterritorial Impacts

The environmental impacts subject to analysis in this EA are limited to those direct and indirect impacts that would occur in the United States and those that affect the global commons, such as global climate change that results from emissions of greenhouse gases (GHGs). This EA does not analyze potential environmental impacts associated with elements of the proposed Project that would occur within the sovereign territory of Mexico or any other country. These include the potential local and regional impacts of pipeline transportation of natural gas within Mexico to the Facility, the construction and operation of the Facility in Mexico (including LNG terminal operations), and terminal operations, transport, and use of LNG within the receiving country.

NEPA does not require an analysis of environmental impacts that occur within another sovereign nation that result from actions approved by that sovereign nation. Executive Order (E.O.) 12,114 (Jan. 4, 1979) requires federal agencies to prepare an analysis of significant impacts from a federal action in certain defined circumstances and exempts agencies from preparing analyses in others. The E.O. does not require federal agencies to evaluate impacts outside the U.S. when the foreign nation is participating with the U.S. or is otherwise involved in the action [Section 2- 3(b)]. The Project meets this criterion – it would have to be constructed in accordance with all applicable Mexican laws, regulations, and standards. Additionally, aside from the life cycle emission of GHGs and the marine transport of LNG in international waters, the federal action would not affect the global commons.

[14] EIA's International Energy Outlook 2021 projects global natural gas consumption to increase by more than 30% between 2019 and 2050, in its Reference Case, even as it projects renewable sources to pass natural gas by the end of the 2030s. *See* EIA, International Energy Outlook 2021, https://www.eia.gov/outlooks/ieo/consumption/sub-topic-01.php. McKinsey has also projected LNG demand growth averaging 3.4% per year to 2035, with continued growth of 0.5% per year through 2050. The firm's accelerated transition scenario still shows an increase in demand only slightly lower by mid-century. *See* McKinsey, Global Gas Outlook to 2050, Summary Report, at 2 (Feb. 2021), https://www.mckinsey.com/~/media/mckinsey/industries/oil%20and%20gas/our%20insights/global%20gas%20outlook%20to%202050/global-gas-outlook-2050-executive-summary.pdf.

1.4.2 Summary of Mexico's Environmental Review Process

The Project and any pipeline facilities that may be constructed in Mexico are subject to review and approval by Mexican agencies under the state and federal laws of that nation. While outside of the scope of this EA, DOE is providing information about Mexico's review process for the public's information. The agencies in Mexico with potential jurisdiction over the activities proposed within Mexico, with respect to environmental and cultural impacts, are listed in Table 2.

Agency	Environmental, Cultural and Safety Assessments
Environmental and Safety Agency for the Hydrocarbon Industry (ASEA)	Manifestación de Impacto Ambiental/Environmental Impact Assessment (MIA); Environmental Risk Assessment (ERA); Registration of Industrial, Operational, and Environmental Safety Management Systems; Unique Regulated Registry Number; Technical Justification Study which demonstrating that the ecosystem's biodiversity will not be jeopardized where natural vegetation will be removed
Energy Regulatory Commission (CRE)	Transportation permit for natural gas through pipelines, with any new pipeline engineering to be verified by a third party with a report that supports the permitted design
Secretary of Energy (SENER)	Evaluación de Impacto Social/Social Impact Assessment (EvIS), which identifies, characterizes, and assesses social impacts that could be caused by the project; Social Management Plan designed to implement specific measures required to address positive or negative social impacts
National Institute of Anthropology and History (INAH)	Archaeological Survey conducted before construction; archaeological clearance if INAH finds that archaeological vestiges exist.

Table 2. Mexican agencies responsible for environmental, cultural, and safety assessments for LNG and/or pipeline projects[15]

Mexico's primary statute governing environmental reviews of projects is the Ley General del Equilibrio Ecológico y la Protección al Ambiente/General Law of Ecological Balance and Environmental Protection (LGEEPA), which is administered by the Secretaría de Medio Ambiente y Recursos Naturales/Ministry of Environmental and Natural Resources (SEMARNAT). Within the SEMARNAT, the Agencia Nacional de Seguridad Industrial y de Protección al Medio Ambiente del Sector Hidrocarburos/National Agency for Industrial Security and Environmental Protection for the Hydrocarbon Industry (ASEA), is responsible for regulating and supervising industrial, operational and environmental safety for projects related to the hydrocarbon sector, including the construction of natural gas pipelines and liquefaction facilities.

[15] *See* 2018 Application at Appendix C (Permitting Overview for Pipeline and Liquefaction Projects in Mexico).

As part of ASEA's review of projects under LGEEPA, an MIA must be prepared. Similar to an Environmental Impact Statement (EIS) under NEPA, a MIA presents the results of comprehensive analysis and studies of potential environmental impacts associated with a project, including site preparation, construction, operation, and decommissioning, as well as an assessment of measures to mitigate environmental impacts and an analysis demonstrating compliance with Mexican laws and regulations, as well as prudent industry practices and international standards.

ASEA also oversees a facility's continued compliance with applicable laws, regulations, and conditions governing safety, risk mitigation, technical processes, and the environment. In addition to review of the MIA and ERA, ASEA reviews and issues authorizations for projects, such as pipelines and liquefaction facilities, that will impact existing land use.

Project proponents of pipeline and liquefaction facilities must perform an EvIS, which identifies, characterizes and assesses social impacts that could be caused by the project along with a social management plan to address those impacts. The EvIS is subject to review and approval of the Secretaría de Energía/Ministry of Energy. In addition, permits are required from the Comisión Reguladora de Energía/Energy Regulatory Commission to engage in activities that are subject to third-party access and those activities that are not subject to third-party access but require a permit, including the self-supply of electric energy, transportation, liquefaction, regasification, and storage of natural gas in Mexico.

2 Potential Environmental Impacts

2.1 Affected Environment

The affected environment is limited to the areas potentially affected by the Proposed Action that are within the scope of the EA, as detailed in section 1.4.

2.1.1 Incremental Natural Gas Production

Potential natural gas sources for the Project include producing basins in the lower-48 states. The U.S. Energy Information Administration (EIA) projects that, by 2030, over 90% of natural gas produced in the lower-48 states will be produced from unconventional resources, which include gas from tight geological formations, gas from shale formations or gas associated with oil in tight formations, and gas from coal beds ("coalbed methane").[16] More than 80% is expected to be produced from shale formations alone. According to EIA's 2022 Annual Energy Outlook (AEO), the share of gas produced from these sources is expected to remain above 90% in 2050. The most likely impacts associated with natural gas production would therefore relate to Project-induced incremental production of those resources. As discussed in DOE's environmental study, *Addendum to Environmental Review Documents Concerning Imports of Natural Gas from the United States* (Aug. 2014) (Addendum),[17] which is incorporated herein by reference,

[16] See EIA, 2022 Annual Energy Outlook, https://www.eia.gov/outlooks/aeo/data/browser/#/?id=14-AEO2022&cases=ref2022&sourcekey=0.

[17] https://www.energy.gov/sites/prod/files/2014/08/f18/Addendum.pdf.

identifies areas potentially affected in unconventional natural gas production include water resources, air quality, induced seismicity, and land use.[18]

2.1.2 Incremental Cross-Border Pipeline Transportation of Natural Gas

ECA proposes to utilize any cross-border pipeline or combination of pipelines that are currently operational or may become operational. In its 2020 Application, ECA does not propose to construct and operate new pipeline facilities in the United States. Natural gas transported on behalf of the Project would increase utilization of pipelines, and therefore has the potential to cause incremental impacts in emissions related to pipeline operations. (These potential impacts are addressed in section 2.2.2.1, below.)

There is a significant and growing natural gas pipeline supply infrastructure between producing basins in the Southwestern and Gulf Coast regions of the U.S. and northern Mexico (Figure 1). The cross-border pipeline connections that have already been approved by, or proposed to, the U.S. Federal Energy Regulatory Commission (FERC) are highlighted in Figure 1, which was constructed with data from EIA and other public sources.[19] Appendix C provides details about the pipelines in Figure 1, including the border crossing location and average export data for 2021. Appendix B provides the summary of existing cross-border facilities provided in the Application, including the FERC docket numbers for the related regulatory proceedings. This data shows that there is nearly 15 billion cubic feet per day (Bcf/d)[20] of existing physical cross-border pipeline capacity between the United States and Mexico, including nearly 7 Bcf/d of capacity in California, Arizona, and West Texas, and approximately 8 Bcf/d in South Texas.

[18] The Addendum also addresses potential impacts on upstream greenhouse gas emissions (apart from their role in local or regional air quality), but those emissions are addressed holistically with emissions from other life cycle segments in section 2.1.4 ("GHG Emissions and Climate Change") below.

[19] https://www.energy.gov/sites/prod/files/2015/08/f25/POEE%20List.pdf; Natural Gas Intelligence, 2022 Map of Mexico's Natural Gas Pipelines, Market Hubs & LNG Facilities, https://www.naturalgasintel.com/ngis-2022-map-of-mexicos-natural-gas-pipelines-market-hubs-lng-facilities/; EIA, U.S. Natural Gas Exports and Re-Exports by Point of Exit, https://www.eia.gov/dnav/ng/ng_move_poe2_a_EPG0_ENP_Mmcf_a.htm; https://ienova.gcs-web.com/static-files/1ba71478-c5cf-424c-9c2a-38ff0de6f0da.

[20] Pipeline capacities are often discussed in Bcf/d, to indicate a possible rate of flow. 1 Bcf/d is equivalent to 365 Bcf/yr.

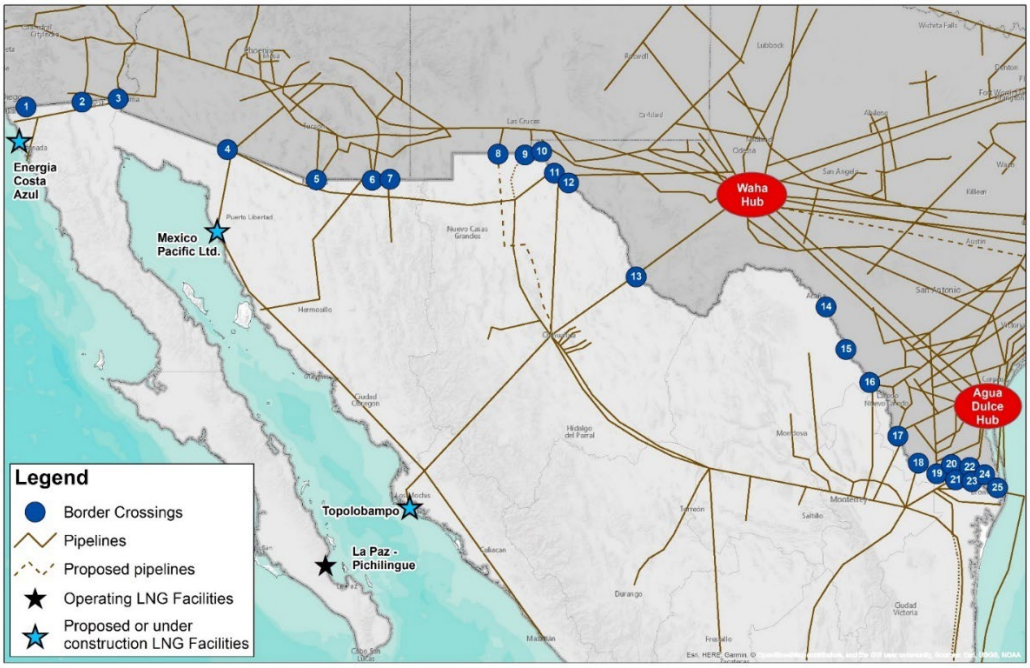

Figure 1: U.S. Natural Gas Pipelines with Cross-Border Connections to Mexico (Source: KeyLogic, constructed using information from EIA and other public sources, including the 2018 Application.)

2.1.3 Marine Transportation of LNG

Exports from the Facility in Mexico would occur via ocean transport. The potentially affected environment in marine transportation of LNG includes resources that could be impacted by a release of the LNG cargo, in liquid or gaseous form, as well as routine shipping-related risks, such as fuel leaks and engine emissions. These resources include the ocean environment and the atmosphere in the area around an LNG vessel at sea.

2.1.4 GHG Emissions and Climate Change

Rising atmospheric GHG concentrations are significantly altering global climate systems with the potential for long-term impacts on human society and the environment. The region of influence (ROI) for GHGs differs from other resource areas considered in this EA since the concerns about GHG emissions are primarily related to climate change, which is global and cumulative in nature.

Increasing GHG concentrations in the atmosphere are linked to a range of ongoing and potential changes to global climate. Assessments of future climate change are strongly dependent on predicted trends in GHG emissions, which depend on future policy and other actions to reduce GHG emissions. Climate change is linked to rising surface temperatures, changing levels of precipitation, reduction in sea ice cover, increasing ocean temperature, and rising sea levels. Climate change can result in changes in ecosystems, an increase in the frequency and severity of extreme weather events, and can impact human health and society.

2.2 Potential Impacts

2.2.1 Natural Gas Production

The natural gas to be liquefied and exported by the Project would first have to be produced from natural gas wells in the lower-48 states. As noted in section 2.1.1, a significant majority of natural gas produced in the U.S. is from unconventional resources.

2.2.1.1 Proposed Action

On August 15, 2014, DOE published the Addendum.[21] DOE prepared the Addendum to be responsive to the public and to provide the best information available on a subject that had been raised by commenters in LNG export application dockets. The Addendum addresses unconventional natural gas production in the lower-48 states. It does not attempt to identify or characterize the incremental environmental impacts that would result from LNG exports to non-FTA countries.[22]

The Addendum determined that the current rapid development of natural gas resources in the United States likely will continue, with or without the export of natural gas to non-FTA nations.[23] Nevertheless, a decision by DOE to authorize exports to non-FTA nations could accelerate that development by some increment. The Addendum reviewed the academic and technical literature covering the most significant issues associated with unconventional natural gas production, including impacts to water resources, air quality, GHG emissions, induced seismicity, and land use.

The Addendum shows that there are potential environmental issues associated with unconventional natural gas production that need to be carefully managed, especially with respect to emissions of volatile organic compounds and methane, and the potential for groundwater contamination. However, DOE does not have the ability to determine which specific natural gas resources would be produced to serve the Project.

2.2.1.2 No Action Alternative

In the No Action Alternative, LNG would not be supplied from the Project. In this case, DOE assumes that other LNG facilities would serve incremental international demand for LNG, supplying some or all of the volume planned to be supplied by the Project. Therefore, natural gas could be produced for liquefaction, in the United States or in another country.

If produced in the lower-48 United States for a North American project, any potential impacts related to incremental natural gas production would similarly occur in the No Action Alternative, which would therefore not have a currently identifiable environmental advantage over the proposed action. If produced

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[21] https://www.energy.gov/sites/prod/files/2014/08/f18/Addendum.pdf.

[22] *See Sierra Club v. U.S. Dep't of Energy*, 867 F.3d 189, 198–99 (D.C. Cir. 2017) (upholding DOE's conclusion that, without knowing where local production of the incremental natural gas would occur, the corresponding environmental impacts are not reasonably foreseeable under NEPA).

[23] Addendum at 2.

outside of the United States for a foreign LNG project, it would be outside the scope of this analysis to assess impacts from natural gas production.

2.2.2 Natural Gas Pipelines

2.2.2.1 Proposed Action

DOE considered potential environmental impacts from natural gas pipeline transportation in the lower-48 states that may be caused by the Project's natural gas demand, which would be equal to about 0.66% of U.S. pipeline system throughput in 2020.[24] All of the U.S. pipelines that could potentially transport natural gas to Mexico for the Project's use are under federal or state jurisdiction. They have been, or, in the case of pipelines under development, are being or will be evaluated by the FERC and/or the relevant state regulatory authorities, for environmental and other impacts.[25] Appendix B lists cross-border pipelines and includes FERC docket numbers for the regulatory review of those pipelines. The documents in those FERC dockets, including those related to environmental review, are incorporated herein by reference.

Incremental pipeline throughput would not increase the flow of natural gas to levels above those permitted by FERC and/or state regulatory authorities, for existing or future pipelines. Incremental natural gas flow caused by the Project's demand would therefore not be expected to cause environmental effects that exceed permitted levels.

DOE also considered pipeline safety. Potential impacts relevant to this EA are any impacts associated with the operation of these pipelines that might be incrementally greater with marginally higher throughput due to the Project's demand. The Pipeline and Hazardous Materials Safety Administration (PHMSA) develops and enforces regulations for the safe, reliable, and environmentally sound operation of the nation's pipeline transportation system.[26]

Reviewing PHMSA incident reports submitted by companies that operate U.S. pipelines that connect at border crossings between the U.S. and Mexico, DOE finds that between January 2010 and July 2022 these companies submitted a total of 81 incident reports for their entire operations (Table 3). These 81 incidents resulted in about 2 Bcf of gas emissions over this 12½-year time period. Five of these incidents accounted for nearly 40% of the emitted gas. The reasons for these incidents are highlighted in Table 3. "Equipment failure" is noted as the most common cause, accounting for 46% of the incidents.

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[24] The 2020 Application requests authority to export up to 182 Bcf/yr, EIA reports that the U.S. natural gas transportation network "delivered about 27.7 [Tcf] of natural gas" in 2020. (182 Bcf ÷ 27.7 Tcf, or 27,700 Bcf = 0.66%.) EIA, Natural Gas Explained: Natural Gas Pipelines, https://www.eia.gov/energyexplained/natural-gas/natural-gas-pipelines.php.

[25] For information about FERC's regulatory role for natural gas pipelines, see the web page at https://www.ferc.gov/industries-data/natural-gas/overview/natural-gas-pipelines#:~:text=FERC%20itself%20has%20no%20jurisdiction,needed%20pipelines%20and%20related%20facilities. For information regarding environmental reviews of any of the pipelines listed in Appendix B, see FERC's eLibrary at https://elibrary.ferc.gov/eLibrary/search.

[26] For information on PHMSA's role in ensuring the safe operation of natural gas pipelines, see https://www.phmsa.dot.gov/regulations.

Company	System	Incident Reports	Total Vol. Gas Released (MMcf)	Causes
West Texas Gas Inc.	Transport	4	7.5	Corrosion failure (1), equipment failure (1), excavation damage (2)
Tennessee Gas Pipeline (El Paso)	Transport	15	431.6	Corrosion failure (3), equipment failure (8), incorrect operation (1), failure of pipe material or weld (3)
El Paso	Transport	24	614.2	Corrosion failure (2), equipment failure (10), excavation damage (1), incorrect operation (3), failure of pipe material or weld (3), outside force damage (3), other incident (2)
ONEOK	Transport	12	305.6	Corrosion failure (3), equipment failure (4), excavation damage (1), incorrect operation (2), failure of pipe material or weld (2)
Kinder Morgan	Transport	20	587.4	Corrosion failure (2), equipment failure (12), excavation damage (2), failure of pipe material or weld (2), outside force damage (1), natural forces damage (1)
TETCO (Enbridge)	Transport	2	21.2	Failure of pipe material or weld (2)
Enbridge	Transport	3	97.3	Equipment failure (1), excavation damage (1), other incident (1)
Valley Crossing	Transport	1	3.5	Equipment failure (1)
Total		81	2068.3	

Table 3. Data from PHMSA incident reports[27] from January 2010 to July 2022

Of these 81 incident reports, nine were reported to be located in counties associated with border crossing locations; one in Arizona and eight in Texas. These nine incidents are listed in Table 4. The location of eight of the nine incidents appear to indicate that they could be (but are not necessarily) associated with equipment/operations supporting pipeline crossings. Five of these eight incidents were reported by Kinder Morgan, all due to malfunction of control/relief equipment, at company infrastructure relatively close to the pipeline border crossing it operates near Laredo, Texas. There have been no incidents reported to PHMSA at locations near that border crossing since April 2018.

[27] PHMSA, Distribution, Transmission & Gathering, LNG, and Liquid Accident and Incident Data, https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data.

Company	Incident Report No.	Date of Incident Report	County	Location	Nearby Border Interconnect (Pipeline Operator)	Total Vol. Gas Released (MMcf)	Cause
El Paso Natural Gas	20160090	11/12/2016	Cochise Co., AZ	Monument 90 Meter Station	Nogales (El Paso)	8.49	Malfunction of control/relief equipment
El Paso Natural Gas	20170025	3/24/2017	Hudspeth Co., TX	Cornudas Compressor Station	None	3.13	Malfunction of control/relief equipment
Kinder Morgan Tejas Pipeline	20180081	8/8/2018	Hidalgo Co., TX	Rio Grande 8" pipeline	Penitas (Kinder Morgan)	7.40	Excavation damage by 3rd party
	20180046	4/28/2018	Starr Co., TX	Rio Grande Compressor Station	Laredo (Kinder Morgan)	3.92	Malfunction of control/relief equipment
	20160053	6/29/2016	Zapata Co., TX	Operator property	Laredo (Kinder Morgan)	9.59	Malfunction of control/relief equipment
	20160057	7/6/2016	Starr Co., TX	Bob West Compressor Station	Laredo (Kinder Morgan)	6.11	Malfunction of control/relief equipment
	20150126	10/26/2015	Starr Co., TX	Bob West Compressor Station	Laredo (Kinder Morgan)	17.71	Malfunction of control/relief equipment
	20150058	4/29/2015	Starr Co., TX	Bob West Compressor Station	Laredo (Kinder Morgan)	10.60	Malfunction of control/relief equipment
West Texas Gas	20180031	3/7/2018	Maverick Co., TX	Pipeline in Eagle Pass, TX	Eagle Pass (West Texas Gas)	0.24	Excavation damage by 3rd party
Total						67.19	

Table 4. Incidents reported by companies operating pipelines that connect to cross-border interconnections along the Mexico-U.S. border, from January 2010 to July 2022, that are located within the same county as a pipeline border crossing

Assuming the eight incidents close to the border crossings were directly related to operations at those crossings, approximately 64 million cubic feet (MMcf) of gas would have been emitted during the time period from January 2010 to July 2022, mostly due to equipment malfunctions. According to EIA data, from January 2010 through June 2022 (a similar period of time), approximately 15.5 Trillion cubic feet

(Tcf) of gas was exported via pipeline to Mexico.[28] That would equate to the accidental emission of less than one-one thousandth of one percent[29] of total exported gas during this period, well below current estimates of average methane emissions associated with upstream production and transport across the U.S. natural gas infrastructure.[30]

2.2.2.2 No Action Alternative

If the Project were not constructed, any potential local or regional impacts associated with incremental pipeline transportation of natural gas for the Project would not occur. If incremental LNG production capacity were constructed in North America using natural gas from the lower-48 states, local or regional impacts would be similar to gas supplied to the Project (although perhaps at different locations in the United States), and the No Action Alternative would not have a currently identifiable environmental advantage over the Proposed Action. If incremental liquefaction capacity were developed outside of the United States, impacts associated with pipeline transportation would occur within a sovereign foreign country and therefore would be outside the scope of this analysis.

2.2.3 Marine Transport of LNG

2.2.3.1 Proposed Action

DOE considered potential impacts associated with the marine transport of LNG from production facilities to destination markets. As part of a NEPA rulemaking finalized on December 4, 2020,[31] DOE conducted a detailed review of technical documents regarding potential effects associated with marine transport of LNG.[32] These documents were identified in an accompanying Marine Transport Technical Support Document (Technical Support Document), which is incorporated herein by reference.[33] On the basis of the data referenced in the Technical Support Document, DOE concluded that "the transport of natural gas

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[28] EIA, U.S. Natural Gas Pipeline Exports to Mexico, https://www.eia.gov/dnav/ng/hist/n9132mx2a.htm.

[29] The more exact figure is 0.000413%.

[30] The EPA's 2020 GHG Inventory states that methane emissions from U.S. oil and natural gas production, processing, transport and distribution activities in 2020 totaled about 211 $MMTCO_2$-eq. https://www.epa.gov/natural-gas-star-program/estimates-methane-emissions-segment-united-states. This would be equivalent to about 8.45 MMT of methane, which in turn is equivalent to about 438 Bcf of methane. EPA Conversion tables, https://www.epa.gov/cmop/coal-mine-methane-units-converter#metricTons. The volume of U.S. gross natural gas production in 2020 was just under 40,614 Bcf, according to EIA data. https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm. This translates to a loss of 0.0107 cubic feet of methane emitted to the atmosphere per cubic feet of natural gas produced, or about 1.07% since natural gas is mostly methane. Researchers have proposed that based on comparisons of "top down" atmospheric measurements with the EPA's GHGI "bottom up" measurements, actual methane emissions may be 60 to 70% higher than the EPA estimates. (https://www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures; https://www.edf.org/climate/methane-studies) A loss of 0.000413 percent is well below either of these figures.

[31] *See* U.S. Dep't of Energy, National Environmental Policy Act Implementing Procedures, Final Rule; 85 Fed. Reg. 78,197 (Dec. 4, 2020).

[32] *Id.* at 78,199.

[33] *See id*. at 78,198 n.16 (citing U.S. Dep't of Energy, Technical Support Document, Notice of Final Rulemaking, National Environmental Policy Act Implementing Procedures (10 C.F.R. Part 1021) (Nov. 2020)).

by marine vessels adhering to applicable maritime safety regulations and established shipping methods and safety standards normally does not pose the potential for significant environmental impacts."[34]

2.2.3.2 No Action Alternative

If the Project were not constructed, some or all of the volume of LNG the Project would have exported could be supplied to markets from other sources. Although varying with transportation distance (which could be shorter or longer), DOE finds that these impacts would be similar to those identified in the Marine Transport Technical Support Document, and would also "not pose the potential for significant environmental impacts."

2.2.4 GHG Emissions

2.2.4.1 Proposed Action

DOE's National Energy Technology Laboratory (NETL) conducted a study in 2014, which was updated in 2019, both of which studies (collectively, GHG Studies) are incorporated herein by reference, of GHG emissions attributable to LNG exports from the lower-48 states, to inform decisions on applications to export lower-48 natural gas in the form of LNG to non-FTA countries. DOE has determined that the findings of this study are applicable to assessment of the GHG emissions from the Project. This EA does not include a Project-specific calculation of emissions from construction and operation of the proposed Facility; however, DOE finds that its study of Life Cycle GHG emissions provide sufficient consideration of these emissions.

In 2014, NETL published *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States* (2014 LCA GHG Report).[35] The 2014 LCA GHG Report calculated the life cycle (LCA) GHG emissions for LNG made from natural gas sourced from the lower-48 states and exported to markets in Europe and Asia. DOE commissioned this life cycle analysis to inform its review of non-FTA applications, as part of its broader effort to evaluate different environmental aspects of the LNG production and export chain. The 2014 LCA GHG Report concluded that the use of U.S. LNG exports for power production in European and Asian markets will not increase global GHG emissions from a life cycle perspective, when compared to regional coal extraction in the global regions near the point of consumption, and consumption for power production.

In 2019, NETL published an update to the 2014 LCA GHG Report, entitled *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas From the United States: 2019 Update* (2019 Update).[36]

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[34] *Id.* at 78,200; *see also id.* at 78,202. We note that, in the 2014 LCA GHG Report and 2019 Update, DOE also considered how emissions associated with the ocean transport of U.S. LNG in tankers contribute to total life cycle GHG emissions.

[35] U.S. Dep't of Energy, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas From the United States, 79 Fed. Reg. 32,260 (June 4, 2014).

[36] Nat'l Energy Tech. Lab., *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States: 2019 Update* (DOE/NETL-2019/2041) (Sept. 12, 2019), https://www.energy.gov/sites/prod/files/2019/09/f66/2019%20NETL%20LCA-GHG%20Report.pdf.

The conclusions of the 2019 Update were consistent with those of the 2014 LCA GHG Report—that, "[w]hile acknowledging uncertainty, to the extent U.S. LNG exports are preferred over coal in LNG-importing nations, U.S. LNG exports are likely to reduce global GHG emissions on per unit of energy consumed basis for power production."[37] Additionally, "to the extent U.S. LNG exports are preferred over other forms of imported natural gas, they are likely to have only a small impact on global GHG emissions."[38] Both the 2014 LCA GHG Report and the 2019 Update are incorporated herein by reference.

DOE finds that the Project is comparable to the representative LNG Project analyzed in the GHG Studies, and therefore finds it reasonable to apply the GHG Studies in reviewing the life cycle emissions from the Project. The source of natural gas for the Project (the lower-48 U.S.) is the same source analyzed in the GHG Studies. Pipeline transport within the U.S. would also be comparable. Emissions from pipeline transport within Mexico may differ from U.S. pipeline emissions estimates in the GHG Studies for two reasons: 1) the total transport distance may be longer due to the Project's location compared to a U.S. Gulf Coast location, and 2) GHG emissions from pipelines in Mexico may be different from emissions from U.S. pipelines. The extent of these differences is unknown or uncertain, but a sensitivity analysis of pipeline emissions values in the GHG Studies based on these two considerations can reasonably estimate a range of possible divergence from the GHG Studies' findings.

DOE also assumes that marine shipments of LNG from the Project would have similar attributes to shipments from a U.S. Gulf Coast location analyzed in the GHG Studies. As noted above, the 2020 Application emphasizes exports to Asian markets, and so transport to that region is the focus of DOE's assessment here, although the 2020 Application allows for exports to other markets as well. The shorter distance to markets in Asia would lead to slightly lower marine transport emissions from LNG shipping from the Project, as compared to a Gulf Coast location. (If the Project were to export LNG to some other markets, such as Europe, shipping distances would be longer, and marine transport-related emissions commensurately greater, than LNG shipped from a Gulf Coast export terminal.) Emissions from end use would be the same regardless of destination.

Results from the 2019 Update for each segment of the life cycle analysis, for that study's representative Asian market (Shanghai, China), are shown in Table 5 below.[39] Because the GHG Studies examined use of fuels for power generation as a basis of comparison, emissions rates are expressed in terms of the amount of carbon dioxide-equivalent of GHGs emitted per unit of electricity generated -- carbon dioxide-equivalent emissions per Megawatt hour (CO_2-e/MWh).

[37] U.S. Dep't of Energy, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas From the United States: 2019 Update – Response to Comments, 85 Fed. Reg. 72, 85 (Jan. 2, 2020).

[38] *Id.*

[39] 2019 Update, Exhibit A-2, p. A-2.

Process Element	100-yr GWP
Natural Gas Extraction	21
Gathering and Boosting	50
Processing	18
Pipeline Transport	60
Liquefaction	41
Tanker Transport	76
LNG Regasification	4
Power Plant Operations	416
Electricity T&D	2
Total	688
Low	663
High	763

Table 5. Life cycle GHG emissions (100-yr GWP) for U.S. LNG shipped from New Orleans to Shanghai, China for power generation (kg CO_2-e/MWh)

GHGs in this analysis were reported on the common mass basis of kilograms (kg) of carbon dioxide equivalent (CO_2-e) using the global warming potentials (GWPs) of each GHG from the 2013 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5). The 100-yr GWP is the timeframe used for comparison in this EA.

Segments related to natural gas production and processing and to regasification and end use would be the same for the Project as in the GHG Studies. DOE evaluated the three segments that might have variation between the Project and the GHG Studies – these are listed in red in the table. Differences could result from 1) distance and conditions of pipeline transport from U.S. producing basins to the proposed Mexican LNG plant locations as compared to the U.S. Gulf Coast; 2) conditions of operation for an LNG plant in Mexico versus a U.S. Gulf Coast facility; and 3) distance and conditions of LNG tanker transport from Mexican LNG terminals to Shanghai as compared to tanker transport from New Orleans to Shanghai.

Therefore, differences in calculated emissions would primarily result from: 1) any difference in natural gas pipeline transport distance between U.S. producing basins and the liquefaction plants and differences in emissions between Mexican pipelines and U.S. pipelines; 2) differences in the emissions associated with liquefaction in Mexico versus the U.S.; and 3) the difference in nautical distance traveled by an LNG tanker between liquefaction plants and Shanghai, China. We examine each of these three categories below.

Pipeline Transport – In the GHG Studies, extracted and processed natural gas is transported via pipeline, where GHG emissions are associated with: 1) the combustion of a portion of the natural gas in compressors; 2) intentional venting; and 3) fugitive losses of natural gas. Emissions from these sources are a function of the length of the transport distance, the number of compressor stations (a function of the length of transport), and the associated natural gas storage capacity (a function of the throughput), as well as maintenance and operational practices. DOE believes it reasonable to assume that throughput is comparable in both scenarios, in which case the potential differences are reduced to the possible difference

in pipeline transport distance from gas sources to the Project, and to possible emissions differences between pipeline operations in Mexico and in the United States.

Analysis in the GHG Studies estimated that the average pipeline transport distance from natural gas extraction to an LNG terminal on the Gulf Coast was 971 km (~600 miles), that being the average pipeline transmission distance for LNG exports from the United States.[40] This distance is based on the characteristics of the entire transmission network and delivery rate for natural gas in the United States. The pipeline transport distance from U.S. production sources to the Project would not necessarily be longer, but DOE nevertheless explored this possibility by assuming an approximately 50% increase in average transportation distance, or a total of 900 miles.

The GHG studies estimated that total expected life cycle GHG emissions of U.S. LNG exports to Shanghai, China from the Gulf Coast would be 688 kg CO_2-e/MWh (*See* Exhibit A-2 in the 2019 Update). The GHG studies estimated that 8.7%, or 60 kg CO_2-e/MWh, of these emissions would be from pipeline transport.[41] DOE assumed a linear relationship between distance and emissions -- that extending the transportation distance from ~600 miles to 900 miles (an approximately 50% increase) would increase the pipeline transport contribution to GHG emissions from 60 kg CO_2-e/MWh to 90 kg CO_2-e/MWh (a 50% increase), with emissions rates from pipeline transportation held constant at levels estimated for U.S. pipelines in the GHG Studies.[42] This would increase total estimated life cycle emissions to 718 kg CO_2-e/MWh, an increase of about 4.4%.[43] The higher pipeline transport-related emissions would be about 12.5% of the new total.

Possible Differences Between Pipeline Emissions in Mexico and the United States

DOE has not identified a direct estimate for the emissions of pipelines in Mexico. For this EA, DOE has assumed that pipeline emissions in Mexico would be the same as from pipelines located in the United States. This is the same assumption DOE made in the GHG Studies for pipeline emissions in all countries.

However, DOE recognizes that higher and growing divergence in emissions rates between Mexican and United States pipeline transportation is possible given policy and regulatory differences with the U.S. regulatory system. These include Environmental Protection Agency (EPA) requirements to report greenhouse gas emissions for pipeline transportation[44] (and other components of the natural gas value

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[40] Nat'l Energy Tech. Lab., *Life Cycle Analysis of Natural Gas Extraction and Power Generation* (DOE/NETL-2019/2039), at 4 (Apr. 19, 2019), https://www.netl.doe.gov/energy-analysis/details?id=3198.

[41] Using the 100-year GWP.

[42] In the GHG studies, emissions profiles of transmission pipelines in other countries are held constant at the U.S. rate, with the pipeline transport distance being the determinant of emissions differences (2019 Update, Exhibit 5-5, p. 13)

[43] An increase of 30 kg CO_2-e/MWh from a total of 688 CO_2-e/MWh: 30 / 688 = 0.0436, or about 4.4%.

[44] EPA's Greenhouse Gas Reporting Program (GHGRP) covers emissions from different aspects of the oil and gas industry through several of its subparts. The reporting is required of domestic natural gas market participants in different phases of oil and natural gas value chains, including extraction, production, transport, and use. https://www.epa.gov/ghgreporting.

chain) and FERC requirements for accounting for lost and unaccounted for gas.[45] And in the future, U.S. pipeline operators may be subject to regulatory emission limits,[46] with those pipelines that do not meet regulatory limits subject to a waste emissions charge established in the Inflation Reduction Act of 2022.[47]

On the other hand, DOE notes that the average pipeline age in Mexico[48] is less than most U.S. pipelines, and therefore in the near-term, Mexican pipelines may experience fewer age-related maintenance issues that could increase risk of methane emissions.[49]

DOE notes that the extent to which the Mexican pipeline emissions rate would influence total life cycle emissions is limited, given that the pipeline transportation emissions would be approximately 12.5% of the total lifecycle emissions for a delivery to Asia, with the longer transport distance estimated above.

LNG Liquefaction – In the GHG Studies, LNG plant operations and associated emissions were based on the following assumptions:

- The LNG plant includes pre-treatment of the input pipeline-quality gas, liquefaction of the pre-treated gas, and on-site temporary storage of LNG before it is loaded onto an ocean tanker.
- The pre-treatment processes include: Acid gas removal (removal of CO_2 and H_2S from the pipeline feed gas, to avoid freezing and plugging in downstream units), Molecular sieve dehydration (removal of water to avoid freeze-up and unplanned shut downs) and heavy hydrocarbon removal to protect the main heat exchanger from freezing and plugging, via adsorption or cryogenic distillation.
- The liquefaction plant employs a Propane Pre-Cooled Mixed Refrigerant (C3MR) process in combination with the pre-treatment technologies, represented through four different scenarios.
- Based on the publicly available data on U.S. plant export capacities and ship capacity assumptions, the residence time of LNG on site is estimated to be between 1.33 days to 1.60 days. During storage, boil-off gas (~0.02% to 0.1%) is assumed to be re-liquefied, which then enters back into the supply-chain.

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[45] Pipelines subject to FERC's jurisdiction are required to disclose volumes of natural gas lost and unaccounted for during pipeline operations in FERC Form 2. https://www.ferc.gov/sites/default/files/2020-04/form-2.pdf.

[46] *See* Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 86 Fed. Reg. 63,110 (Nov. 15, 2021).

[47] Inflation Reduction Act, Pub. L. No. 117-169, § 60113 (2022).

[48] "Since 2016, Mexico has been expanding its natural gas pipeline system, which has supported continual growth in U.S. natural gas exports." *See* EIA, Today in Energy, "U.S. natural gas exports to Mexico set to rise with completion of the Wahalajara system" (July 6, 2020), https://www.eia.gov/todayinenergy/detail.php?id=44278. For the U.S., see PHMSA, Gas Transmission Miles By Decade Installed, https://portal.phmsa.dot.gov/analytics/saw.dll?Dashboard (retrieved September 23, 2022). The data in the table indicate that 9% of the natural gas transmission miles of pipeline in the U.S. were installed since 2010.

[49] *See* PHMSA, Pipeline Replacement Background (Apr. 26, 2021), https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/pipeline-replacement-background ("[F]ollowing major natural gas pipeline incidents, U.S. Department of Transportation and the Pipeline Hazardous Materials Safety Administration issued a Call to Action to accelerate the repair, rehabilitation, and replacement of the highest-risk pipeline infrastructure. Among other factors, pipeline age and material are significant risk indicators.").

- Pre-treatment and liquefaction energy requirements are assumed to be met through combusting a stream of natural gas as it leaves the pre-treatment facility and before it enters the liquefaction facility.

The 2020 Application states that "[t]he liquefaction facilities will include: (a) two (2) new APCI liquefaction trains, each with its own gas treatment and expected liquefaction capacity of approximately 6.2 million tons per annum (MTPA); (b) new ground flare equipment; (c) piping & utility tie-ins to ECA's existing regasification terminal; and (d) a marine off-loading facility for the unloading of construction equipment and materials and a heavy haul road," adding that "the existing regasification terminal may include (a) a new full containment tank capable of storing up to 160,000 m^3 of LNG onsite, and (b) gas-fired generation and emission control facilities."[50] No further details are provided in the 2020 Application regarding the specific nature of the liquefaction process to be used.

DOE believes it reasonable that, on a per-unit-volume-of-LNG-produced basis, GHG emissions from the proposed Mexican plants and the Gulf Coast plant modeled in the GHG Studies would be similar. DOE notes, however, that modeling of liquefaction facility operation in the GHG Studies did not include carbon capture and storage (CCS) capability. Liquefaction facilities in the U.S. are eligible for tax credits to add CCS to operations, and some U.S. liquefaction facilities have stated their intention to pursue CCS capability that would reduce emissions from liquefaction operations.[51]

LNG Tanker Transport – As discussed above, the 2020 Application emphasizes exports to markets in Asia, although it does not limit its request to those markets. Because of the 2020 Application's emphasis, DOE has focused its evaluation on transport routes to Asia, although exports to other markets, such as Europe, could occur. The 2019 Update based LNG tanker transport emissions on fuel combustion emissions (both compressed boil-off gas and supplementary diesel fuel), average speed assumptions, and the distance between New Orleans and Shanghai via various sea routes. The calculation assumed that the shortest distance would be 18,544 kilometers (via the Panama Canal), while the distance via other alternate routes would vary from 25,436 to 31,722 kilometers (Table 6). In comparison, the distance from Ensenada, Mexico (ECA Large-Scale Project) to Shanghai is 10,775 km.[52] The shortening in routes that would occur if LNG were to be shipped from the Project, as opposed to New Orleans, are shown in Table 6.

[50] 2020 Application at 8-9.

[51] *See* announcement from Sempra Infrastructure regarding the Cameron LNG project in Louisiana (May 22, 2022), https://www.sempra.com/sempra-infrastructure-signs-participation-agreement-totalenergies-mitsui-mitsubishi-carbon; *See also* announcement from NextDecade regarding the Rio Grande LNG project in Texas (Mar. 18, 2021), https://investors.next-decade.com/news-releases/news-release-details/nextdecade-launches-next-carbon-solutions.

[52] Calculated using online platform Maritime Optima. *See* https://app.maritimeoptima.com.

Departure Port	Route	Distance (km)	Shortening of Route with the *ECA* Project
New Orleans	Via Panama Canal	18,544	42%
	Via Suez Canal	25,436	58%
	Via Cape of Good Hope	27,731	61%
	Via Strait of Magellan	31,606	66%
	Via Cape Horn	31,722	66%
Ensenada (*Energía Costa Azul*)	Direct cross-Pacific route	10,775	

Table 6. Distance by sea for LNG tanker travel from U.S. Gulf Coast and from the Project to Shanghai, China, and calculated shortening of LNG tanker travel route for this representative Asian market

DOE believes it reasonable to assess marine transport-related GHG emissions as directly (*i.e.* linearly) related to transport distance. Based on these calculations, the reduction in GHG emissions associated with LNG tanker transport would be between 42% and 66%, depending on the port of departure and the New Orleans to Shanghai route chosen for comparison. As the share of the scenario's emissions contributed by LNG tanker transport is approximately 11% (76 ÷ 688 from Table 5), this would translate to a reduction in overall emissions of between 4% and 8% due to the shorter tanker travel route. DOE notes, however, the LNG exports to other markets, such as Europe, would entail greater shipping distances than the ones analyzed in the GHG Studies, and commensurately greater GHG emissions from marine transport of LNG.

2.2.4.2 No Action Alternative

If the Project were not constructed, other LNG production capacity could be constructed in the United States or another country to serve some or all of the LNG demand the Project is intended to serve. Since it is uncertain where this production would take place, it is not possible for DOE to make a quantitative comparison of estimated life cycle GHG emissions. DOE acknowledges that the differences described could result in additional GHG emissions associated with Mexican LNG exports, as compared to alternative LNG sources and/or changes in natural gas production and consumption. However, DOE finds it not unreasonable to assume that GHG emissions would be broadly similar, and, given the global nature of climate change, would have similar incremental impacts.

3 List of States & Tribes Contacted

3.1 Tribes Contacted

California
Barona Reservation
Campo Reservation
Captain Grande (no longer in existence)
Cuyapaipe Reservation
Inaja and Cosmit Reservation
Jamul Indian Village
La Jolla Reservation
La Posta Reservation
Los Coyotes
Manzanita Reservation
Mesa Grande Reservation
Pala Reservation
Pauma and Yuima Reservation
Pechanga Tribe
Rincon Tribe
San Pasqual Reservation
Santa Ysabel Reservation
Sycuan Reservation
Torres-Martinez Tribal Lands
Viejas Reservation
New Mexico
N/A
Arizona
Cocopah Reservation
Fort Yuma
Pascau Yaqui Reservation
Tohono Reservation
Texas
Kickapoo
Ysleta Del Sur

3.2 States Contacted

State Governments
California
Arizona
Texas

4 List of Preparers

4.1 U.S. Department of Energy

Brian Lavoie, Sr. Natural Gas Analyst

Amy Sweeney, Director, Office of Regulation, Analysis, and Engagement

Jennifer Wade, Director, Division of Natural Gas Regulation

Appendix A: Agency and Tribal Correspondence

SUBJECT LINE: Notice of Environmental Assessment to [State/Indian Tribe on the list]

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To Whom it May Concern:

The U.S. Department of Energy recently announced that two environmental assessments (EAs) under the National Environmental Policy Act (NEPA) are being prepared pursuant to the review of applications to export U.S. natural gas from planned natural gas liquefaction projects in Mexico. Both applications include transfer by pipeline of natural gas from the U.S. to Mexico.

NEPA requires federal agencies to assess the potential environmental impacts of major federal actions significantly affecting the environment. Using the NEPA process, agencies evaluate the environmental and related social and economic effects of their proposed actions. An EA is a concise public document that provides sufficient evidence and analysis to determine to prepare an environmental impact statement or a finding of no significant impact.

The EAs being prepared are related to the two LNG export proceedings shown below:

Applicant	DOE Docket	Notice of Environmental Assessment
Energía Costa Azul, S. de R.L. de C.V.	18-145-LNG	Energia Costa Azul 18-145-LNG - Notice of EA - 07-12-2022.pdf (energy.gov)
Vista Pacifico LNG, S.A.P.I. de C.V.	20-153-LNG	Vista Pacifico 20-153-LNG - Notice of EA - 7-12-22.pdf (energy.gov)

You are being contacted as a state or tribe located near where the cross-border natural gas pipelines that may service the planned liquefaction projects are located. At this time, the planned liquefaction projects anticipate that they may source U.S. natural gas from one or more of the below existing pipelines, or from one or more additional cross-border pipelines that may be constructed in the future.

	Pipeline / Operator	FERC Order Granting Presidential Permit or Establishing Capacity	FERC Docket Nos.	Point of Entry / Exit	Approved / Proposed Capacity (mmcfd)
1	San Diego Gas & Electric Co.	116 FERC ¶ 61,246 (2006)	CP93-117	Otay,CA / Tijuana, BC	800
2	Southern California Gas Co.	68 FERC ¶ 61,277 (1994)	CP94-207	Calexico, CA/ Mexicali, BC	40
3	North Baja Pipeline Co.	98 FERC ¶ 61,020 (2002)	CP01-23, CP06-61	Ogilby, CA/ Los Algodones, BC	500
4	Sierrita Gas Pipeline	147 FERC ¶ 61,192 (2014)	CP13-74, CP18-38	Sasabe, AZ/ Sasabe, Son	627
5	El Paso Natural Gas Co (Ductos de Nogales)	94 FERC ¶ 61,393 (2001)	CP01-41	Santa Cruz, AZ/ Nogales, Son	9
6	El Paso Natural Gas Co (Douglas Meter)	141 FERC ¶ 61,026 (2012)	CP98-357, CP12-7	Cochise, AZ/ Agua Prieta, Son	117
7	El Paso Natural Gas Co (El Fresnal/Willmex Meter)	141 FERC ¶ 61,026 (2012)	CP99-323, CP12-7	Cochise, AZ/ Agua Prieta, Son	329
8	El Paso Natural Gas Co (Naco/Monument 90 Facilities)	154 FERC ¶ 61,257 (2016)	G-104, CP15-493	Cochise, AZ/ Naco, Son	57
9	El Paso Natural Gas Co (Samalayuca Crossing)	140 FERC ¶ 61,072 (2012)	CP93-253, CP12-74	El Paso, TX/ Cd. Juarez, Chih	545
10	El Paso Natural Gas Co (El Norte Crossing)	140 FERC ¶ 61,174 (2012)	CP12-96	Clint, TX/ Cd. Juarez, Chih	366
11	ONEOK Partners (Roadrunner – Tarahumara PL)	153 FERC ¶ 61,041 (2015)	CP15-161	San Elizario, TX/ San Isidro, Chih	875
12	Comanche Trail Pipeline LLC (ETP Waha-San Elizario)	155 FERC ¶ 61,182 (2016)	CP15-503	San Elizario, TX/ San Isidro, Chih	1,100
13	Trans-Pecos Pipeline LLC (ETP Waha-Presidio)	155 FERC ¶ 61,140 (2016)	CP15-500	Presidio, TX/ Ojinaga, Chih	1,300
14	OkTex Pipeline Co., (Del Norte Facilities)	105 FERC ¶ 61,047 (2003)	CP03-99, CP00-384 CP91-2128	El Paso, TX / Juarez, Chih.	112
15	West Texas Gas Co (Acuña Export Crossing)	101 FERC ¶ 61,058 (2002)	CP02-97	Val Verde, TX/ Cd. Acuña, Coah	25
16	West Texas Gas Co (Conagas)	76 FERC ¶ 61,264 (1996)	CP84-361, CP84-366, CP96-497, CP02-382	Eagle Pass, TX/ Piedras Negras, Coah	38
17	West Texas Gas Co. (Reef Int'l Facilities)	99 FERC ¶ 61,221 (2002).	CP02-74, CP08-410	Eagle Pass, TX / Piedras Negras, Chih.	15
18	Kinder-Morgan Texas Pipeline Co.	77 FERC ¶ 61,205 (1996)	CP96-583, CP12-440, CP13-94	Roma, TX/ Cd. Miguel Aleman, Tam	700
19	NET Mexico Pipeline	145 FERC ¶ 61,112 (2013)	CP13-482	Starr, TX/ Cd. Camargo, Tam	2,100
20	Tennessee Gas Pipeline Co (PEMEX Exp)	86 FERC ¶ 61,244 (1999)	CP99-28	Hidalgo, TX/ Reynosa, Tam	185
2	Tennessee Gas Pipeline Co (South Texas Exp)	101 FERC ¶ 61,360 (2002)	CP02-117	Hidalgo, TX/ Reynosa, Tam	320
2	Coral Energy Corp. / Kinder Morgan Border Pipeline LLC	89 FERC ¶ 61,171 (1999)	CP99-564, CP17-474	Hidalgo, TX/ Reynosa, Tam	450
23	Houston Pipeline (Energy Transfer)	146 FERC ¶ 61,195 (2014)	CP14-13	Hidalgo, TX/ Reynosa, Tam	140
24	Texas Eastern Transmission (South Texas Exp)	16 FPC 27 (1956) 9 FERC ¶ 61,362 (1979)	G-9785, CP80-93	Hidalgo, TX/ Reynosa, Tam	300
25	Colombia Pipeline , LLC (Howard Energy - Impulsora)	151 FERC ¶ 61,117 (2015)	CP14-513, CP16-70	Webb, TX/ Colombia, NL	1,120
26	Encinal Gathering Ltd	121 FERC ¶ 61,248 (2007)	CP07-418	Webb, TX/ Coahuila	60
27	Valley Crossing Pipeline Co (Spectra Energy)	161 FERC ¶ 61,084 (2017)	CP17-19	Brownsville, TX/ Offshore with Sur de Texas-Tuxpan Interconnect	2,600
	Total Existing Cross-Border Capacity				**14,830**

DOE anticipates providing a draft of the EAs later this summer, and a 15-day comment period open to your state or Indian Tribe will then commence.

If you have any questions related to this notice or have updated contact information, please reply to this email.

Thank you,

Office of Resource Sustainability

Division of Natural Gas Regulation

Office of Fossil Energy and Carbon Management

U.S. Department of Energy

Email: fergas@hq.doe.gov

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Appendix B: Application Summary of Existing Cross-Border Facilities

	Pipeline / Operator	FERC Order Granting Presidential Permit or Establishing Capacity	FERC Docket Nos.	Point of Entry / Exit	Approved / Proposed Capacity (mmcfd)
1	San Diego Gas & Electric Co.	116 FERC ¶ 61,246 (2006)	CP93-117	Otay,CA / Tijuana, BC	800
2	Southern California Gas Co.	68 FERC ¶ 61,277 (1994)	CP94-207	Calexico, CA/ Mexicali, BC	40
3	North Baja Pipeline Co.	98 FERC ¶ 61,020 (2002)	CP01-23, CP06-61	Ogilby, CA/ Los Algodones, BC	500
4	Sierrita Gas Pipeline	147 FERC ¶ 61,192 (2014)	CP13-74, CP18-38	Sasabe, AZ/ Sasabe, Son	627
5	El Paso Natural Gas Co (Ductos de Nogales)	94 FERC ¶ 61,393 (2001)	CP01-41	Santa Cruz, AZ/ Nogales, Son	9
6	El Paso Natural Gas Co (Douglas Meter)	141 FERC ¶ 61,026 (2012)	CP98-357, CP12-7	Cochise, AZ/ Agua Prieta, Son	117
7	El Paso Natural Gas Co (El Fresnal/Willmex Meter)	141 FERC ¶ 61,026 (2012)	CP99-323, CP12-7	Cochise, AZ/ Agua Prieta, Son	329
8	El Paso Natural Gas Co (Naco/Monument 90 Facilities)	154 FERC ¶ 61,257 (2016)	G-104, CP15-493	Cochise, AZ/ Naco, Son	57
9	El Paso Natural Gas Co (Samalayuca Crossing)	140 FERC ¶ 61,072 (2012)	CP93-253, CP12-74	El Paso, TX/ Cd. Juarez, Chih	545
10	El Paso Natural Gas Co (El Norte Crossing)	140 FERC ¶ 61,174 (2012)	CP12-96	Clint, TX/ Cd. Juarez, Chih	366
11	ONEOK Partners (Roadrunner – Tarahumara PL)	153 FERC ¶ 61,041 (2015)	CP15-161	San Elizario, TX/ San Isidro, Chih	875
12	Comanche Trail Pipeline LLC (ETP Waha-San Elizario)	155 FERC ¶ 61,182 (2016)	CP15-503	San Elizario, TX/ San Isidro, Chih	1,100
13	Trans-Pecos Pipeline LLC (ETP Waha-Presidio)	155 FERC ¶ 61,140 (2016)	CP15-500	Presidio, TX/ Ojinaga, Chih	1,300
14	OkTex Pipeline Co., (Del Norte Facilities)	105 FERC ¶ 61,047 (2003)	CP03-99, CP00-384 CP91-2128	El Paso, TX / Juarez, Chih.	112
15	West Texas Gas Co (Acuña Export Crossing)	101 FERC ¶ 61,058 (2002)	CP02-97	Val Verde, TX/ Cd. Acuña, Coah	25
16	West Texas Gas Co (Conagas)	76 FERC ¶ 61,264 (1996)	CP84-361, CP84-366, CP96-497, CP02-382	Eagle Pass, TX/ Piedras Negras, Coah	38
17	West Texas Gas Co. (Reef Int'l Facilities)	99 FERC ¶ 61,221 (2002).	CP02-74, CP08-410	Eagle Pass, TX / Piedras Negras, Chih.	15
18	Kinder-Morgan Texas Pipeline Co.	77 FERC ¶ 61,205 (1996)	CP96-583, CP12-440, CP13-94	Roma, TX/ Cd. Miguel Aleman, Tam	700
19	NET Mexico Pipeline	145 FERC ¶ 61,112 (2013)	CP13-482	Starr, TX/ Cd. Camargo, Tam	2,100
20	Tennessee Gas Pipeline Co (PEMEX Exp)	86 FERC ¶ 61,244 (1999)	CP99-28	Hidalgo, TX/ Reynosa, Tam	185
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	Total Existing Cross-Border Capacity				**14,830**

Source: ECA's Application

Appendix C: Natural Gas Pipeline Border Crossing Locations

Map number	Border Crossing Location	State	US pipeline	Mexican pipeline	EIA 2021 Avg. Exports (MMcfd)
1	Otay Mesa/Tijuana	CA	SDG&E, SoCalGas	Transportadora de Gas Natural de Baja California (Sempra)	1
2	Calexico/Mexicali	CA	SoCal Gas	Rosarito (Sempra)	66
3	Ogilby/Los Algodones	CA	North Baja, El Paso	Rosarito (Sempra)	349
4	Sasabe/Sasabe	AZ	Sierrita (Kinder Morgan)	Gasoducto Aguaprieta/Sonora Pipeline (Sasabe-Guaymas) (Sempra)	84
5	Nogales/Nogales	AZ	El Paso	Samayaluca-Sasabe (Carso Energy)	1
6	Douglas/Naco	AZ	El Paso	Naco-Hermosillo (CENAGAS)	149
7	Douglas/Agua Prieta	AZ	El Paso	Gasoducto la Caridad (Mexicana de Cobre)	
8	Columbus/Port of Palomas (Proposed)	NM	Proposed Paso Norte pipeline (Paso Norte Pipeline Group) to connect El Paso pipeline to border	Proposed Paso Norte pipeline to natural gas hub El Encino	0
9	San Jeronimo/San Jeronimo (Proposed)	NM	El Paso	Libramiento Juarez (Proposed)	0
10	El Paso/Juarez	TX	Norteno Pipeline (ONEOK)	Sistema Nacional de Gasoductos-SNG (PEMEX-CENAGAS)	268
11	San Elizario/San Isidro	TX	El Paso, Comanche Trail	San Isidro-Samalayuca, Samalayuca, Tarahumara (Chihuahua Corridor)	276
12	Clint/El Hueco	TX	Roadrunner (ONEOK)	SNG	88
13	Presidio/Ojinaga	TX	Trans-Pecos	Ojinaga-El Encino	602
14	Del Rio/Acuna	TX	West Texas Gas, Inc.	SNG	1
15	Eagle Pass/Piedras Negras	TX	West Texas Gas, Inc.	SNG	27
16	Laredo/Colombia	TX	Kinder Morgan	Nueva Era	280
17	Roma/Mier	TX	Kinder Morgan	Kinder Morgan	453
18	Rio Grande/Camargo	TX	NET Mexico	Los Ramones I (Sempra)	1,484
19	Penitas/Arguelles	TX	Kinder Morgan	SNG	0
20	McAllen/Arguelles	TX	HPL	SNG	187
21	Alamo/Reynosa	TX	Tennessee Gas Pipeline	SNG	175
22	Hidalgo/Reynosa	TX	Kinder Morgan	SNG	346
23	Rio Bravo/Rio Bravo	TX	TETCO (Enbridge)	SNG-Gasoducto Del Rio	173
24	Progreso/Rio Bravo	TX	TETCO (Enbridge)	SNG-Gasoducto Del Rio	
25	Brownsville/Matamoros	TX	Valley Crossing	SNG	893

Data sources include: Table 1, Points of Entry/Exit, https://www.energy.gov/sites/prod/files/2015/08/f25/POEE%20List.pdf; Natural Gas Intelligence, 2022 Map of Mexico's Natural Gas Pipelines, Market Hubs & LNG Facilities, https://www.naturalgasintel.com/ngis-2022-map-of-mexicos-natural-gas-pipelines-market-hubs-lng-facilities/; EIA, U.S. Natural Gas Exports and Re-Exports by Point of Exit, https://www.eia.gov/dnav/ng/ng_move_poe2_a_EPG0_ENP_Mmcf_a.htm; Infraestructura Energética Nova, S.A.B. de C.V. 2018 Annual Report, https://ienova.gcs-web.com/static-files/1ba71478-c5cf-424c-9c2a-38ff0de6f0da; and ECA's 2018 Application.