

December 19, 2012

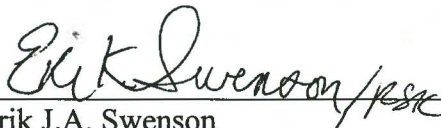
Mr. John Anderson
Office of Fuels Programs, Fossil Energy
U.S. Department of Energy
Docket Room 3F-056, FE-50
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

**Re: In the Matter of Pangea LNG (North America) Holdings, LLC
FE Docket No. 12-____-LNG
Application for Long-Term, Multi-Contract Authorization to Export
Liquefied Natural Gas to Non-Free Trade Agreement Countries**

Dear Mr. Anderson:

Enclosed for filing on behalf of Pangea LNG (North America) Holdings, LLC (“Pangea”), please find Pangea’s application for long-term, multi-contract authorization to engage in exports of up to 398.5 billion cubic feet per year of natural gas in the form of liquefied natural gas (“LNG”), which is the equivalent of approximately eight (8) million metric tons per annum and 410.5 trillion British thermal units per year (“Btu/y”) or 410,500,000 million Btu/y of natural gas.¹ Pangea seeks authorization for a 25-year term, commencing on the earlier of the date of first export or seven (7) years from the date the authorization is issued, to export LNG to any country (i) with which the U.S. does not have a Free Trade Agreement requiring the national treatment for trade in natural gas and LNG; (ii) that has, or in the future develops, the capacity to import LNG via ocean-going carrier; and (iii) with which trade is not prohibited by U.S. law or policy.

Should you have any questions about the foregoing, please feel free to contact the undersigned at 202-662-4555.


Erik J.A. Swenson
Tania S. Perez
Rabeha Kamaluddin
*Attorneys for Pangea LNG (North America)
Holdings, LLC*

¹ A check in the amount of \$50.00 is provided as the filing fee stipulated by 10 C.F.R. § 590.207 (2012).

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

In The Matter Of:

PANGEA LNG (NORTH AMERICA)
HOLDINGS, LLC

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Docket No. 12-184-LNG

APPLICATION FOR LONG-TERM, MULTI-CONTRACT AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS
TO NON-FREE TRADE AGREEMENT COUNTRIES

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

In The Matter Of:)
) Docket No. 12 - 184- LNG
PANGEA LNG (NORTH AMERICA))
HOLDINGS, LLC)
)

**APPLICATION FOR LONG-TERM, MULTI-CONTRACT AUTHORIZATION
TO EXPORT LIQUEFIED NATURAL GAS
TO NON-FREE TRADE AGREEMENT COUNTRIES**

Pursuant to Section 3 of the Natural Gas Act (“NGA”)¹ and Part 590 of the Department of Energy’s (“DOE”) regulations,² Pangea LNG (North America) Holdings, LLC (“Pangea”) hereby requests that DOE, Office of Fossil Energy (“FE”), grant long-term, multi-contract authorization for Pangea to engage in exports of up to 398.5 billion cubic feet per year (“Bcf/y”) of natural gas in the form of liquefied natural gas (“LNG”), which is the equivalent of approximately eight (8) million metric tons per annum (“MTPA”) and 410.5 trillion British thermal units per year (“Btu/y”) or 410,500,000 million Btu/y of natural gas.³ Pangea requests this authorization for a 25-year term commencing on the earlier of (i) the date of first export; or (ii) seven (7) years from the date authorization is issued to export LNG from its proposed South Texas LNG Export Project (“ST LNG Project”), to be located at the Port of Corpus Christi in Ingleside, Texas. Pangea proposes to export LNG to any country (i) with which the U.S. does

¹ 15 U.S.C. § 717b (2006).

² 10 C.F.R. Part 590 (2012).

³ Based on 1 MTPA = 48.7 Bcf/y. See <http://www.bp.com/conversionfactors.jsp>. The volumetric conversion of natural gas to heat content in Btu is based upon a cubic foot to Btu factor of 1,030. This conversion factor represents the average heat content of 1 standard cubic foot of natural gas at Station 35 (Texas) of Williams’ Transcontinental Pipeline from September 2, 2012 to November 28, 2012, as listed on the company’s website (<http://www.1line.williams.com/Transco/index.html>) (follow “Gas Quality” hyperlink). During this period, the heat content ranged from 1,047.6 to 1,018 Btu per cubic foot.

not have a Free Trade Agreement (“FTA”) requiring the national treatment for trade in natural gas and LNG; (ii) that has, or in the future develops, the capacity to import LNG via ocean-going carrier; and (iii) with which trade is not prohibited by U.S. law or policy (taken together, a “non-FTA Country” or “non-FTA Countries”). Pangea is requesting this authorization both on its own behalf and as agent for third parties who hold title to the LNG at the time of export.

This Application represents the second part of Pangea’s two-part request for authorization to export LNG from the ST LNG Project. On November 29, 2012, Pangea submitted a separate application (“November 29 Application”) to the DOE/FE under Section 3 of the NGA for long-term, multi-contract authorization to export up to 398.5 Bcf/y of natural gas (equivalent to approximately eight (8) MTPA) in the form of LNG to any country (i) with which the U.S. has, or in the future enters into, an FTA requiring national treatment for trade in natural gas and LNG; and (ii) that has, or in the future develops, the capacity to import LNG via ocean-going carrier. The November 29 Application currently is pending before the DOE/FE under FE Docket No. 12-174-LNG.⁴

In support of its Application, Pangea states as follows:

⁴ Pangea anticipates exporting up to a total of 398.5 Bcf/y of natural gas in the form of LNG from the ST LNG Project (*i.e.*, the maximum amounts of LNG proposed to be exported in this Application and the November 29 Application are not cumulative).

I.
COMMUNICATIONS AND CORRESPONDENCES

Pangea requests that all communications and correspondences regarding this Application, including all service of pleadings and notices, should be directed to the following persons:⁵

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Project Director
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II.
DESCRIPTION OF THE APPLICANT

The exact legal name of Pangea is Pangea LNG (North America) Holdings, LLC. Pangea is a limited liability company organized under the laws of Delaware with its principal place of business located at 21 Waterway Avenue, Suite 550, The Woodlands, Texas 77380. Its telephone number is (713) 574-1880, and its fax number is (832) 426-1871. Pangea is a wholly owned subsidiary of Pangea LNG B.V. (“Pangea LNG”), a Netherlands-based company that is developing floating LNG liquefaction and storage solutions around the globe. Pangea LNG’s ordinary shares are owned by Daewoo Shipbuilding & Marine Engineering Co., Ltd. (“DSME”)

⁵ Pangea LNG requests waiver of Section 590.202(a) of the DOE regulations to the extent necessary to include outside counsel on the official service list in this proceeding. Pursuant to Section 590.103(b) of the DOE regulations, Pangea hereby certifies that the persons listed herein are the duly authorized representatives of Pangea.

(70%), D&H Solutions AS (“D&H”) (20%) and NextDecade International Coöperatief U.A. (“NDI”) (10%).

DSME is a South Korea-based company whose major shareholders consist of Korea Development Bank (31.27%) and Korea Asset Management Corporation (19.11%), with the remaining shares being widely-held (with no individual entities holding five percent (5%) or more of DSME’s shares).⁶ DSME is one of the world’s leading shipbuilders and contractors for major energy companies, and it owns and operates the largest shipyard in the world (based on dead weight tons of production). DSME is the leading builder of LNG carriers (with 96 LNG carriers delivered or on order) and has built, or initiated construction of, the vast majority (*i.e.*, nine) of the world’s floating LNG regasification vessels. Among its other achievements are construction of some of the world’s largest floating production, storage and offloading (“FPSO”) units, including Agbami, Pazflor, and CLOV (each valued at about \$2 billion).⁷

D&H is a Norwegian-based joint venture company that is owned by Hemla II AS (50%) and DSME (50%). D&H is developing stranded natural gas reserves worldwide using floating LNG solutions as a key technology.

NDI is a Netherlands-based cooperative among six (6) individual investors from the United States, Spain and The Netherlands. It is an energy project development and management company formed around a team of professionals each with decades of experience in international LNG and the energy industry. The Chief Executive Officer (“CEO”) of NDI was previously the

⁶ Treasury shares comprise 1.2% of the total shares of DSME.

⁷ The Agbami FPSO is located offshore Nigeria and has a processing capacity of 250,000 barrels of oil per day (“bo/d”) and storage capacity of approximately 2.2 million barrels of oil. The Pazflor FPSO is located offshore Angola and has a processing capacity of 232,000 bo/d and 150 million cubic feet of gas per day, and a storage capacity of approximately 2.0 million barrels of oil. The CLOV FPSO also will be located offshore Angola and will have a processing capacity of 160,000 bo/d and a storage capacity of approximately 1.8 million barrels.

Chief Commercial Officer of El Paso Energy's Global LNG business unit, a founder and CEO of Excelerate Energy, and the Executive Vice President of Shell's Global LNG business unit.

Consistent with an executed Letter of Intent, Pangea is working with Statoil North America, Inc. on the development of the ST LNG Project. Statoil North America, Inc. is a subsidiary of Statoil ASA ("Statoil"), a Norwegian upstream oil and gas company listed on the Oslo and New York stock exchanges. Headquartered in Stavanger, Norway, Statoil is an international energy company with 40 years of offshore oil and gas production experience on the Norwegian Continental Shelf and currently has operations in 36 countries. Statoil's LNG activities include being the operator of the Snøhvit, an LNG export facility in Norway; exercising its capacity holder rights with respect to the Cove Point import and regasification terminal (in the U.S.); and producing, transporting and marketing LNG worldwide. (In 2011, Statoil delivered LNG to more than 10 countries.) Statoil has been active in the U.S. oil and gas industry for 25 years. Over the past decade, Statoil has increased its North American business substantially through upstream positions in the Gulf of Mexico, acreages in the Marcellus shale gas play, the Eagle Ford shale gas play, the Bakken shale oil play and oil sands acreages in Alberta, Canada. Statoil and Pangea are in active negotiations with respect to Statoil procuring up to a 50% equity stake in the ST LNG Project and utilizing up to 50% of the liquefaction and export capacity of the ST LNG Project.⁸

⁸ Should a change in control occur prior to DOE/FE's issuance of an order in this proceeding, Pangea will file a supplement to the instant Application to update the relevant applicant information. Pangea acknowledges that in any order granting the authorization requested in this Application, DOE/FE may require that Pangea request approval from the Assistant Secretary for Fossil Energy prior to a change in control of the authorization holder, whether by asset sale, stock transfer or other means.

III. EXECUTIVE SUMMARY

Pangea herein is seeking multi-contract, long-term authorization to engage in exports of up to 398.5 Bcf/y of natural gas in the form of LNG to non-FTA Countries for a 25-year term commencing on the earlier of the date of first export or seven (7) years from the date of issuance of the authorization requested herein. Pangea is requesting this authorization in order to act on its own behalf and as agent for third parties.

Pangea is seeking this export authorization in conjunction with its proposal to construct, own and operate the ST LNG Project.⁹ The ST LNG Project will consist of both land-based and floating components and will include natural gas treatment, compression, liquefaction and storage facilities, as well as ancillary facilities required to receive and liquefy natural gas, and to store and deliver LNG. The ST LNG Project will be capable of processing an average of approximately 398.5 Bcf/y (or approximately 1.09 Bcf per day) of pipeline-quality natural gas. Such gas will be delivered to the ST LNG Project through an approximately 27-mile-long pipeline (“ST Pipeline”) to be developed by a Pangea affiliate. Pangea intends to interconnect the ST LNG Project with nine (9) interstate and intrastate pipeline systems¹⁰ via the ST Pipeline,

⁹ Regulatory approval also must be obtained from the Federal Energy Regulatory Commission (“FERC”) under Section 3 of the NGA for the siting, construction and operation of the ST LNG Project and under Section 7 of the NGA for the siting, construction and operation of an affiliated natural gas pipeline that will bring feed gas and fuel gas to the ST LNG Project. Pangea will initiate the process to obtain such authorizations in Spring 2013 by requesting authorization from the Director of the Office of Energy Projects to commence the FERC’s mandatory National Environmental Policy Act (“NEPA”) pre-filing review process for the ST LNG Project and associated pipeline. The potential environmental impacts of the ST LNG Project, as well as the affiliated pipeline, will be reviewed by FERC in conjunction with that proceeding.

¹⁰ These nine (9) pipelines are: Texas Eastern Transmission Corporation (“TETCO”), Kinder Morgan Tejas Pipeline LLC, Natural Gas Pipeline Company of America (“NGPL”), Transcontinental Gas Pipeline Corporation (“TRANSCO”), Tennessee Gas Pipeline Company, Gulf South Pipeline Company, LP, Crosstex Energy, L.P., GulfTerra Texas Pipeline, LP and Channel Industries Gas Company. Their total estimated combined throughput is approximately 4.4 Bcf/d. The ST Pipeline’s actual interconnects and delivery/receipt points ultimately will be determined in accordance with the needs of the users of the ST Pipeline. Significantly, there are various other natural gas pipelines crossed by, or in proximity to, the ST Pipeline’s proposed route that may provide additional transportation options if needed.

thereby allowing natural gas to be supplied through displacement or direct access from a wide variety of supply sources.

The ST LNG Project, like other LNG export projects already pending before DOE/FE, is the result of the surge in U.S. natural gas reserves and the expanding needs for natural gas in the form of LNG in international markets. These conditions have resulted in a situation where exporting LNG is a viable and economically attractive option that has transformed the U.S. from a projected LNG net importer to net exporter.¹¹ Publicly available information, as well as the report commissioned by Pangea from Black & Veatch (“B&V”), entitled *Market Price Impact Study for LNG Exports at the South Texas LNG Export Project* (“B&V Report”),¹² establish that domestic natural gas supplies far exceed existing and projected domestic demand during the 25-year term during which exports would occur from the ST LNG Project, as requested in this Application. Furthermore, the B&V Report demonstrates that the price impact of Pangea’s proposed exports is not significant, and thus the ST LNG Project is not expected to negatively impact U.S. consumption of natural gas. The recently released study commissioned by DOE/FE, and authored by NERA Economic Consulting (“NERA”), *Macroeconomic Impacts of LNG Exports from the United States* (“NERA Report”), lends further support to this position stating

¹¹ See Energy Information Administration, *Annual Energy Outlook 2012*, at 3 (June 25, 2012), <http://www.eia.gov/forecasts/archive/aeo12/index.cfm> (“[n]atural gas production increases throughout the projection period, allowing the United States to transition from a net importer to a net exporter of natural gas”) (hereinafter AEO 2012). On December 5, 2012, the Energy Information Administration (“EIA”) released the Annual Energy Outlook 2013 Early Release forecasting an earlier transition to net exports than was projected in the AEO 2012 Reference case. EIA predicts that U.S. exports of LNG from domestic sources will rise to almost 1.6 trillion cubic feet (“Tcf”) in 2027, close to double the 0.8 Tcf projected in AEO 2012. See *AEO 2013 Early Release* at 1 (Dec. 5, 2012), [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2013\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2013).pdf) (hereinafter *AEO 2013 Early Release*). Significantly, *AEO 2013 Early Release* extended the projection period to 2040, an additional five years beyond *AEO 2012*.

¹² The B&V Report is attached hereto as Appendix A.

that “LNG exports have net economic benefits in spite of higher domestic natural gas prices.”¹³ NERA found this to be the case even with unlimited LNG exports from the U.S.¹⁴

As discussed in Section VII of this Application, the ST LNG Project presents significant benefits to the public, including stimulating the local and regional economy through direct job creation and other forms of personal income, increasing tax revenues and other fiscal benefits for governmental entities; stimulating national economic activity; improving the U.S. balance of payments; and improving security for the U.S. and its trading partners. The economic benefits of the ST LNG Project are quantified in the report commissioned from The Perryman Group, entitled *The Impact of Construction and Operation of Pangea’s South Texas LNG Export Project on Business Activity in the Corpus Christi Area* (“Perryman Report”),¹⁵ which, among other things, demonstrates that the ST LNG Project would generate a substantial economic stimulus through construction and ongoing operations. For example, construction and other pre-operational spending related to the ST LNG Project and ST Pipeline are expected to lead to gains of more than \$1.4 billion in gross product and 17,230 person-years of employment in the Corpus Christi Metropolitan Statistical Area (“MSA”);¹⁶ and approximately \$2.1 billion in gross product and 25,300 person-years of employment nationally.¹⁷ Once the ST LNG Project is fully operational, benefits are anticipated to include \$151 million in gross product each year for the Corpus Christi MSA and \$236.9 million nationally, as well as 1,340 permanent jobs in the

¹³ NERA Economic Consulting, *Macroeconomic Impacts of LNG Exports from the United States*, at 1 (Dec. 5, 2012), http://fossil.energy.gov/programs/gasregulation/reports/nera_lng_report.pdf.

¹⁴ *Id.* at 12.

¹⁵ The Perryman Report is attached hereto as Appendix B.

¹⁶ The Corpus Christi MSA (comprised of Aransas, Nueces and San Patricio counties) was found to be the primary impact area for the ST LNG Project through an assessment of economic linkages in the region. *See* Perryman Report at 2.

¹⁷ *Id.*

Corpus Christi MSA and 2,060 permanent jobs nationally.¹⁸ Furthermore, the Perryman Report estimates that economic activity in the exploration and production (“E&P”) industry would yield benefits in gross product of \$307.6 million and 3,820 permanent jobs in the Corpus Christi MSA; and \$2.5 billion in gross product and 27,800 permanent jobs nationally.¹⁹

Finally, a distinct benefit of the ST LNG Project stems from its ties to South Korea. As discussed above, DSME is a majority, indirect owner of the ST LNG Project. DSME is a leading contractor for major energy development projects, like the ST LNG Project, as well as a leading LNG carrier builder. As such, Pangea anticipates substantial participation by DSME in the ST LNG Project. Pangea believes that economic activities stemming from the ST LNG Project will serve to strengthen the U.S.-South Korea trade relationship, consistent with U.S. stated foreign policy to boost annual U.S. goods exports to South Korea by as much as \$11 billion.²⁰

IV. AUTHORIZATION REQUESTED

Pangea requests long-term, multi-contract authorization to export up to 398.5 Bcf/y of natural gas in the form of LNG, which is the equivalent of approximately eight (8) MTPA, from the ST LNG Project to non-FTA Countries. Pangea requests this authorization for a 25-year term commencing on the earlier of the date of first export or seven (7) years from the date of issuance of the authorization requested herein.

¹⁸ *Id.* at 2 and 16.

¹⁹ *Id.* at 14 and 16.

²⁰ *Obama Administration Record on Promoting U.S. Jobs by Increasing Trade and Exports*, at 2, http://www.whitehouse.gov/sites/default/files/docs/trade_and_exports_record.pdf (“The Obama Administration has expanded access to new markets through ... new trade agreements with South Korea, Colombia, and Panama and is working to further expand market access for U.S. firms to sell their goods and services around the world, creating jobs here at home....In particular, the Korea-United States free trade agreement is expected to boost annual U.S. goods exports to Korea by as much as \$11 billion and support more than 70,000 American jobs.”) (hereinafter *Obama Administration Record*).

Pangea is requesting this authorization both on its own behalf and as agent for other parties who will hold title to the LNG at the time of export. Pangea will comply with all DOE/FE requirements for exporters and agents, including the registration requirements as first established in *Freeport LNG Development, L.P.*, DOE/FE Order No. 2913, and most recently set forth in *CE FLNG, LLC*, DOE/FE Order No. 3193.²¹ In this regard, Pangea, when acting as agent, will register with DOE/FE each LNG title holder for whom it seeks to export as agent, and will provide DOE/FE with a written statement by the title holder acknowledging and agreeing to (i) comply with all requirements in Pangea's long-term export authorization; and (ii) include those requirements in any subsequent purchase or sale agreement entered into by the title holder. Pangea also will file under seal with DOE/FE any relevant long-term commercial agreements that it enters into with the LNG title holders on whose behalf the exports are performed.

Pangea is not submitting long-term supply agreements and long-term export agreements with the instant Application and, therefore, requests that DOE/FE make a similar finding to that in DOE/FE Order No. 2961 with regard to the transaction-specific information requested in Section 590.202(b) of the DOE regulations.²² At present, Pangea does not anticipate entering into any long-term gas supply or long-term export contracts in conjunction with the LNG export

²¹ See *Freeport LNG Development, L.P., Order Granting Long-Term Authorization to Export Liquefied Natural Gas from Freeport LNG Terminal to Free Trade Nations*, FE Docket No. 10-160-LNG, DOE/FE Order No. 2913 (Feb. 10, 2011), *Errata Notice Correcting Footnote 9 in Order 2913 Issued 2/10/2009* (Feb. 17, 2011); see also *CE FLNG, LLC, Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Proposed CE FLNG LNG Terminal in Plaquemines Parish, Louisiana to Free Trade Agreement Nations*, FE Docket No. 12-123-LNG, DOE/FE Order No. 3193 (Nov. 21, 2012).

²² In the May 20, 2010 order granting Sabine Pass Liquefaction, LLC ("Sabine Pass") long-term export authorization to non-FTA Countries, DOE/FE found that Sabine Pass was not required to submit with its application transaction-specific information pursuant to Section 590.202(b) of the DOE regulations. DOE/FE found that given the state of development for the proposed Sabine Pass export project, it was appropriate for Sabine Pass to submit such transaction-specific information when the contracts reflecting such information are executed. See *Sabine Pass Liquefaction, LLC, Opinion and Order Conditionally Granting Long-Term Authorization to Export Liquefied Natural Gas from Sabine Pass LNG Terminal to Non-Free Trade Agreement Nations*, FE Docket No. 10-111-LNG, DOE/FE Order No. 2961, at 41 (May 20, 2011) (hereinafter *Sabine Pass, DOE/FE Order No. 2961*).

authorization requested herein. Rather, both Pangea-affiliated and unaffiliated entities will enter into capacity use arrangements with Pangea. It is these entities that will enter into long-term gas supply and export contracts. In accordance with DOE/FE's stated policy in DOE/FE Order No. 2961, Pangea will submit transaction-specific information when such contracts are executed.²³

Finally, Pangea requests that the Assistant Secretary issue a conditional order pursuant to Section 590.402 of the DOE regulations²⁴ authorizing the export of LNG as requested herein, followed by issuance of a final order immediately upon completion of the environmental review of the ST LNG Project by FERC. Pangea's request is consistent with DOE's regulations and long-standing practice.²⁵ Moreover, DOE routinely issues conditional orders subject to satisfactory environmental review in circumstances similar to those here.²⁶

²³ DOE/FE has previously held that the commitment to file contracts once they are executed complies with the requirement of 10 C.F.R. § 590.202(b) to supply transaction-specific information "to the extent practicable." *See id.* at 41.

²⁴ 10 C.F.R. § 590.402 ("The Assistant Secretary may issue a conditional order at any time during a proceeding prior to issuance of a final opinion and order. The conditional order shall include the basis for not issuing a final opinion and order at that time and a statement of findings and conclusions. The findings and conclusions shall be based solely on the official record of the proceeding.").

²⁵ In promulgating its regulations setting forth the administrative procedures for the import and export of natural gas, DOE indicated that issuance of a conditional decision is appropriate when the application at issue involves, for example, the importation of LNG into new terminal facilities. In such a case, DOE reviews the application to determine if the proposed importation is in the public interest based on the considerations within DOE's jurisdiction, while, concurrently, FERC must review other aspects of the proposed importation such as siting, construction and operation of the LNG receiving terminal facilities. *See Import and Export of Natural Gas*, 46 Fed. Reg. 44,696, at 44,700 (Sept. 4, 1981). *See also Ocean State Power*, DOE/ERA Opinion and Order No. 243-A, 1 ERA ¶ 70,810 (1988) (granting the first conditional authorization by predecessor agency, the Economic Regulatory Administration, to import natural gas from Canada, conditioned upon a final opinion and order from ERA after review by DOE of the final environmental impact statement ("EIS") being prepared for the Ocean State Project by FERC). Moreover, courts have upheld the authority of regulatory agencies to issue conditional orders. *See City of Grapevine, Tex. v. Dep't of Transp.*, 17 F.3d 1502, 1509 (D.C. Cir. 1994) (upholding the Federal Aviation Administration's approval of a runway, conditioned upon the applicant's compliance with the National Historic Preservation Act); *Idaho v. ICC*, 35 F.3d 585, 598 (D.C. Cir. 1994) (agency set forth conditions under which the railroad could proceed, without granting final approval); *PUC of Calif. v. FERC*, 900 F.2d 269, 282-83 (D.C. Cir. 1990) (stating that an agency can make a final decision, so long as it assessed the environmental data before the decision's effective date).

²⁶ *See, e.g., Sabine Pass, DOE/FE Order No. 2961; Rochester Gas and Electric Corp., Conditional Order Granting Long-Term Authorization to Import Natural Gas from Canada and Granting Interventions*, FE Docket No. 90-05-NG, DOE/FE Order No. 503 (May 16, 1991).

V.
DESCRIPTION OF THE PROJECT

A. South Texas LNG Project Facilities

As discussed above, the ST LNG Project will consist of both land-based and floating components, including natural gas treatment, compression, liquefaction and storage facilities. It also will consist of ancillary facilities required to receive and liquefy natural gas, and to store and deliver LNG. Construction of the ST LNG Project will occur in two (2) phases totaling eight (8) MTPA of LNG production. Each phase will be capable of producing four (4) MTPA of LNG, storing approximately 250,000 cubic meters of LNG, and will employ a closed-loop heat exchange system. Common facilities for both phases will include a control room, gas treatment facilities, natural gas-fired back-up power generation, flare, and other ancillary systems. The marine facilities will include a single berth with standard Chiksan® marine loading arms.

Pangea, through its indirect shareholder, DSME, has produced an extensive Preliminary Front End Engineering Design for an integrated floating liquefaction facility (the Tamar Project)²⁷ that will be deployed 60 miles offshore of Israel to liquefy amounts similar to each of the two (2) phases of the proposed ST LNG Project. This design has obtained Det Norske Veritas's ("DNV") Classification.²⁸ With the foregoing experience for starters, Pangea currently is working with Chicago Bridge & Iron Company N.V. ("CB&I")²⁹ to optimize a layout utilizing the 550-acre site and the knowledge gained through the extensive engineering performed related to the Tamar Project. This optimization and final layout will take into account health, safety, and

²⁷ The Tamar Project will be used to liquefy and export natural gas from the Tamar and Dalit fields in the Eastern Mediterranean.

²⁸ DNV is a leading classification society both within offshore classification and ship classification. Classification has gained global recognition as representing an adequate level of safety and performing approval and surveys.

²⁹ CB&I is one of the world's leading engineering, procurement and construction companies and a major process technology licensor.

environmental considerations, the desire to essentially double the LNG capacity through two (2) identical phases, and site-specific weather conditions, such as hurricanes, in order to arrive at the best technical design for the ST LNG Project.³⁰

The ST LNG Project will be located at the Port of Corpus Christi in Ingleside, Texas on a 550-acre site to which Pangea holds an exclusive option to purchase.³¹ The site abuts the La Quinta Channel with approximately 2,400 feet of channel frontage. This frontage sits with an elevation of between 15 and 20 feet above sea level that provides a significant barrier for any storm surge associated with a hurricane or named storm. The site currently is principally zoned for industrial activities and is situated between two industrial companies, Helix Energy Solutions Group and Kiewit Offshore Services.

The LNG carriers that Pangea expects to load with LNG at the ST LNG Project will likely be of a size that can traverse the new Panama Canal locks currently under construction. Given this size expectation and at an approximate eight (8) MTPA LNG production rate, about two (2) LNG carriers per week will call on the ST LNG Project resulting in four (4) transits per week. These ships will navigate, with local pilots aboard, to the ST LNG Project by entering Aransas Pass, making an approximate 45-degree turn after transiting the jetties at the mouth of the Aransas Pass, then making a gradual 90-degree turn into La Quinta Channel. The LNG carriers will enter the ST LNG Project berth by turning either in front of the facility or in the turning circle at the end of the La Quinta Channel. All waterways that the LNG carriers will

³⁰ Design optimization is ongoing and will be sufficiently complete to commence the FERC's pre-filing review process in the Spring 2013.

³¹ Pangea previously submitted detailed information on the ST LNG Project site location and evidence of Pangea's purchase option to the FE, as part of the November 29 Application, now pending in FE Docket No. 12-174-LNG. Pangea hereby incorporates such information by reference.

navigate are federally managed waterways at a depth of 45 feet, which is ample depth for the LNG carriers that will be visiting the site.

Pangea plans to interconnect the ST LNG Project with nine (9) interstate and intrastate pipelines via the ST Pipeline.³² The ST Pipeline will have a throughput capacity of at least 1.2 Bcf/d, an adequate amount to supply the ST LNG Project with both feed-gas for liquefaction and natural gas required to fuel any gas-fired facilities (*e.g.*, compressors) comprising part of the ST LNG Project or the ST Pipeline, taking into account any losses or shrinkage.³³ Should there be demand for additional capacity on the ST Pipeline for uses not associated with the ST LNG Project, the ST Pipeline may be expanded as operationally feasible and in accordance with applicable FERC policies and guidelines. This would ensure adequate capacity is available on the ST Pipeline for the ST LNG Project supply, regardless of the need to accommodate unrelated uses.

B. Export Sources

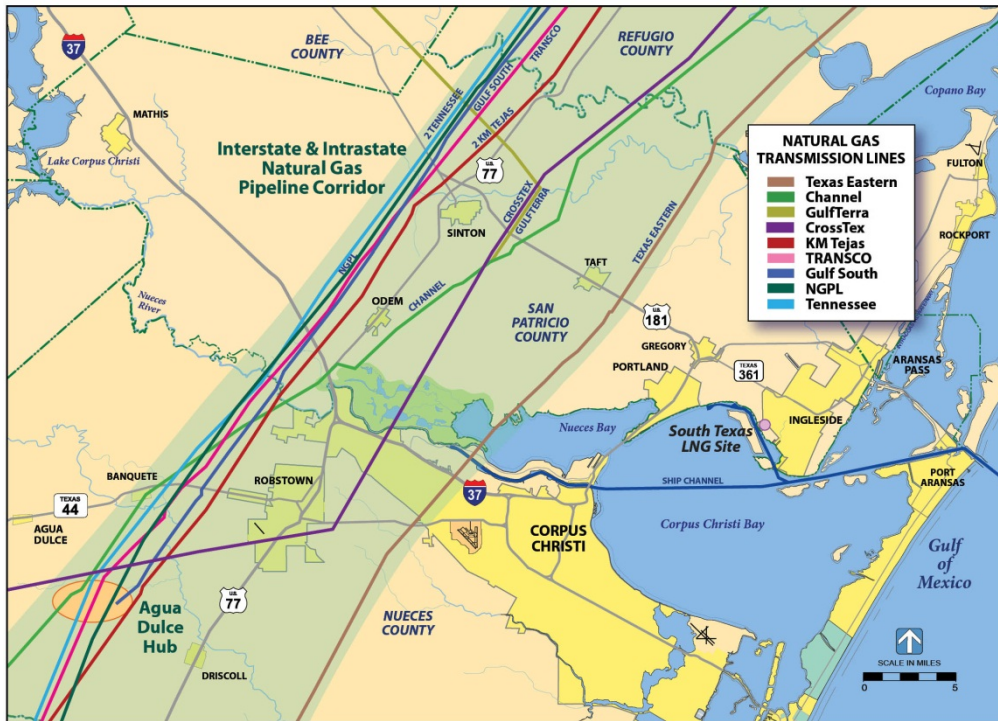
The ST LNG Project will benefit from the ST Pipeline's interconnections with various pipeline systems, such as NGPL, TRANSCO and TETCO, which span states from Texas to Illinois to Pennsylvania and New Jersey and cross multiple conventional and unconventional gas plays. Each of these interconnecting pipeline systems has a developed network of additional interconnects with other natural gas pipeline companies. As a result, the ST LNG Project will have the ability to source gas from almost any point on the U.S. natural gas pipeline grid through

³² See *supra* note 10.

³³ Pangea has assumed the additional demand associated with all necessary fuel gas and total operational losses (including losses associated with the ST Pipeline) equals 10% of the amount to be exported. Thus, $398.5 \text{ Bcf/y} / 365.25 \text{ days/y} + 0.10 * 398.5 \text{ Bcf/y} / 365.25 \text{ days/y} = 1.200 \text{ Bcf/d}$ = the pipeline capacity required to supply the ST LNG Project when operating at the maximum authorized export capacity, assuming the ST LNG Project operates at a constant level throughout the year.

direct physical delivery or by displacement. A map of the pipelines with which the ST LNG Project is currently planning to connect appears below:

Figure 1: Map of Major Natural Gas Pipelines Near ST LNG Project



ACCESS TO NATURAL GAS SUPPLY: A corridor of major natural gas transmission pipelines runs roughly parallel to US Highway 77 in South Texas. The ST LNG Project intends to connect with nine interstate and intrastate pipeline systems via a separate pipeline project of approximately 27 miles in length.

With regard to physical deliveries, the ST LNG Project’s proximity to the Eagle Ford and conventional South Texas natural gas production makes those production areas good candidates for natural gas supply available for export. Additionally, the ST Pipeline’s interconnects offer access to the Marcellus, Haynesville, Utica and Woodford supplies,³⁴ as well as other conventional Gulf Coast and North American production.

³⁴ Natural gas production from unconventional gas resources contributed to a 24% increase in the total U.S. gas production over the past five (5) years. See EIA, *U.S. Dry Natural Gas Production* (Nov. 30, 2012), <http://www.eia.gov/dnav/ng/hist/n9070us2a.htm>. Shale gas production is projected to increase from five (5) Tcf per year in 2010 (23% of total U.S. dry gas production) to 13.6 Tcf per year in 2035 (49% of total U.S. dry gas production). See EIA, *AEO 2012*, at 3; see also EIA, *AEO 2013 Early Release*, at 10 (cumulative production of dry natural gas from 2011 through 2035 in the AEO 2013 Reference case is about eight percent (8%) higher than in *AEO 2012*).

The ST Pipeline's planned interconnections currently account for 4.4 Bcf/d of receipt capacity; however, this receipt capacity is expected to increase due to changes in flow characteristics and directions of these pipelines. During the past few years, various major natural gas pipelines have changed their physical flow characteristics due to a shift in location of key natural gas production regions within North America.³⁵ Specifically, the Agua Dulce region is experiencing additional natural gas processing, with at least three (3) Bcf/d of new natural gas processing capacity recently put into operation or planned to be in operation by mid-year 2014.³⁶ This new gas supply to the region will likely be distributed throughout the Texas Gulf Coast through the nine (9) interstate and intrastate pipelines.

C. Commercial Arrangements

Pangea has not entered into any contractual or other capacity arrangements at this time. As discussed above, Pangea does not currently anticipate entering into any long-term gas supply or long-term export contracts in conjunction with the LNG export authorization requested herein. In this regard, Pangea likely will structure its commercial arrangements in a manner that provides for third parties to hold liquefaction capacity in the ST LNG Project. Customers contracting for such capacity will be responsible for sourcing their own gas supplies and arranging the delivery of the gas to the ST LNG Project, including obtaining transportation capacity on the ST Pipeline. Affiliates of Pangea and Statoil are likely to be among customers contracting for capacity at the ST LNG Project.

³⁵ See *NiSource Inc., NiSource Reports Second Quarter 2012 Earnings* (July 31, 2012), available at <http://ir.nisource.com/releasedetail.cfm?releaseid=696709> (in response to the changing supply and demand markets, Columbia Gas Transmission and Columbia Gulf Transmission are planning a \$200 million project to reverse the flow of gas on part of the pipeline system to transport approximately 500,000 dekatherms per day of Marcellus gas production to Gulf Coast markets); see also *Empire Pipeline, Inc.*, Letter Order in Docket Nos. RP11-2456-000 and RP11-2456-001 (Oct. 26, 2011) (approving tariff changes filed to reflect the reversal of flow in connection with the Tioga County Expansion Project).

³⁶ This quantity is based on information sourced from Bentek Energy LLC.

VI.
APPLICABLE LEGAL STANDARD

Pursuant to Section 3 of the NGA, FE is required to authorize exports to a foreign country unless there is a finding that such exports “will not be consistent with the public interest.”³⁷ Specifically, Section 717b(a) of the NGA states in relevant part:

(a) Mandatory authorization order

[N]o person shall export any natural gas from the United States to a foreign country or import any natural gas from a foreign country without first having secured an order of the Commission authorizing it to do so. The Commission shall issue such order upon application, unless, after opportunity for hearing, it finds that the proposed exportation or importation will not be consistent with the public interest.³⁸

Section 717b(a) thus creates a statutory presumption in favor of approval of this Application, which opponents bear the burden of overcoming. Further, in evaluating an export application, FE applies the principles described in DOE Delegation Order No. 0204-111, which focuses primarily on domestic need for the gas to be exported, and the Secretary’s natural gas policy guidelines,³⁹ which presume the normal functioning of the competitive market will benefit the public. Although DOE Delegation Order No. 0204-111 is no longer in effect, DOE/FE’s review of export applications in decisions under current delegated authority has continued to focus on the domestic need for natural gas proposed to be exported; whether the proposed exports pose a threat to the security of domestic natural gas supplies; and any other issue determined to be appropriate, including whether the arrangement is consistent with DOE’s policy of promoting competition in the marketplace by allowing commercial parties to freely negotiate

³⁷ 15 U.S.C. § 717b(a).

³⁸ *Id.* (emphasis added).

³⁹ *Policy Guidelines and Delegation Orders Relating to the Regulation of Imported Natural Gas*, 49 Fed. Reg. 6,684 (Feb. 22, 1984) (hereinafter *Policy Guidelines*).

their own trade arrangements.⁴⁰ In the past, FE also has considered local interests, international effects and the environment as factors relevant to the public interest determination.⁴¹

In the context of the instant Application and existing natural gas market conditions, the longstanding principles of minimizing federal control and involvement in natural gas markets articulated in the *Policy Guidelines* are particularly relevant.⁴² The *Policy Guidelines* emphasize free market principles and promote limited government involvement in federal natural gas regulation:

The market, not government, should determine the price and other contract terms for imported [and exported] gas. U.S. buyers [and sellers] should have full freedom - along with the responsibility - for negotiating the terms of trade arrangements with foreign sellers [and buyers].

The government, while ensuring that the public interest is adequately protected, should not interfere with buyers' and sellers' negotiation of the commercial aspects of import [and export]

⁴⁰ In this regard, in DOE/FE Order No. 2961, the first, and currently only, DOE/FE order authorizing exports of lower-48 domestically produced LNG to non-FTA Countries, DOE/FE reinforced that although DOE Delegation Order No. 0204-111 is no longer in effect, it continues to focus on the principles set forth therein in reviewing export applications. See *Sabine Pass, DOE/FE Order No. 2961*, at 29.

⁴¹ In DOE/FE Opinion and Order No. 2500, which granted ConocoPhillips Alaska Natural Gas Corporation and Marathon Oil Company authorization to export LNG from Alaska, for example, DOE/FE considered the regional need for the gas by reviewing the natural gas supply and demand projections submitted, cited or relied on, by the parties in the proceeding and determined that there was a reasonable basis for concluding that local supplies were adequate to support the proposed export as well as to meet local demand requirements during the term of the proposed blanket authorization. *ConocoPhillips Alaska Natural Gas Corp., Order Granting Authorization to Export Liquefied Natural Gas from Alaska*, FE Docket No. 07-02-LNG, DOE/FE Order No. 2500, at 47 (June 3, 2008) (hereinafter *ConocoPhillips, DOE/FE Order No. 2500*). In addition, DOE found that: (1) local interests would be well served by a grant of the requested authorization because the continued operation of the applicant's liquefaction plant provided significant benefits to the local economy; (2) exportation of LNG would help to improve the United State's balance of payments with Pacific Rim countries during the term of the proposed blanket authorization; and (3) there was no significant environmental impact. See *id.* at 57-58. See also *Cheniere Marketing, Inc., Order Granting Authorization to Export Liquefied Natural Gas*, FE Docket No. 08-77-LNG, DOE/FE Order No. 2651, at 14 (June 8, 2009) (explaining that, consistent with the *Policy Guidelines* and applicable precedent, the DOE considers the potential effects of proposed exports on aspects of the public interest other than domestic need, including international effects and the environment) (hereinafter *CMI, DOE/FE Order No 2651*).

⁴² While the *Policy Guidelines* deal specifically with imports, the principles are applicable to exports as well. See *Phillips Alaska Natural Gas Corp. and Marathon Oil Co., Order Extending Authorization to Export Liquefied Natural Gas from Alaska*, FE Docket No. 96-99-LNG, DOE/FE Order No. 1473, at 14 (Apr. 2, 1999) (hereinafter *Phillips Alaska, DOE/FE Order No. 1473*).

arrangements. The thrust of this policy is to allow the commercial parties to structure more freely their trade arrangements, tailoring them to the markets served.⁴³

The *Policy Guidelines* also provide some insight into the public interest standard for evaluating potential import and export applications. In this regard, they state that the “policy cornerstone of the public interest standard is competition.”⁴⁴ Competitive import/export arrangements are therefore an essential element of the public interest and, so long as the sales agreements are set in terms that are consistent with market demands, they should be considered to “largely” meet the public interest standard.⁴⁵ The guidelines continue by saying that “[t]his policy approach presumes that buyers and sellers, if allowed to negotiate free of constraining governmental limits, will construct competitive import [and export] agreements that will be responsive to market forces over time.”⁴⁶ To date, FE orders granting authorization to export natural gas continue to reflect and reinforce the principles laid out in the *Policy Guidelines* by emphasizing the concepts of free trade and limited government involvement.⁴⁷

VII. **PUBLIC INTEREST ANALYSIS**

The ST LNG Project has been proposed, in part, due to the markedly improved outlook for domestic natural gas reserves and production. Improved drilling techniques and extraction

⁴³ *Policy Guidelines* at 6685. The macroeconomic analysis provided in the NERA Report reinforces DOE/FE’s continued reliance on the *Policy Guidelines*’ free market approach. In concluding that LNG exports will have net economic benefits in spite of higher domestic natural gas prices, NERA states “[t]his is exactly the outcome that economic theory describes when barriers to trade are removed.” NERA Report at 1.

⁴⁴ *Id.* at 6687.

⁴⁵ *Id.*

⁴⁶ *Id.* (with reference to “exports” inserted to reflect DOE policy that “the principles are applicable to exports as well” as enunciated in *Phillips Alaska, DOE/FE Order No. 1473*, at 14).

⁴⁷ *See, e.g., Sabine Pass, DOE/FE Order No. 2961*, at 29 (referencing DOE’s policy of promoting competition in the marketplace by allowing commercial parties to freely negotiate their own trade arrangements); *Phillips Alaska, DOE/FE Order No. 1473*, at 51 (stating that the public interest is generally best served by a free trade policy); *ConocoPhillips, DOE/FE Order No. 2500*, at 44-45 (stating that DOE’s general policy is to minimize federal government involvement and allow commercial parties to freely negotiate their own trade arrangements).

technologies have contributed to the rapid growth in new supplies from unconventional gas-bearing formations across the U.S. and have been utilized to enhance production in some conventional fields. Such developments have completely changed the complexion of the U.S. natural gas industry and radically expanded the resource base.

LNG exports via the ST LNG Project represents a market-driven path toward deploying the country's vast energy reserves in a manner that will meaningfully contribute to the public interest through a variety of benefits, including:

- More jobs⁴⁸ and personal income, greater tax revenues, and increased economic activity;
- Improved U.S. balance of payments (by between \$3.7 billion and \$6 billion annually) through the exportation of natural gas and the displacement of imports of other petroleum liquids;
- Enhanced national security, as a result of the U.S.'s larger role in international energy markets, assistance provided to our allies, and reduced U.S. dependency on foreign oil through domestic oil and natural gas production;⁴⁹
- Better opportunities to market U.S. products and services abroad, as a result of new competitively priced gas supplies introduced into world markets leading to improved economies among the U.S.'s trading partners;
- Increased economic trade and closer ties with foreign trading partners and hemispheric allies, while displacing environmentally damaging fuels in those countries;
- Increased production capacity able to better adjust to varying domestic demand scenarios; and
- Dampened volatility in domestic natural gas prices.

⁴⁸ As discussed in the Perryman Report supporting this Application, Pangea asserts that the ST LNG Project will spur substantial job creation. The statement found at page 2 of the NERA Report ("LNG exports are not likely to affect the overall level of employment in the U.S.") should not be read to contradict this. NERA had as a base assumption "full employment" within the U.S. economy. NERA Report at 103. Therefore, NERA could only use its model to assess shifts in employment, which were found to be within industry norms. *Id.* at 2.

⁴⁹ John Deutch, *The U.S. Natural-Gas Boom Will Transform the World*, WALL ST. J. (Aug. 14, 2012), <http://online.wsj.com/article/SB10001424052702303343404577514622469426012.html>.

Pangea submits that these benefits, and others discussed in this Application, demonstrate that Pangea's export proposal is not inconsistent with the public interest. That stance is now buttressed by the independent NERA Report, which key findings related to the macroeconomic impacts of LNG exports are overwhelmingly positive. For example, NERA found that "[a]ll export scenarios are welfare-improving for U.S. consumers. The welfare improvement is the largest under the high export scenarios even though the price impacts are also the largest."⁵⁰ With regard to gross domestic product ("GDP"), NERA found that "[i]n the short run, the GDP impacts are positive as the economy benefits from investment in the liquefaction process, export revenues, resource income, and additional wealth transfer in the form of tolling charges. In the long run, GDP impacts are smaller but remain positive because of higher resource income."⁵¹ NERA also found that results related to aggregate consumption "suggest that the wealth transfer from exports of LNG provides net positive income for the consumers to spend after taking into account potential decreases in capital and wage income from reduced input."⁵²

A. Analysis Of Domestic Need For Gas To Be Exported

As discussed below, the domestic supply base of natural gas is sufficient to meet future domestic demand and the proposed ST LNG Project's export volumes over the term of the authorization. In this regard, proved U.S. reserves of dry natural gas have increased by 93.5 Tcf (44%) between 2006 and 2010.⁵³ However, as illustrated by the following graph, consumption has grown at a far slower rate:

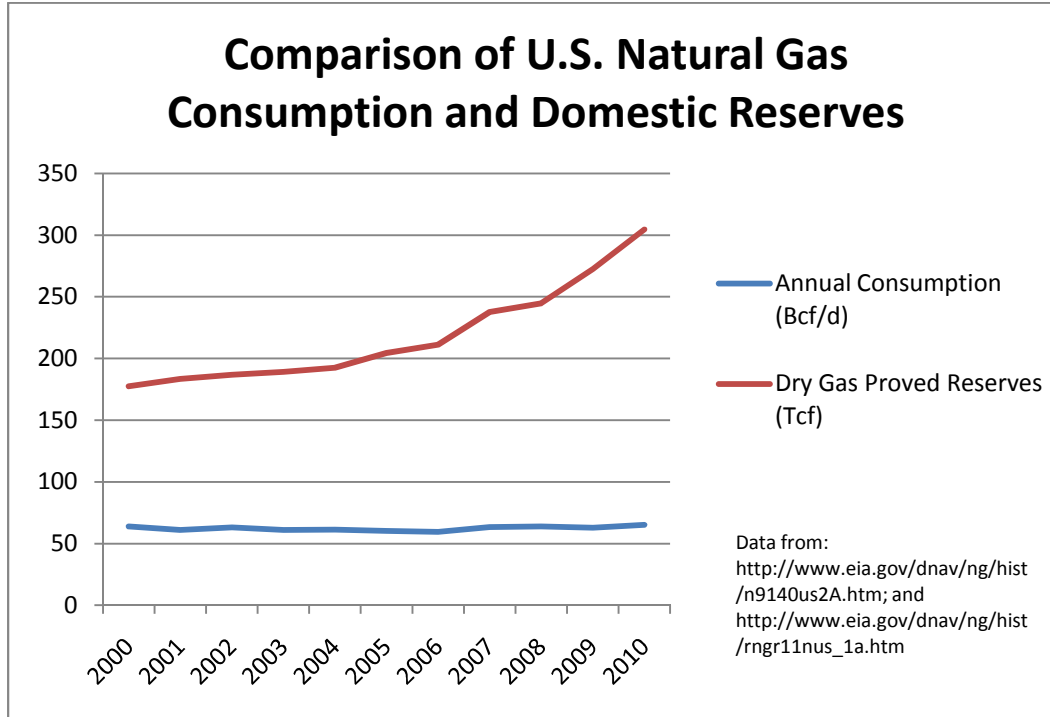
⁵⁰ NERA Report at 55.

⁵¹ *Id.* at 56.

⁵² *Id.* at 57.

⁵³ EIA, *Natural Gas Reserves Summary as of Dec. 31, 2010* (Aug. 2, 2012), http://www.eia.gov/dnav/ng/ng_enr_sum_dcu_nus_a.htm.

Figure 2: U.S. Natural Gas Consumption Compared to Proved Reserves



In concert with the increases in proved reserves, drilling productivity and extraction technology improvements have enabled rapid and economical, growth in the overall U.S. natural gas production capabilities, thereby increasing the economically recoverable reserves, as well as the technical recoverable reserves.⁵⁴

As a result, U.S. natural gas prices have significantly decreased. The monthly average Henry Hub price for natural gas fell from over \$10.00 per MMBtu in late 2005 to \$3.32 per MMBtu in late 2012.⁵⁵ In the *AEO 2012* Reference case, the EIA projects that the annual average wellhead price for natural gas will remain under \$5.00 per MMBtu through at least

⁵⁴ B&V Report at 9-12.

⁵⁵ EIA, *Henry Hub Gulf Coast Natural Gas Spot Price* (Dec. 12, 2012), <http://www.eia.gov/dnav/ng/hist/rngwhhdm.htm> (hereinafter *Henry Hub*). In April 2012, the monthly average Henry Hub price for natural gas was as low as \$1.95 per MMBtu. *Id.*

2025, and rise to only \$6.48 by 2035.⁵⁶ Prices for natural gas in the U.S. market are now substantially below those of most other major gas-consuming countries.⁵⁷ While U.S. gas prices are now similar to or less than they were a decade ago,⁵⁸ prices for LNG in other major gas consuming countries have increased sharply over the past decade.⁵⁹ The result is that domestic gas can be liquefied and exported to foreign markets on a very competitive basis. As discussed below, such exports can be expected to have only a nominal effect on U.S. prices.

1. *National Supply - Overview*

In recent years, the U.S.'s total natural gas recoverable resource base has increased. In 2012, the EIA estimated technically recoverable natural gas resources in the U.S. to be 2,203 Tcf.⁶⁰ The EIA estimate compares to the 2011 assessment of the Potential Gas Committee of the Colorado School of Mines ("Committee"), estimating that the U.S.'s recoverable natural gas supply is 2,170 Tcf.⁶¹ The Committee considered this amount to be the highest resource

⁵⁶ See AEO 2012 at 131.

⁵⁷ See Matthew Brown, *Gas Golden Age Darkens in Europe on U.S. Coal: Energy Markets*, BLOOMBERG (Oct. 30, 2012), <http://www.bloomberg.com/news/2012-10-31/gas-golden-age-darkens-in-europe-on-u-s-coal-energy-markets.html> (noting that gas for delivery on The Netherlands' Title Transfer Facility, the mainland European benchmark, traded at €27.50 (\$35.65) a megawatt-hour, the equivalent of \$10.43 per million British thermal units, compared to \$3.69 per million Btu for front-month fuel in the U.S.) (hereinafter *Brown*).

⁵⁸ See EIA, *Henry Hub*, *supra* note 55 (referencing a monthly average Henry Hub price of \$4.13 per MMBtu in October 2002).

⁵⁹ See *Brown*, *supra* note 57 (noting that, in late October 2012, gas traded at more than double the price from four (4) years ago in Europe, reducing the competitiveness of major European industrial users); see also Dan Milmo, *Nuclear Crisis Forces Up UK Gas Prices*, THE GUARDIAN (Mar. 14, 2011), <http://www.guardian.co.uk/business/2011/mar/14/japan-disaster-lng-gas-uk> (following Japan's Fukushima nuclear power plant incident, prices for LNG delivery to the UK rose by 6% per therm.); see also Lindsay Wright, *Pipeline Politics: Russia's Natural Gas Diplomacy*, PIPELINE & GAS J. (Aug. 2009), <http://www.pipelineandgasjournal.com/pipeline-politics-russia%E2%80%99s-natural-gas-diplomacy?page=show> (noting price increases due to politically motivated disruptions in gas transit to parts of Europe from Russia).

⁶⁰ See EIA, *Assumptions to the Annual Energy Outlook 2012*, Table 9.2 (Aug. 2, 2012), <http://www.eia.gov/forecasts/aeo/assumptions>.

⁶¹ See Potential Gas Committee, *Potential Supply of Natural Gas in the United States: Report of the Potential Gas Committee*, Dec. 31, 2010 (2011), available at <http://www.narucmeetings.org/Presentations/PGC%20NARUC%20Committee%20on%20Gas%20July%2018,%20>

evaluation in the group's 46-year history and enough to satisfy 90 years of domestic market needs, based on 2010 consumption.⁶²

According to the July 2011 report titled "Shale Gas and U.S. National Security" by the James A. Baker III Institute for Public Policy at Rice University, North America has a mean technical recoverable shale gas resources of 937 Tcf, with 637 Tcf of that located in the U.S.⁶³ This report indicates that break-even prices for some of the more prolific unconventional supply basins in the U.S. are as low as \$3, with a large majority of the resources accessible at below \$6, which is a significant cost decrease compared to the end of the prior decade.⁶⁴ Further, in a July 2011 report commissioned by the EIA, an independent consultant estimates U.S. onshore lower 48 states shale gas resources to be 750 Tcf.⁶⁵

With copious reserves available, natural gas production is poised to rise with increases in demand. In 2012, the EIA revised its previous projection of onshore shale gas production for the lower 48 states in 2015 from 7.20 Tcf to 8.24 Tcf, and its projection for 2035 from 12.25 Tcf to 13.63 Tcf.⁶⁶ The EIA also estimates that U.S. dry natural gas production was 1.97 Tcf in

2011.pdf; *see also* Massachusetts Institute of Technology, *The Future of Natural Gas*, at 24 (Fig. 2.8) (2011), available at http://web.mit.edu/mitei/research/studies/documents/natural-gas-2011/NaturalGas_Report.pdf (estimating that the U.S. has a mean remaining resource base of approximately 2,150 Tcf of natural gas, including approximately 1,000 Tcf of recoverable shale gas resources (approximately 400 Tcf of this could be economically developed with a gas price at or below \$6/MMBtu at the wellhead)).

⁶² See Press Release, Potential Gas Committee, *Potential Gas Committee Reports Unprecedented Increase In Magnitude of U.S. Natural Gas Resource Base*, at 2 (Apr. 27, 2011), <http://potentialgas.org/press-release>.

⁶³ James A. Baker III Institute for Public Policy, *Shale Gas and U.S. National Security*, at 23-24 (July 2011), <http://www.bakerinstitute.org/publications/EF-pub-DOEShaleGas-07192011.pdf>.

⁶⁴ The break-even price is the average price needed for development of up to 60% of the identified technical recoverable resource. *Id.*

⁶⁵ EIA, *Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays*, at 5 (July 2011), <http://www.eia.gov/analysis/studies/usshalegas/pdf/usshaleplays.pdf>. The 750 Tcf of shale gas resources in this report is a subset of the estimated 862 Tcf of onshore lower 48 states shale natural gas technically recoverable resources in the EIA's *Annual Energy Outlook 2011* (hereinafter *AEO 2011*).

⁶⁶ *AEO 2012* at Table A-14; *AEO 2011* at Table A-14.

September 2012, increasing from 1.91 Tcf in dry natural gas production in September 2011.⁶⁷ In *AEO 2012*, the EIA indicates that U.S. natural gas production is projected to increase by one percent (1%) per year, to 27.9 Tcf in 2035, more than enough to meet domestic needs for consumption.⁶⁸ The EIA states that cumulative production of dry natural gas from 2011 through 2035 in the AEO 2013 Reference case is about eight percent (8%) higher than in AEO 2012.⁶⁹ After years of decline, annual offshore natural gas production is expected to start growing in 2015, eventually increasing to 2.8 Tcf in 2035.⁷⁰ As a result of the growth in production, U.S. natural gas production will exceed consumption early in the next decade, allowing the U.S. to transition from a net importer of natural gas to a net exporter.⁷¹

The EIA's projections reflect, among other things, strong growth in domestic natural gas production and reduced pipeline imports.⁷² Much of the growth in natural gas production results from the application of recent technological advances and continued drilling activity.⁷³ In particular, improved drilling efficiencies have resulted in a greater number of wells being drilled more quickly, with fewer rigs and higher initial production rates.⁷⁴

These studies and reports indicate that the U.S. has an inventory of recoverable natural gas resources sufficient to last beyond any practicable planning horizon. Indeed, in his 2012 State of the Union Address, President Obama stated: "We have a supply of natural gas that can

⁶⁷ EIA, *Natural Gas Gross Withdrawals and Production* (Nov. 30, 2012), http://www.eia.gov/dnav/ng/ng_prod_sum_dcunus_m.htm.

⁶⁸ *AEO 2012* at 92.

⁶⁹ *AEO 2013 Early Release* at 10.

⁷⁰ *Id.*

⁷¹ *AEO 2012* at 3.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *AEO 2013 Early Release* at 5.

last America nearly 100 years.”⁷⁵ This inventory is expected to continue growing as further advancements in drilling technology are deployed to exploit additional shale gas development opportunities.⁷⁶

2. *Regional Supply*

As described in the B&V Report, the proposed ST LNG Project will be located in an area with robust access to natural gas supplies available through the highly integrated and well developed interstate and intrastate natural gas pipeline system.

As noted in the B&V Report:

Access to multiple pipelines with an estimated throughput of 4.4 Bcf/d will allow the ST LNG Project to receive gas from multiple supply sources. In addition to the Eagle Ford shale, which is in close proximity to the ST LNG Project, the planned pipeline interconnects offer access to the Marcellus, Haynesville, and Woodford shales as well as conventional Gulf Coast production either directly or via displacement of flows downstream of the ST LNG Project. The ST LNG Project will have the ability to diversify its sourcing of natural gas across the various supply basins it will have access to via the proposed pipeline interconnects.⁷⁷

The large number of natural gas pipelines to be crossed by the ST Pipeline over its relatively short length reflects the natural gas transportation industry’s capability to build and expand the capacity of pipeline infrastructure as needed to ensure adequate regional supplies.

Extensive local natural gas reserves and production lend additional support to the proposition that the relevant regional natural gas supply is adequate to meet both the domestic needs of the area and the demand for exported natural gas. As the B&V Report states:

⁷⁵ *President Obama’s State of the Union Address*, N.Y. TIMES (Jan. 24, 2012), <http://www.nytimes.com/2012/01/25/us/politics/state-of-the-union-2012-transcript.html?pagewanted=all>.

⁷⁶ See *AEO 2013 Early Release* at 5.

⁷⁷ B&V Report at 8.

Although Pangea’s customers will determine the source(s) of natural gas actually used as feed gas for the ST LNG Project, it is clear that there are ample resources available in the vicinity of the project. For example, the Eagle Ford Shale, along with its associated gas-bearing strata within the Maverick Basin, is believed to offer ample recoverable resources to supply the ST LNG Project for many years to come. Recent estimates of recoverable natural gas can significantly vary by estimator, ... but support the case for a large amount of recoverable gas within the Eagle Ford shale, ranging from 21 to 52 Tcf, if not more. A probabilistic resource assessment of the Eagle Ford oil and gas shale zones, as made by the U.S. Geological Survey in 2010, estimated the minimum volume of technically recoverable gas as 24 Tcf and with statistically plausible upper limits as high as 94 Tcf...[a]t 2012 production rates (about 250-300 Bcf per year), such a level of recoverable resources would support continued Eagle Ford production for at least an additional 75-100 years.

Although the Eagle Ford oil and gas shales are the most widely publicized producing units, other gas-bearing sources co-exist with Eagle Ford within the Maverick and Gulf Coast Basins any of which could supply the ST LNG Project. For example, the U.S. Geological Survey’s 2010 resource assessment also included a probabilistic estimate of 3.4-17.8 Tcf of gas technically recoverable from the Pearsall Shale. The Pearsall Shale is not an oil play and likely is much poorer in natural gas liquids than Eagle Ford. Pearsall also lies deeper than Eagle Ford and therefore is unlikely to be aggressively produced until economics improve. Even so, it represents a significant supplemental source of dry gas in the same geographic locale as Eagle Ford.⁷⁸

According to the B&V Report, “because of their proximity to the ST LNG Project, the South Texas producing regions are logical sources of gas to serve the ST LNG Project.”⁷⁹ However, this does not imply that, but for the ST LNG Project, the resources in this area would not be produced. Indeed, as the B&V Report describes, “the Eagle Ford Shale [has already] experienced a production boom along with other North American shale basins in recent years.”⁸⁰

⁷⁸ *Id.* at 12-13 (footnote omitted).

⁷⁹ *Id.* at 13.

⁸⁰ *Id.* at 12.

3. National Natural Gas Demand

Over the past decade, the U.S. has experienced little growth in the demand for natural gas in the U.S.⁸¹ In 2012, the EIA estimated long-term annual U.S. consumption growth of only 0.4%, with consumption expected to reach 26.6 Tcf in 2035 (compared to 22.8 Tcf of actual demand in 2009).⁸² The EIA most recently estimated that natural gas consumption would rise from 24.4 Tcf in 2011 to 28.7 Tcf in 2035, reflecting an increase of 2.1 Tcf from the *AEO 2012* Reference case.⁸³ The table below presents a comparison of actual consumption and prices in 2011 and forecasted demand and prices in the year 2020, based on information presented in the *AEO 2012*.⁸⁴

Table 1: Present and Future Demand and Pricing (AEO 2012)		
	2011	2020
Natural Gas Demand (Bcf/day)	67.2	69.8
Henry Hub Spot Price (\$/MMBtu) ⁸⁵	3.94	4.58
Average Lower 48 Wellhead Price (\$/MMBtu)	3.72	4.10

As discussed in Section VII.A.1. above, the EIA and academic and industry experts estimate that the U.S. has between 2,170 and 2,203 Tcf of recoverable natural gas resources.

⁸¹ In 2011, natural gas consumption was approximately 4.2% higher than in 2000. See EIA, *Natural Gas Consumption by End Use* (Nov. 30, 2012), http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

⁸² *AEO 2012* at 62.

⁸³ *AEO 2013* at 8.

⁸⁴ *AEO 2012* at Table A13. In addition, 2010 volumes and prices were updated to 2011 actual volumes and prices, based on EIA, *Natural Gas Summary*, http://www.eia.gov/dnav/ng_sum_lsum_dcu_nus_a.htm.

⁸⁵ A key update in *AEO 2013 Early Release* is a shift from using regional natural gas wellhead prices to using representative regional natural gas spot prices as the basis of the natural gas supply price. Due to this change, the methodology for estimating the Henry Hub price was revised. Previously, the Henry Hub prices were based on the average national wellhead price and its historical relationship with the Henry Hub price. The Henry Hub spot prices in the AEO 2013 Reference case are based on natural gas prices that balance the supply and demand for Gulf Coast natural gas, which contributes to a lower Henry Hub price projection in AEO 2013 than in AEO 2012. Henry Hub spot natural gas prices remain below \$4 per million Btu (2011 dollars) through 2018, reach \$5.40 per million Btu in 2030 and \$7.83 per million Btu in 2040, in the AEO 2013 Reference case. See *AEO 2013 Early Release* at 3 and 5.

Even at 100% utilization, the ST LNG Project would result in maximum natural gas requirements, inclusive of fuel used at the project and losses associated with the project and its affiliated pipeline, of 10.96 Tcf over the 25-year term of the requested authorization.⁸⁶ This represents only 0.498% to 0.505% of total estimated recoverable U.S. natural gas resources.

4. *Supply-Demand Balance Demonstrates the Lack of National and Regional Need*

As discussed in Section VII.A.3. above, the enormous available domestic supply of natural gas dwarfs current U.S. demand and, even under the extreme case of operating at 100% utilization, the natural gas to be exported from the ST LNG Project is only on the order of one-half (1/2) of one percent (1%) of the available resources. The current low prices of natural gas are a consequence of a buyer's market owing to plentiful supply and limited domestic needs. The interest in exporting gas from the U.S. despite the billions of dollars of investment needed to develop a single LNG export terminal is a reflection of these market conditions.

As more fully described in the B&V Report, the issue is not merely one of volume, but also of price impact.⁸⁷ The B&V Report's modeling approach accounts for this supply-demand dynamic using RBAC Inc's GPCMTM model. The GPCMTM model employs an advanced algorithm to solve for optimal equilibrium price and quantities by balancing multiple demand and supply nodes in the market. As a network model, distinct nodes represent production regions, pipelines, storage facilities, and end-use customer groups.⁸⁸

⁸⁶ This number was calculated by multiplying 398.5 Bcf/y times 25 years and increasing the result by 10% to allow for losses and gas to operate the ST LNG Project.

⁸⁷ See B&V Report at 20-23.

⁸⁸ *Id.* at 15.

B&V utilized a basin-by-basin, play-by-play approach to assess the availability and cost of major supply sources in North America.⁸⁹ For the major shale plays that will contribute to the majority of production growth, B&V utilized in-house geoscientists and geologists to assess the resource base, technology trends in drilling and natural gas liquids content.⁹⁰ B&V also monitors trends in finding and development costs, well type curves, estimated ultimate recovery, and tax and policy changes in order to assess the relative production costs across all shales that will determine the dynamics of production growth based on competitive cost advantages.⁹¹

5. *Price Impacts – Natural Gas*

The B&V Report commissioned by Pangea in conjunction with this Application considers price impacts related to the export of natural gas from the U.S. via the ST LNG Project. In particular, the B&V Report explores four (4) scenarios. Each scenario includes natural gas demand associated with LNG exports.⁹² The lowest export scenario, 2.5 Bcf/d titled “Base Case,” modeled the price of natural gas on both the regional and national levels in circumstances where LNG exports from a new terminal in British Columbia and Cheniere’s Sabine Pass LNG export project add up to 2.5 Bcf/d of natural gas demand to other demand for natural gas in the U.S. domestic market. The Base Case did not include any exports from the ST LNG Project. To test the market price impact of the ST LNG Project, B&V modeled a second scenario (titled “With ST LNG Project Exports”) that used the natural gas demand assumed in the Base Case, plus an additional 1.2 Bcf/d of natural gas demand from the ST LNG Project

⁸⁹ *Id.*

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² LNG export projects typically create a demand for natural gas that exceeds the amount of natural gas actually exported in the form of LNG. This is due to the projects’ use of natural gas as a fuel to operate the projects and other losses. Pangea has assumed such additional demand equals 10% of the amount to be exported.

starting in April 2018. To examine whether the impact of the ST LNG Project on natural gas market prices varied substantially with changes in the overall level of LNG exports, B&V modeled two (2) additional scenarios: the third scenario, titled “High LNG Exports,” added 2.8 Bcf/d of natural gas demand associated with additional LNG exports from the Gulf Coast region over and above the demand included in the Base Case; and the fourth scenario, titled “High LNG Exports with ST LNG Project Exports,” added another 1.2 Bcf/d of demand to the High LNG Exports case in order to simulate the addition of exports from the ST LNG Project over and above the exports already included within the High LNG Exports case.⁹³ For reporting purposes, each of the four (4) scenarios was subdivided into two (2) periods: 2018-2027 and 2028-2042, allowing near term impacts to be contrasted with long term impacts. While the natural gas demand associated with LNG exports was fixed for each of the scenarios, other sources of demand and sources of supply were determined by RBAC Inc.’s GPCMTM model, which dynamically balanced demand and supply.⁹⁴

The potential impact of LNG exports on U.S. natural gas prices is set forth in Tables 2, 3 and 5-12 of the B&V Report. A selection of representative “Base Case” and “With ST LNG Project Exports”⁹⁵ results from those tables is set forth below:

⁹³ *Id.* at 1-2.

⁹⁴ *Id.* at 15.

⁹⁵ The “With ST LNG Project Exports” cases includes the impact of the aggregate natural gas demand associated with the Base Case and the ST LNG Project.

Table 2: Impact of ST LNG Project Exports on Base Exports Case				
Export Case	Agua Dulce Hub	Henry Hub	Dominion South Point	Waha
Base Case (2018-2027)	Avg. Price \$5.93/MMBtu	Avg. Price \$5.93/MMBtu	Avg. Price \$5.83/MMBtu	Avg. Price \$5.60/MMBtu
ST LNG Case (2018-2027)	Avg. Price \$6.06/MMBtu (2.2% increase)	Avg. Price \$6.05/MMBtu (2.0% increase)	Avg. Price \$5.93/MMBtu (1.7% increase)	Avg. Price \$5.68/MMBtu (1.5% increase)
Base Case (2028-2042)	Avg. Price \$8.45/MMBtu	Avg. Price \$8.36/MMBtu	Avg. Price \$7.68/MMBtu	Avg. Price \$7.30/MMBtu
ST LNG Case (2028-2042)	Avg. Price \$8.65/MMBtu (2.4% increase)	Avg. Price \$8.54/MMBtu (2.1% increase)	Avg. Price \$7.74/MMBtu (0.8% increase)	Avg. Price \$7.38/MMBtu (1.1% increase)

Interestingly, the B&V High LNG Export Case reveals that the addition of exports from the ST LNG Project in the high export case actually has a smaller impact on prices in both absolute and relative terms than when the ST LNG Project exports are added to the Base Case. Representative results from the B&V Report showing this effect are summarized below:

Table 3: Impact of ST LNG Project Exports on High Exports Case				
Export Case	Agua Dulce Hub	Henry Hub	Dominion South Point	Waha
High Case (2018-2027)	Avg. Price \$6.18/MMBtu	Avg. Price \$6.19/MMBtu	Avg. Price \$6.05/MMBtu	Avg. Price \$5.83/MMBtu
High + ST LNG Case (2018-2027)	Avg. Price \$6.30/MMBtu (2.0% increase)	Avg. Price \$6.30/MMBtu (1.7% increase)	Avg. Price \$6.13/MMBtu (1.3% increase)	Avg. Price \$5.90/MMBtu (1.3% increase)
High Case (2028-2042)	Avg. Price \$8.79/MMBtu	Avg. Price \$8.71/MMBtu	Avg. Price \$7.82/MMBtu	Avg. Price \$7.54/MMBtu
High + ST LNG Case (2028-2042)	Avg. Price \$8.95/MMBtu (1.8% increase)	Avg. Price \$8.85/MMBtu (1.6% increase)	Avg. Price \$7.87/MMBtu (0.5% increase)	Avg. Price \$7.60/MMBtu (0.8% increase)

As shown in Tables 2, 3 and 5-12 of the B&V Report, the maximum locational price increase identified as a result of the addition of the ST LNG Project plus an additional 4.1 Bcf/d of export-related demand from other terminals was 20 cents per MMBtu (at Agua Dulce Hub and Katy). This change is far smaller than that frequently experienced by the natural gas industry

due to other causes.⁹⁶ The B&V Report results are also generally consistent with the notion that the price impacts of an export terminal tend to diminish with distance from the terminal. For example, the B&V model estimated price increases at Chicago, California (PG&E Citygate) and Transco Zone 6 (Non-NY) in the “With ST LNG Exports Case” of 1.6%, 1.2% and 1.6%, respectively, for the early years and 0.9%, 0.6% and 1.3%, respectively, for the out years.⁹⁷ Thus, price increases in markets associated with major metropolitan areas may be as little as only about a quarter of the modest increases project for the Agua Dulce Hub.

Pangea believes these price impacts are very conservative because they are driven in significant part by the assumption used by B&V for growth in domestic gas consumption (1.42% per year),⁹⁸ which is much higher than the 0.4% per year figure adopted by the EIA, as discussed previously at page 28 of this Application. If EIA’s projection proves more accurate, then the estimated price increase would be even smaller than those presented here.

B. Other Public Interest Considerations

1. Promote Long-Term Stability in Natural Gas Markets

Lower U.S. natural gas prices have led to decreased capital spending on dry natural gas drilling and development activities.⁹⁹ Exporting natural gas would create increased demand for

⁹⁶ For example, as reported by the EIA, the average monthly Henry Hub spot price for natural gas in 2011 ranged from \$3.17 to \$4.54 per MMBtu (a change of \$1.37 per MMBtu) and the average January Henry Hub spot price during the period 2008 to 2012 ranged from \$2.67 to \$7.99 per MMBtu (a change of \$5.32 per MMBtu). *See* EIA, *Henry Hub*, *supra* note 55.

⁹⁷ B&V Report at 23.

⁹⁸ *Id.* at 16.

⁹⁹ *See, e.g.,* Marcus V. McGregor, *The American Shale Gas Revolutions: Fundamental Winners and Losers*, ASSET MANAGEMENT VIEWPOINT, Vol. 16, No. 2 (Apr. 2012), https://www.conning.com/uploadedFiles/Asset_Management/Point_of_View/Viewpoint/04-2012%20Shale%20Gas%20Revolution%20FINAL.pdf (noting: “Operators have been allocating more capital to exploration and production of liquids in order to mitigate the recent decline in natural gas spot prices ...”); *see also* *Chesapeake Energy December 2012 Investor Presentation*, at 11, available at http://www.chk.com/investors/documents/latest_ir_presentation.pdf (noting that, in response to low natural gas prices, Chesapeake Energy has been aggressively shifting its capital expenditures to liquid-rich plays).

domestically produced gas and, as noted above, contribute to a small increase in domestic natural gas prices. Both of these factors would help encourage investment and thereby help to stabilize the natural gas industry.¹⁰⁰ Of broader importance is the stabilizing effect increased exports would have on both the price and availability of natural gas for domestic uses. The stabilizing effects would stem from multiple causes.

First, simply by increasing the size and diversity of the demand for natural gas to include consumers in other nations, the volatility in demand decreases, which will contribute to more stable prices in the U.S. This basic economic concept was well explained in a 2007 paper by Ian Down, Associate Professor of Political Science at the University of Tennessee.¹⁰¹ In that paper, Dr. Down states:

The greater the number of buyers and sellers the greater the likelihood that shocks emanating from any one source will be offset by equally sized opposite shocks emanating from another source. Moreover, the greater the number of market participants the smaller will be the contribution to total volatility of any single participant, *ceteris paribus*. Accordingly, larger, deeper markets will display less volatility than smaller, shallower markets. The greater size and depth of international markets relative to the markets of any single national economy implies the international economy is less volatile than any of its constituent national components. Thus, greater trade openness entails a greater degree of domestic production and consumption oriented towards larger, deeper, more stable international markets and away from smaller, shallower, more volatile domestic markets.¹⁰²

¹⁰⁰ In the February 2012 issue (Vol. 233, No. 2) of *WORLD OIL ONLINE*, James C. West, Anthony Walker, Zachary Sadow and Rachel Nabatoan of Barclays Capital reported on the results of a survey of 351 oil and gas operating companies: “[r]oughly 27% of companies surveyed plan on increasing spending [on natural gas exploration and production activities] if natural gas prices average \$4.50/MMbtu in 2012, and 70% would do so if they average \$5.00/MMbtu. Nearly half of surveyed companies would cut back spending if gas averaged \$3.50/MMbtu, while \$3.00/MMbtu was the most popular threshold for companies to reduce budgets.” <http://www.worldoil.com/February-2012-EP-spending-to-reach-record-600-billion.html>.

¹⁰¹ See Ian Down, *Trade Openness, Country Size and Economic Volatility: The Compensation Hypothesis Revisited*, BUSINESS AND POLITICS, Vol. 9, No. 2 (2007), http://www.unc.edu/depts/europe/conferences/tgsw/iandown-trade_openness.pdf.

¹⁰² *Id.* at 5.

Second, a greater domestic production base and upgraded gas transmission capabilities present an opportunity for rapid, voluntary diversion of gas supply to domestic purposes should domestic demand change rapidly. For example, consider the possibilities if the U.S. were to have a catastrophic event that broadly impacted a large segment of the U.S. electric generating industry in a manner similar to what Japan has experienced recently with regard to its nuclear generation. In such a situation, there could be a sudden demand for increased natural gas fired generation that could only be immediately satisfied if sufficient natural gas production and transportation infrastructure were already in place. A U.S. natural gas industry that had already expanded production and transportation infrastructure to serve the export market would be in a position to respond quickly through a global least cost solution. Subject to jurisdictional and commercial requirements, exporters could choose to voluntarily cancel export shipments and divert gas for use in domestic natural gas generating facilities. In contrast, a smaller U.S. natural gas industry with infrastructure only adequate to serve the pre-existing domestic demand would not have the option to redeploy foreign bound gas, and production and transportation capabilities would be more limited. Simply producing more gas immediately would not be an option, and trying to expedite the drilling of new wells on an emergency basis would increase the level of environmental risk. The only immediately available course of action would involve establishing a new short-term equilibrium in a domestic-only market with fewer options, leading to much higher prices and a greater potential for scarcity of both natural gas and electricity.

2. *Benefits to Local, Regional and U.S. Economies*

In the attached Perryman Report, the economic benefits of the ST LNG Project are quantified for the Corpus Christi MSA. The Perryman Report recognizes: “Other areas beyond Corpus Christi will also see economic gains stemming from the project. The Perryman Group

has performed multiple analyses of liquefaction projects located in different parts of the state and has consistently found that the benefits for the United States as a whole exceed those for the primary impact area by a significant margin.”¹⁰³ Given the uniform trend of greater benefits for areas outside the primary impact area, Pangea has elected to focus its evaluation on the impacts of the ST LNG Project within the primary impact area. However, a summary analysis of benefits to the U.S. as a whole also was performed by the Perryman Group. The results of both the local and national analysis follow.

a. *Construction Benefits*

The ST LNG Project will represent a remarkable source of employment, economic activity and tax revenues to the local, regional and national economies. The Perryman Report estimates gains in business activity for the primary impact area stemming from construction and related outlays to be \$1.4 billion in gross product and 17,230 person-years of employment.¹⁰⁴ On average, each year of employment would provide about \$57,000 of income per worker.¹⁰⁵ Federal, state and local fiscal (*e.g.*, tax) benefits related to business activity in the Corpus Christi MSA stemming from construction of the ST LNG Project amounts to more than \$346 million.¹⁰⁶ Looking more broadly at the U.S. as a whole, the Perryman Report estimates the gain in business activity, due to spending for the project during the preoperational and construction period, of approximately \$2.1 billion in gross product and 25,300 person-years of employment.¹⁰⁷

¹⁰³ Perryman Report at 6.

¹⁰⁴ *Id.* at 2 and 11.

¹⁰⁵ Total Personal Income (\$988.7 million)/Employment (17,230 person-years) = \$57,382.47/job. *See id.* at 11. This is approximately equal to the wages and benefits per job, but slightly overestimates the actual amount due to rents and interest being included in the category of personal income.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.* at 2.

b. *Operational Benefits*

Following completion of construction, the ST LNG Project would continue to provide considerable economic benefits. The Perryman Report estimates that the economic benefits to the Corpus Christi MSA, of ongoing operations of the ST LNG Project during Phase 1 operations, will include \$75.5 million in gross product each year and 670 permanent jobs, growing to \$151.0 million in yearly gross product and 1,340 permanent jobs upon Phase 2 entering operations.¹⁰⁸ The Phase 1 estimates were made by simply halving the total benefits of the entire ST LNG Project as modeled by The Perryman Group. This results in a conservative (*i.e.*, underestimated) quantification of the Phase 1 estimates because due to economies of scale, and work and facilities shared between the two phases, more than half of the total ST LNG Project and ST Pipeline cost and half of the project work effort will be expended in the course of Phase 1. The jobs associated with operation of the ST LNG Project will be of even higher quality, in an economic sense, than those created during the construction phase, with average annual wages and benefits per job of close to \$63,000.¹⁰⁹ Fiscal benefits to government entities as a result of the ST LNG Project will total \$15.2 million each year during Phase 1 and \$30.4 million each year after Phase 2 starts operating.¹¹⁰ Considering the U.S. as a whole, once the facility is operational, ongoing gains in business activity were estimated to be approximately \$236.9 million in gross product and 2,060 permanent jobs.¹¹¹

¹⁰⁸ *Id.* at 12.

¹⁰⁹ Annual Personal Income (\$85.5 million)/Employment (1,340 jobs) = \$63,888/job. *See id.* at 13.

¹¹⁰ *Id.*

¹¹¹ *Id.* at 16.

3. *Benefits from Stimulation of the Natural Gas Industry*

Exports through the ST LNG Project will also likely stimulate additional development of natural gas resources by an additional market for North American natural gas, thereby greatly magnifying the overall benefits derived from the ST LNG Project. This development involves sizable investment in exploration and production activity and, thus, further economic stimulus. While this development could occur in various parts of the United States, for study purposes the Perryman Report assumed that spillover benefits occurred within the Corpus Christi MSA.¹¹²

According to the Perryman Report, in a typical year, incremental natural gas production associated with the ST LNG Project would lead to spillover benefits to the Corpus Christi MSA of \$307.6 million in gross product and 3,820 permanent jobs.¹¹³ The fiscal benefits to governments from this activity would exceed \$10.5 billion annually.¹¹⁴ Examined more broadly, enhanced natural gas production could be expected to generate annual gains in business activity in the U.S. as a whole of approximately \$2.5 billion in gross product and 27,800 jobs.¹¹⁵

4. *International Considerations*

Recent world events, such as the continuing weakness of certain European Community member country economies, have served as ample reminders that the welfare of U.S. citizens is interdependent on the health of the world economy. In May 2012, the Brookings Institution's Energy Security Initiative released its Policy Brief 12-01, titled "Liquid Markets: Assessing the Case for U.S. Exports of Liquefied Natural Gas," and in analyzing the international implications

¹¹² *Id.* at 14. This is a reasonable assumption because the area has a notable established base in relevant support industries. If the development actually occurs elsewhere, the magnitude of the total benefits should still be similar. However, the spillover benefits falling to the Corpus Christi MSA might be smaller, only to be balanced by additional benefits accruing to one or more other MSAs.

¹¹³ *Id.*

¹¹⁴ *Id.* at 15.

¹¹⁵ *Id.* at 16.

of LNG exports, the Brookings Study's authors broke the subject down into three components: pricing, geopolitics, and the environment.¹¹⁶

With respect to pricing, the Brookings Study observes: "LNG exports will help to sustain market liquidity in what looks to be an increasingly tight LNG market beyond 2015."¹¹⁷ Looser or more liquid markets help place downward pressure on the pricing terms of oil-linked contracts, which are common in the world markets for LNG. This has resulted, in turn, on the renegotiation of some contracts particularly in Europe.¹¹⁸ Of course, lower prices for energy in Europe and elsewhere can contribute to an uptick in the world economy, fueling increased trade with the U.S.

With respect to geopolitics, the Brookings Study concludes: "A large increase in U.S. LNG exports would have the potential to increase U.S. foreign policy interests in both the Atlantic and Pacific basins."¹¹⁹ "[T]he addition of a large, market-based producer [*i.e.*, the U.S.] will indirectly serve to increase gas supply diversity in Europe, thereby providing European consumers with increased flexibility and market power. *** Increased LNG exports will provide similar assistance to strategic U.S. allies in the Pacific Basin. By adding supply volumes to the global LNG market, the U.S. will help Japan, Korea, India, and other import-dependent countries in South and East Asia to meet their energy needs. *** As U.S. foreign policy undergoes a 'pivot

¹¹⁶ Charles Ebinger, Kevin Massy and Govinda Avasarala, Brookings Institution Energy Security Initiative, *Liquid Markets: Assessing the Case for U.S. Exports of Liquefied Natural Gas*, Policy Brief 12-01, May 2012, http://www.brookings.edu/~media/research/files/papers/2012/1/natural%20gas%20ebinger/natural_gas_ebinger.pdf (hereinafter *Brookings Study*).

¹¹⁷ *Id.* at 39.

¹¹⁸ *Id.* at 38.

¹¹⁹ *Id.* at 41.

to Asia,' the ability of the U.S. to provide a degree of increased energy security and pricing relief to LNG importers in the region will be an important economic and strategic asset.”¹²⁰

Finally, as to the environment, the Brooking Study states:

“According to the [International Energy Agency], natural gas in general has the potential to reduce carbon dioxide emissions by 740 million tonnes in 2035, nearly half of which could be achieved by the displacement of coal in China’s power-generation portfolio. Natural gas – in the form of LNG – also has the potential to displace more carbon-intensive fuels in other major energy users, including across the EU and in Japan, which is being forced to burn more coal and oil-based fuels to make up for the nuclear generation capacity lost in the wake of the Fukushima [nuclear] disaster. In addition to its relatively lower carbon-dioxide footprint, natural gas produces lower emissions of pollutants such as sulfur dioxide nitrogen oxide and other particulates than coal and oil.”¹²¹

The Brookings Study also notes that some have expressed concern that lower gas prices may lead to increased carbon dioxide emissions due to the displacement of nuclear and renewable energy by cheap natural gas.¹²² Pangea asserts that such concerns are misplaced. First, as the Brookings Study concludes, the export of U.S. natural gas would not make a substantial impact on the need for other energy sources to generate electricity.¹²³ Second, U.S. LNG exports are driven by the price differential between the destination markets and the U.S. natural gas market. Destination markets must command a significant price premium in order to cover the cost of liquefaction, transportation and regasification. Such considerations all favor the

¹²⁰ *Id.* at 43.

¹²¹ *Id.* at 44.

¹²² *Id.*

¹²³ *Id.*

use of nuclear and renewable energy sources overseas relative to their competitiveness against natural gas in the U.S. Moreover, any tendency on the part of LNG exports to raise the cost of U.S. domestic gas supplies, not only tends to reduce the volume of exports, it also contributes to the increased use of alternative forms of generation in the U.S., making nuclear and renewable energy relatively more cost-effective. Thus, any loss of competitiveness of such generating technologies abroad would be at least partially mitigated by increased competitiveness of these technologies in the U.S.

a. *U.S. Balance of Trade*

Exporting LNG from the ST LNG Project will also improve the U.S. balance of trade. The U.S. has experienced large trade deficits for several decades.¹²⁴ In 2011, the U.S. trade deficit was over \$559 billion, representing a significant increase since 2009 (about \$379 billion),¹²⁵ and the highest since 2008 (\$698.3 billion).¹²⁶ As recognized by DOE/FE, LNG exports would have a positive role on U.S. trade with destination countries, and reduce U.S. trade imbalances.¹²⁷ In particular, the Perryman Report estimates that exporting LNG from the ST LNG Project would help improve the balance of trade.¹²⁸ Improvements in the international balance of payments may range between \$3.7 billion to \$6 billion per year.¹²⁹

¹²⁴ U.S. Dep't of Commerce, Census Bureau, *U.S. Trade in Goods and Services – Balance of Payments Basis, 1960 through 2011* (June 8, 2012), <http://www.census.gov/foreign-trade/statistics/historical/gands.txt> (hereinafter *Census Bureau*).

¹²⁵ See U.S. Bureau of Economic Analysis, U.S. Dep't of Commerce, *U.S. NG Int'l Trade in Goods and Services*, at 1 (June 8, 2012), <http://www.bea.gov/newsreleases/international/trade/2012/pdf/trad1312.pdf>.

¹²⁶ See *Census Bureau*, *supra* note 124.

¹²⁷ See, e.g., *Sabine Pass, Order No. 2961*, at 35-36. See also, *CMI, DOE/FE Order No. 2651*, at 14; *ConocoPhillips, DOE/FE Order No. 2500*, at 58; see also *Brookings Study*, at vi (stating that U.S. LNG exports are likely to make a positive contribution to the U.S. trade balance).

¹²⁸ Perryman Report at 16.

¹²⁹ *Id.*

b. *Additional International Benefit*

In light of DSME's majority, indirect ownership interest in the ST LNG Project, Pangea anticipates substantial participation by DSME in the ST LNG Project. As referenced above, DSME is a leading contractor for major upstream energy development projects, like the ST LNG Project, as well as a leading LNG carrier builder. As such, Pangea believes that economic activities stemming from the ST LNG Project will serve to strengthen the U.S.-South Korea trade relationship, which the U.S. is actively seeking to strengthen.¹³⁰ In this regard, on March 15, 2012, the U.S. FTA with South Korea went into effect and is expected to boost annual U.S. goods exports to South Korea by as much as \$11 billion, and support more than 70,000 American jobs.¹³¹ The ST LNG Project is anticipated to contribute to this stated U.S. international policy.

VIII.
RELATED AUTHORIZATIONS AND ENVIRONMENTAL IMPACTS

Pangea will request NGA Section 3 authorization from FERC so that it may site, construct and operate the ST LNG Project. Pangea intends to commence the FERC's mandatory pre-filing process in Spring 2013 and then file its final application to obtain Section 3 authorization in the Fall 2013. Pangea's affiliate developing the ST Pipeline will file an application for NGA Section 7(c) authorization to construct, own and operate the ST Pipeline.

The potential environmental impacts of the ST LNG Project will be reviewed by FERC under NEPA. Consistent with the NEPA scheme applicable to applications for authorizations

¹³⁰ See *Obama Administration Record* at 2. The U.S. trade relationship with Korea has changed significantly within the past 10 years. Before 2003, the U.S. was South Korea's top trading partner. Since then, U.S. trade with Korea fell behind China, Japan and the European Union, with the U.S. share of South Korea's import market of goods decreasing from 21% to approximately 9%. See *Economic Value of the U.S.-South Korea Free Trade Agreement: More American Exports, More American Jobs* (Sept. 27, 2011), http://www.whitehouse.gov/sites/default/files/09272011_wh_economic_value_fact_sheet_us_korea.pdf.

¹³¹ See *Obama Administration Record* at 2.

under NGA Section 3 delineated by Congress in the Energy Policy Act of 2005,¹³² Pangea expects that FERC shall act as the lead agency, with DOE/FE acting as a cooperating agency, in connection with the ST LNG Project.

Pangea also anticipates that DOE/FE will cooperate with FERC in the development of an EIS for the ST LNG Project.¹³³ Finally, Pangea expects that upon issuance of an EIS by FERC for the ST LNG Project, DOE/FE will adopt the FERC EIS if DOE/FE concludes that its comments and suggestions have been satisfied.¹³⁴ To the extent it reaches such conclusion, DOE/FE may then promptly issue a record of decision pursuant to NEPA, thereby finalizing any conditional order issued on this Application pursuant to Pangea's request herein.

IX. **REPORT CONTACT INFORMATION**

The contact for any reports required in connection with the requested authorization is as follows:

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X. **APPENDICES**

The following appendices are attached hereto and incorporated by reference herein:

Appendix A: *Market Price Impact Study for LNG Exports at the South Texas LNG Export Project*, prepared by Black & Veatch (December 2012)

¹³² Pub. L. No. 109-58, 119 Stat. 594.

¹³³ See 10 C.F.R. § 1021.342.

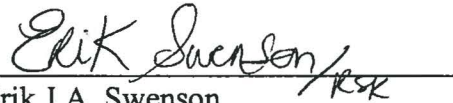
¹³⁴ See 40 C.F.R. § 1506.3(c) (2012) ("A cooperating agency may adopt without recirculating the environmental impact statement of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied.").

- Appendix B: *The Impact of Construction and Operation of Pangea's South Texas LNG Export Project on Business Activity in the Corpus Christi Area*, prepared by The Perryman Group (December 2012)
Appendix C: Verification
Appendix D: Opinion of Counsel

XI.
CONCLUSION

For the foregoing reasons, Pangea respectfully requests that DOE/FE grant Pangea's request for long-term, multi-contract authorization to engage in exports of up to approximately 398.5 Bcf/y of natural gas in the form of LNG, which is the equivalent of approximately eight (8) MTPA, from the ST LNG Project to non-FTA Countries, for a 25-year term commencing on the earlier of the date of first export or seven (7) years from the date of issuance of such authorization.

Respectfully submitted,



Erik J.A. Swenson
Tania S. Perez
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Attorneys for Pangea LNG (North America) Holdings, LLC

Dated: December 19, 2012

APPENDIX A- B&V REPORT

Market Price Impact Study
for LNG Exports at the South Texas
LNG Export Project

PREPARED FOR

Pangea LNG (North America) Holdings, LLC

DECEMBER 2012



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BLACK & VEATCH STATEMENT

This report was prepared for Pangea LNG (North America) Holdings, LLC (“Client”) by Black & Veatch Corporation (“Black & Veatch”) and is based in part on information not within the control of Black & Veatch. As such, Black & Veatch has not made an analysis, verified, or rendered an independent judgment of the validity of the information provided by others, and, therefore, Black & Veatch does not guarantee the accuracy thereof.

In conducting our analysis, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodologies we utilize in performing the analysis and making these projections follow generally accepted industry practices. While we believe that such assumptions and methodologies as summarized in this report are reasonable and appropriate for the purpose for which they are used; depending upon conditions, events, and circumstances that actually occur but are unknown at this time, actual results may materially differ from those projected.

Readers of this report are advised that any projected or forecast price levels and price impacts, reflects the reasonable judgment of Black & Veatch at the time of the preparation of such information and is based on a number of factors and circumstances beyond our control. Accordingly, Black & Veatch makes no assurances that the projections or forecasts will be consistent with actual results or performance. To better reflect more current trends and reduce the chance of forecast error, we recommend that periodic updates of the forecasts contained in this report be conducted so more recent historical trends can be recognized and taken into account.

Neither this report, nor any information contained herein or otherwise supplied by Black & Veatch in connection with the services, shall be released or used in connection with any proxy, proxy statement, and proxy soliciting material, prospectus, Securities Registration Statement, or similar document without the written consent of Black & Veatch.

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1.0 Introduction

To support Pangea LNG (North America) Holdings, LLC's ("Pangea") application to the United States Department of Energy's Office of Fossil Energy, Black & Veatch Corporation ("Black & Veatch") was retained by Pangea to provide an independent assessment of the market price impact of Pangea's proposed South Texas LNG Project ("ST LNG Project"), an LNG liquefaction and export project to be sited in Ingleside, Texas.

Black & Veatch's assessment methodology is built upon our industry expertise in the North American gas and power markets and our experience in fundamental analysis of natural gas supply, demand, and the interconnecting pipeline grid. Having served the power industry for nearly a century, Black & Veatch has hands-on experience analyzing key drivers of natural gas demand growth from the power sector such as the relative capital cost of power generation technologies, impact of green-house gas ("GHG") regulations, nuclear permitting, EPA rules, and renewable targets. With shale plays emerging as a major supply source to the U.S. market, we continually monitor their development and undertake in-depth analyses to understand North American natural gas supply potential. In addition, Black & Veatch has conducted analyses on critical issues relevant to the future of the natural gas industry such as gas demand from the power sector, on-going finding and development cost trends, and LNG exports.

Black & Veatch produces an integrated and comprehensive outlook on North American energy issues in our bi-annual Energy Market Perspective ("EMP") that incorporates our power market expertise with internally consistent views on generating fuels such as natural gas and coal. The Base Case assumptions and analysis in this report are based on our 2012 Year-End EMP and summarize our views on key power and natural gas market fundamental drivers that influence our projections of natural gas supply, demand and price across North America. Black & Veatch utilized RBAC, Inc.'s GPCM™ model to assess the regional and national market price impact of liquefying and exporting 1.2 Bcf per day¹ of domestic gas supplies at the ST LNG Project from 2018 through 2042.

Black & Veatch explored four LNG export scenarios to test the impact of exports from the ST LNG Project on prices in the immediate South Texas region and across the U.S.. The *Base Case* is based on Black & Veatch's 2012 Year-End EMP, which incorporates future greenhouse gas legislation as the primary driver for gas demand growth in the power generation sector. Anticipated national GHG reduction legislation would spur natural gas demand growth because of its lower GHG content relative to other fossil fuels. The *Base Case* includes demand associated with LNG exports (from a new terminal in British Columbia as well as Cheniere's Sabine Pass LNG terminal) that reach 2.5 Bcf/d by 2019. In the *With ST LNG Project Exports* scenario, an additional 1.2 Bcf/d of natural gas demand is included (related to LNG exports from the ST LNG Project) by April 2018. Due to the

¹ This figure was derived by assuming the 398.5 Bcf/year which Pangea applied for, which is net of fuel used and inerts removed during liquefaction and accordingly reflects a 10% reduction to account for fuel and the removal of inerts. The 1.2 Bcf/d reflects the total feed gas entering the facility and accordingly reverses the aforementioned 10% reduction and was reached using a volumetric conversion of natural gas to heat content (in Btu) is based upon an Mcf to MMBtu factor of 1.030 for natural gas, which is representative of the characteristics of natural gas in the interstate pipelines of South Texas.

heightened market interest to export LNG from the Lower 48, we developed a *High LNG Exports* scenario, which includes, in addition to exports assumed in the *Base Case*, an additional 2.8 Bcf/d of natural gas demand associated with added LNG exports from the Gulf Coast starting in 2020, with total U.S. and Canadian LNG export-related demand reaching 7.8 Bcf/d and meeting over 10% of the total projected global demand for LNG by 2023. In order to compare the price impact of the ST LNG Project under conditions of LNG exports assumed in the *Base case* vs. the *High LNG Exports* scenario, Black & Veatch developed the *High LNG Exports with ST LNG Project Exports* scenario, which adds an incremental 1.2 Bcf/d of demand (associated with LNG exports from the ST LNG Project) by April 2018 to the *High LNG Exports* scenario

Black & Veatch's market price assessment examines the market price impact of the ST LNG Project on a regional and national level. For the regional market, Black & Veatch examined prices at Agua Dulce Hub as a reference location to assess the ST LNG Project's price impacts in South Texas. The price impact across a number of other pricing points across the U.S. was also examined, using prices at Henry Hub as a barometer for the national price impact.

Table 1: Scenario Descriptions

SCENARIO	DESCRIPTION
Base Case	Based on Black & Veatch's 2012 Year-End Energy Market Perspective, which incorporates our latest analysis of the near-term impacts of coal to gas switching in the power generation markets and long-term implications from GHG legislation at the state and federal level. It also incorporates Black & Veatch's latest assessment of NGL uplifts to shale gas production costs and their impact on North American unconventional production. Natural gas demand associated with LNG exports from a new terminal in British Columbia and Cheniere's Sabine Pass LNG reaches 2.5 Bcf/d by 2019
With ST LNG Project Exports	Identical to the <i>Base Case</i> with the exception of an additional 1.2 Bcf/d of natural gas demand associated with LNG exports from the ST LNG Project beginning in April 2018
High LNG Exports	Includes an additional 2.8 Bcf/d of natural gas demand associated with Gulf Coast LNG exports in 2020 incremental to the <i>Base Case</i> . Total natural gas demand associated with US and Canadian LNG exports reaches 7.8 Bcf/d by 2023. All other assumptions are identical to <i>Base Case</i> .
High LNG Exports with ST LNG Project Exports	Identical to the <i>High LNG Exports</i> scenario with the exception of an additional 1.2 Bcf/d of natural gas demand associated with LNG exports from the ST LNG Project beginning in April 2018

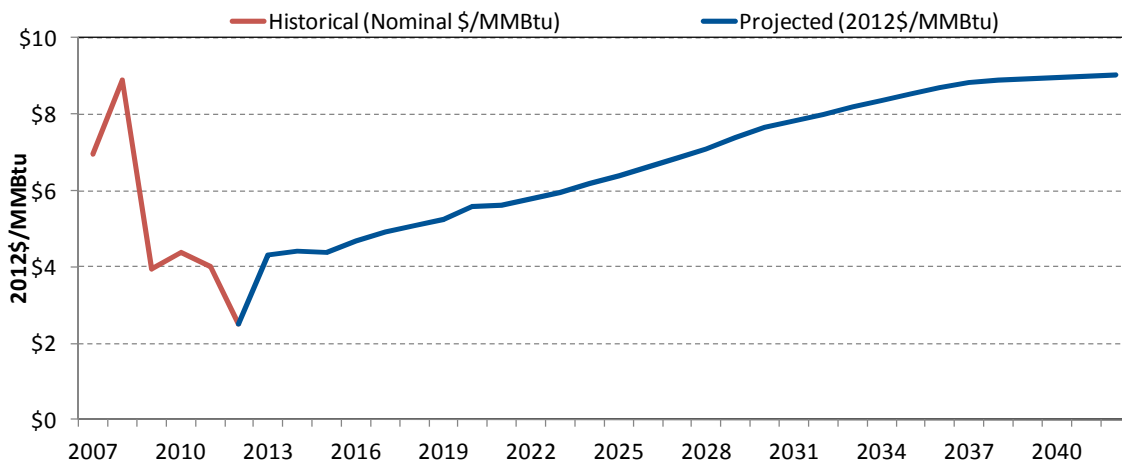
2.0 Executive Summary

Black & Veatch utilized scenario analysis to assess the potential price impact of 1.2 Bcf/d of related gas demand due to LNG exports from the ST LNG Project. Based on our independent assessment, these proposed export volumes are expected to have a limited price impact across the U.S. during the analysis period of 2018 through 2042.

National Price Impact

Black & Veatch’s 2012 Year-End EMP projects a rising Henry Hub gas price during the analysis period. As seen in Figure 1, Black & Veatch projects that gas prices will recover from their current lows and stabilize at \$5.08/MMBtu by 2018. Prices then rise more moderately to average \$5.93/MMBtu over the first 10 years of the analysis period (2018 through 2027), rising to an average price level of \$8.36 over the remaining 15 years of the analysis period (2028 through 2042). North American demand growth is primarily driven by increased demand for gas-fired electric generation. While some emerging shale producers will continue to benefit from liquids uplifts, conventional producers’ costs are expected to rise over the analysis period. The price trajectory of Henry Hub projected in the *Base Case* is determined by the interplay of all market fundamental factors modeled and cannot be solely, or even mostly, attributed to the level of LNG exports assumed in the *Base Case*.

Figure 1: Projected Base Case Henry Hub Natural Gas Prices



Black & Veatch’s *Base Case* analysis indicates that export volumes from the ST LNG Project would contribute to an estimated \$0.12/MMBtu (2.0%) increase in gas prices at the Henry Hub during the first 10 years of operation. The price impact during the remaining 15 years is expected to be an average increase of \$0.17/MMBtu (2.1%) over the *Base Case* average price of \$8.36/MMBtu. See Table 2.

Black & Veatch also tested the sensitivity of national prices to LNG export volumes in excess of those assumed in the *Base Case*. Under the *High LNG Exports* scenario, in which an additional 2.8 Bcf/d of demand associated with LNG exports from other gulf coast terminals is assumed beginning in 2020, the price impact of exports from the ST LNG Project (as modeled in the *High LNG Exports with ST LNG Project Exports* scenario) to Henry Hub is

estimated to be \$0.11/MMBtu (1.7%) between 2018 and 2027 and \$0.14/MMBtu (1.6%) between 2028 and 2042.

Table 2: Market Price Impact at Henry Hub

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
Average Price (\$/MMBtu)	5.93	6.05	6.19	6.30
2018-2027 Average Diff. from Base		0.12		0.11
Percentage Increase		2.0%		1.7%
Average Price (\$/MMBtu)	8.36	8.54	8.71	8.85
2028-2042 Average Diff. from Base		0.17		0.14
Percentage Increase		2.1%		1.6%

South Texas Price Impact

In the *Base Case*, the South Texas market price as measured at the Agua Dulce Hub is projected to rise from current price levels and reach \$5.05/MMBtu by 2018. Similar to Henry Hub, Agua Dulce Hub prices rise moderately to average \$5.93/MMBtu over the first 10 years of the analysis period (2018-2027), and to an average of \$8.45/MMBtu over the remaining 15 years (2028-2042).

ST LNG Project export volumes are expected to have a similar price impact on the Agua Dulce Hub as on Henry Hub. The *Base Case* price impact at the Agua Dulce Hub is projected to be \$0.13/MMBtu (2.2%) over the first 10 years of the ST LNG Project’s operations. The price impact for the remaining 15 years is slightly higher, increasing the *Base Case* average price of \$8.45/MMBtu by \$0.20/MMBtu (2.4%). The ST LNG Project is expected to exert a similar, though slightly less significant, price impact in relation to the *High LNG Exports* scenario, raising prices at Agua Dulce Hub by \$0.12/MMBtu (2.0%) from 2018-2027 and \$0.16/MMBtu (1.8%) from 2028-2042. See Table 3.

Table 3: Market Price Impact at Agua Dulce Hub

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
Average Price (\$/MMBtu)	5.93	6.06	6.18	6.30
2018-2027 Average Diff. from Base		0.13		0.12
Percentage Increase		2.2%		2.0%
Average Price (\$/MMBtu)	8.45	8.65	8.79	8.95
2028-2042 Average Diff. from Base		0.20		0.16
Percentage Increase		2.4%		1.8%

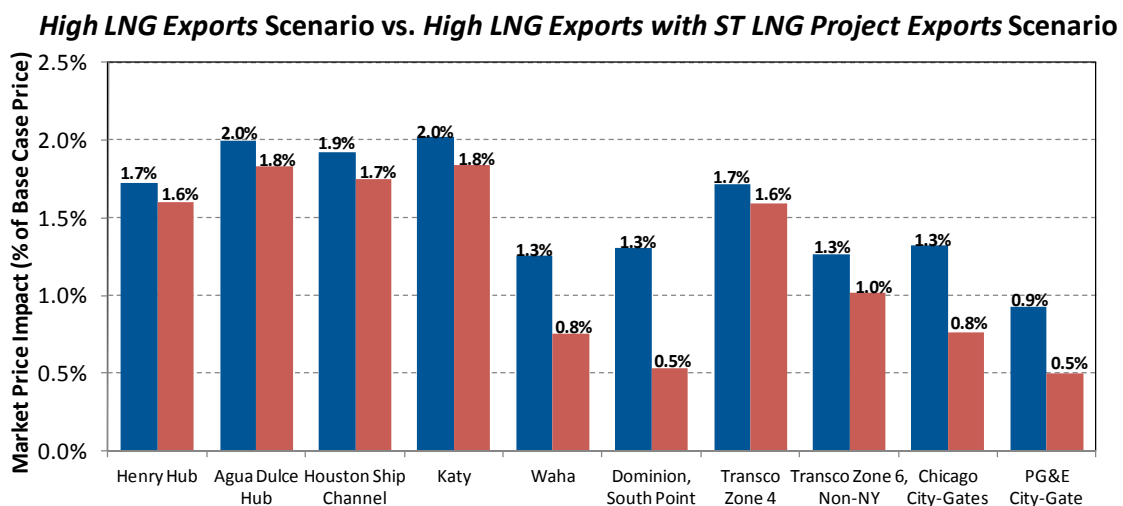
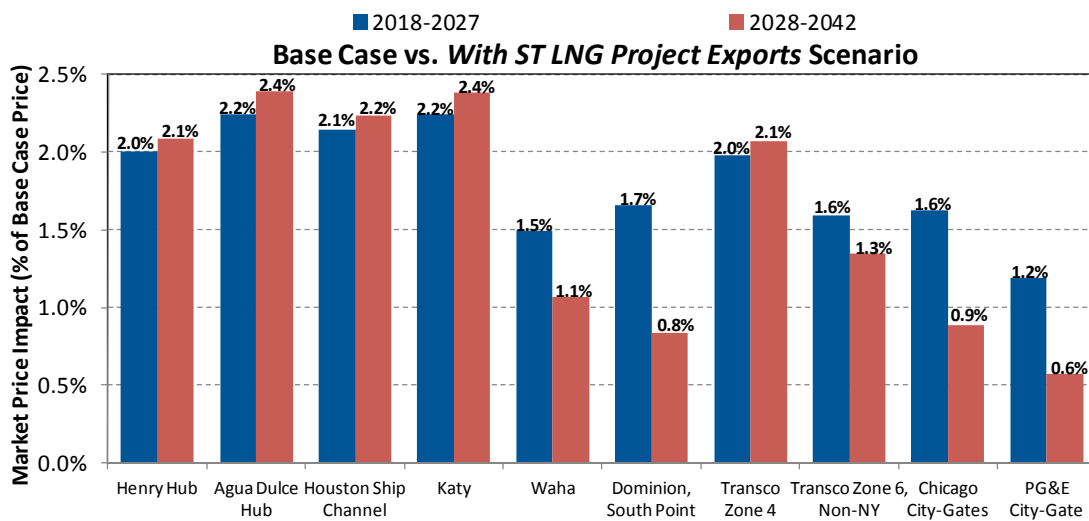
Price Impact across the Broader U.S. Market

Black & Veatch also examined the market price impact of the ST LNG Project at eight additional locations (Katy Hub; Houston Ship Channel; Waha; Transco Zone 4; Dominion, South Point; Transco Zone 6, Non-New York; Chicago City-Gates; and PG&E City-Gates) and observed a similar range of price impacts, as shown in Figure 2. These trading hubs were

selected due to their importance to consumers and because they measure the price impact at major markets located downstream of the ST LNG Project in East Texas (Katy and Houston Ship Channel), and in the Midwest (Waha), Northeast (Dominion, South Point and Transco Zone 6, Non-New York) and Southeast (Transco Zone 4), Chicago (Chicago City-Gates), and California (PG&E City-Gate).

The market price impact of the ST LNG Project exports, expressed as a percentage of market prices, slowly decreases over the analysis period as natural gas prices rise across North America. The export terminal has a lower impact in the northeast U.S. as the reduced supply out of South Texas is readily replaced from other sources such as shale production out of the Marcellus and Utica shale plays.

Figure 2: Projected Market Price Impact across Pricing Points



Summary Conclusions

Black & Veatch's assessment demonstrates that the proposed ST LNG Project has a limited impact on natural gas prices across the U.S.. The estimated price impact at Henry Hub throughout the analysis period is approximately 2% when compared to the *Base Case*. The ST LNG Project is expected to have the greatest price impact in the local South Texas market, with price increases at Agua Dulce Hub ranging from 2.2% from 2018-2027 and 2.4% from 2028-2042 when compared to the *Base Case*.

The price impact of LNG exports from the ST LNG Project is not expected to rise in tandem with total North American LNG exports; Black & Veatch's findings indicate that the price impact of exports from the ST LNG Project does not intensify in an environment where North American LNG exports exceed those assumed in the *Base Case*. As seen through a comparison of results from the *High LNG Exports* scenario vs. the *High LNG Exports with ST LNG Project Exports* scenario, exports from the ST LNG Project exert a similar, if less significant, impact on U.S. prices than observed in the *Base Case* in both absolute and percentage terms.

The market price impact of the ST LNG Project on market prices across the U.S. decreases in with greater geographic distance from the project. For example, LNG exports have a minimal impact on natural gas prices in the Northeast U.S. given the robust supply expected to be available from other sources. With continued advancement in oil and gas extraction technologies, the projected price impact would likely diminish with additional gas supplies becoming available in the North American market. Lesser price impacts are also observed in Chicago, California, and Northeast markets as compared those observed in Texas and Louisiana.

3.0 Overview of the Proposed ST LNG Project

Pangea is developing an LNG export terminal in Ingleside, Texas on the U.S. Gulf Coast. As currently proposed, Phase 1 of the project will consist of a single train liquefaction facility with a capacity of up to 4 MTPA to be brought into service by April 2018. The facility's capacity will be increased in a Phase 2 expansion that will add a second train and additional liquefaction capacity of 4 MTPA by April 2019.

The ST LNG Project's proposed pipeline header will have at least 1.2 Bcf/d of throughput capacity and interconnect with interstate and intrastate pipelines with access to gas supplies from conventional production and emerging shales along the Texas Gulf Coast or elsewhere. Access to multiple pipelines will allow the ST LNG Project to use a combination of different pipelines to source and transport its natural gas supply, thereby distributing its capacity utilization impact across multiple pipelines. Table 4 lists the potential pipeline interconnections for the ST LNG Project.

Figure 3: Map of the ST LNG Project

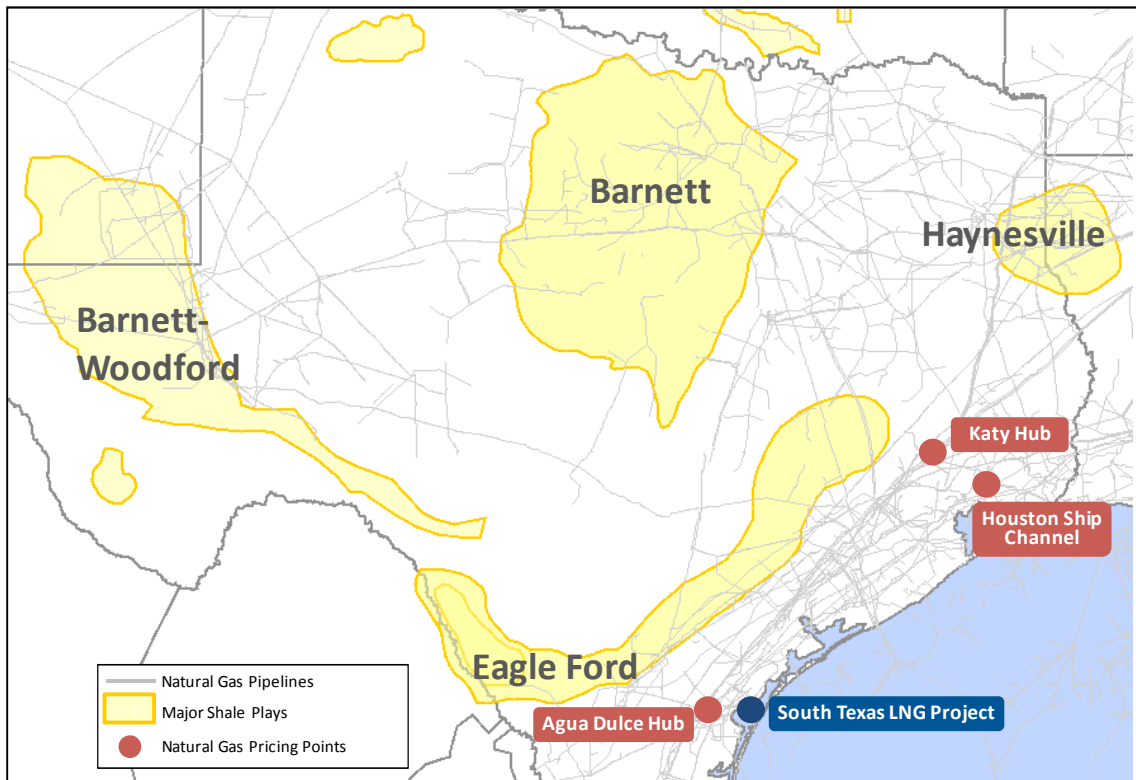


Table 4: Proposed Pipeline Lateral Interconnections

INTERSTATE PIPELINES	INTRASTATE PIPELINES
Tennessee Gas Pipeline Company	Kinder Morgan Tejas Pipeline LLC
Transcontinental Gas Pipeline Corporation	CrossTex Energy, LP
Natural Gas Pipeline Company of America	GulfTerra Texas Pipeline, LP
Gulf South Pipeline Company, LP	Channel Industries Gas Company
Texas Eastern Transmission Corporation	

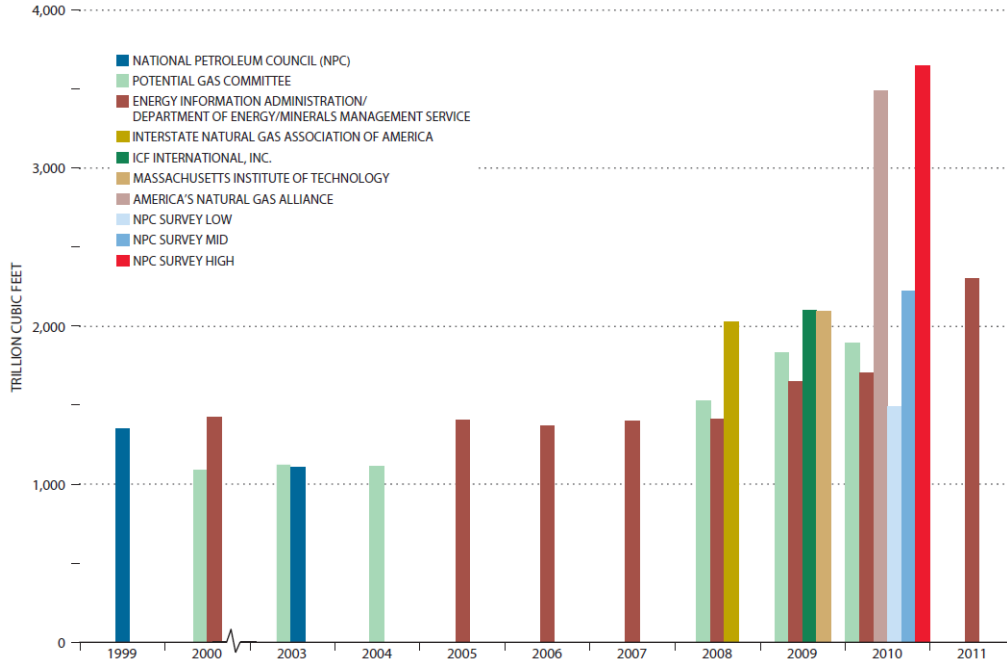
Access to multiple pipelines with an estimated throughput capacity of 4.4 Bcf/d will allow the ST LNG Project to receive natural gas from multiple supply sources. In addition to the Eagle Ford shale, which is in close proximity to the ST LNG Project, the planned pipeline interconnects offer access to the Marcellus, Haynesville, and Woodford shales as well as conventional Gulf Coast production either directly or via displacement of flows downstream of the ST LNG Project. The ST LNG Project will have the ability to diversify its sourcing of natural gas across the various supply basins it will have access to via the proposed pipeline interconnects.

4.0 North American Market Overview

The North American natural gas market has undergone a dramatic shift over the last several years due to the largely unanticipated and exponential growth of shale gas production. Throughout much of the opening decade of the 21st century, there was a market consensus that the combination of declining conventional production and increasing demand was poised to create an increasingly supply-constrained market. As recently as 2008, spot prices at Henry Hub reached \$13.00/MMBtu. Such high prices led to the expectation that the U.S. would require LNG imports via regasification terminals to fill the expected gap between supply and demand. Accordingly, during the mid-2000's, numerous North American LNG regasification terminals were certified for construction.

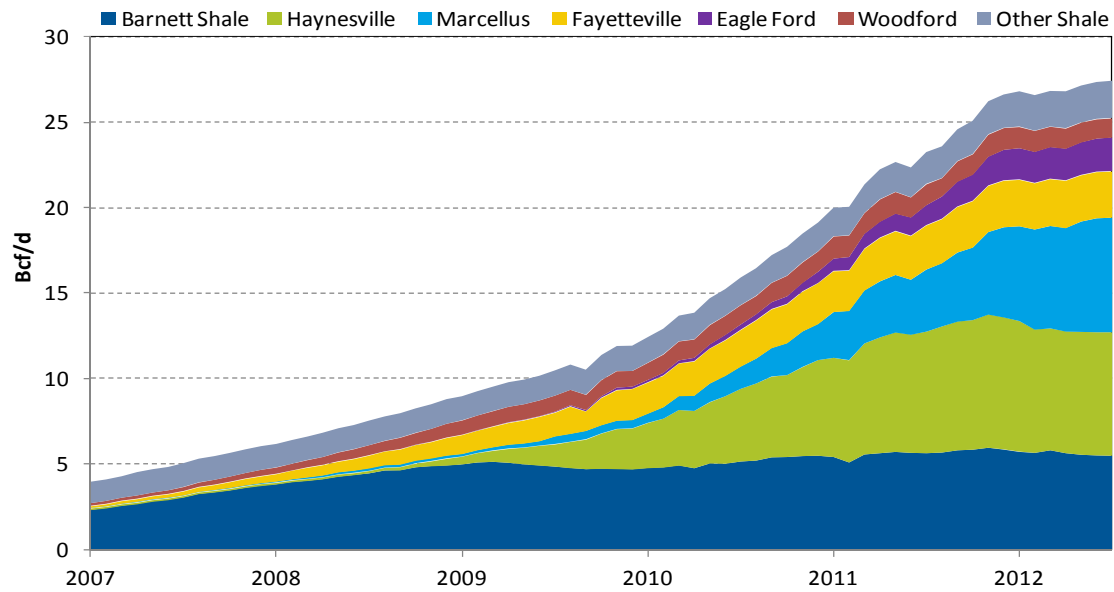
Just as it abetted the development of import terminals, the expectation of rising natural gas prices also spurred investments in technologies designed for the economic recovery of unconventional gas. Rapid technological advances in horizontal drilling and hydraulic fracturing expanded the economically recoverable shale gas resource base that had hitherto been only technically recoverable. As new land positions were established and reserves were tested, the resulting influx of shale gas reserves has dramatically increased the supply base of the North American market. Figure 4 shows that the technically recoverable natural gas resource estimates have grown substantially since 2007.

Figure 4: Evolution of U.S. Technically Recoverable Natural Gas Resource Estimates



Source: National Petroleum Council. *Prudent Development: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources* (September 2011)

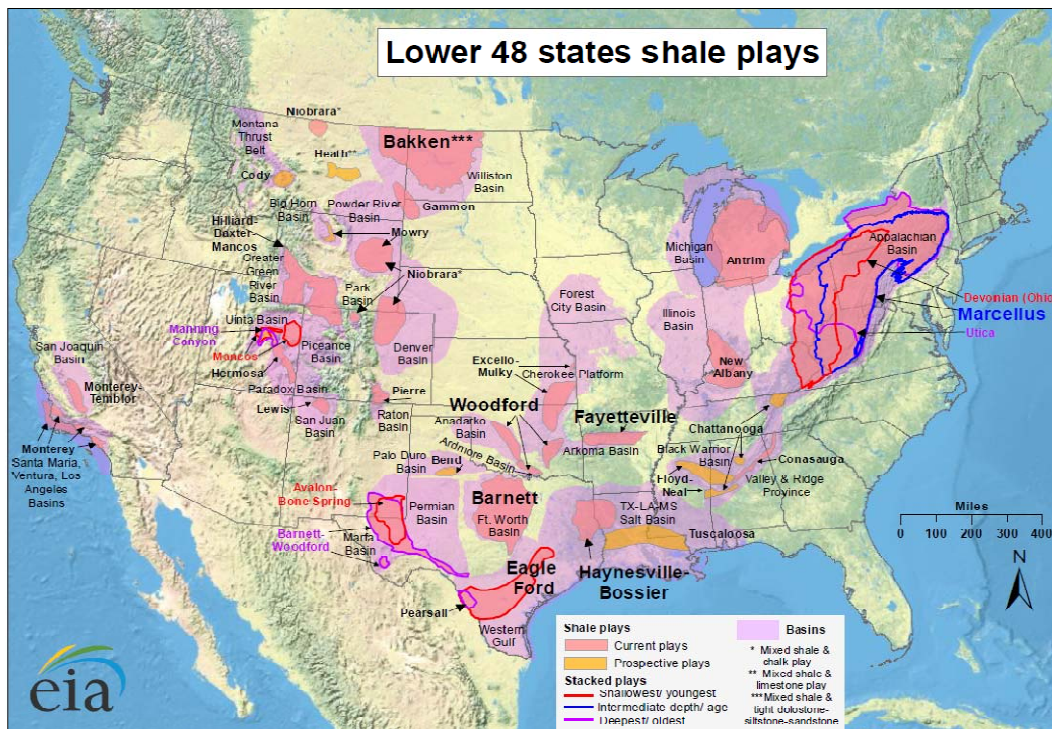
Figure 5: Major Shale Production by Basin



Source: Lippman Consulting

As seen in Figure 5, natural gas production from shale plays has increased more than fourfold from January 2008 to 2012, from approximately 6 Bcf/d to more than 26 Bcf/d. The location of major shale plays in the Lower 48 is shown in Figure 6.

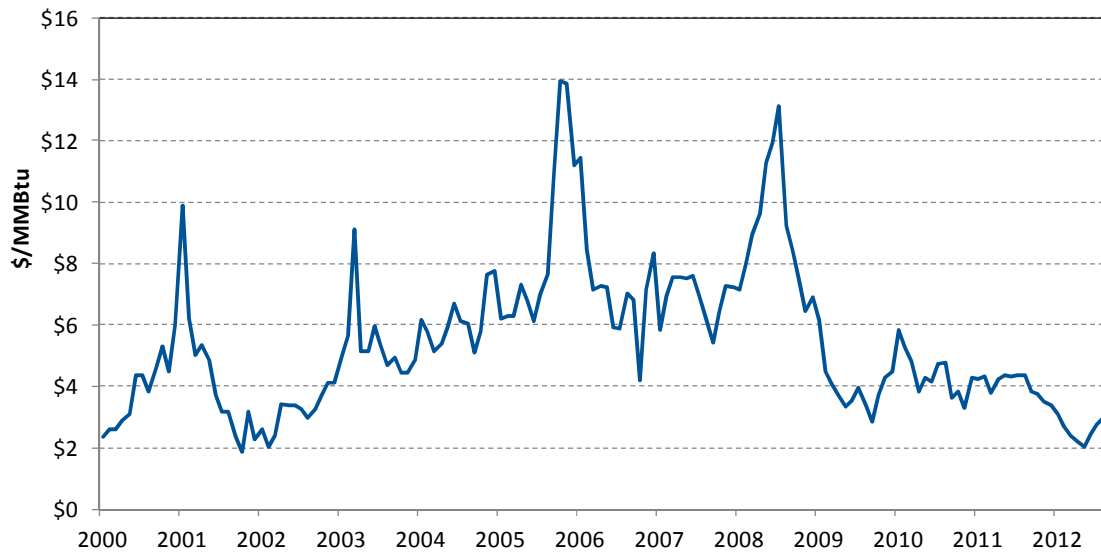
Figure 6: Shale Plays in the Lower 48 States



Source: Energy Information Administration, updated May 9, 2011

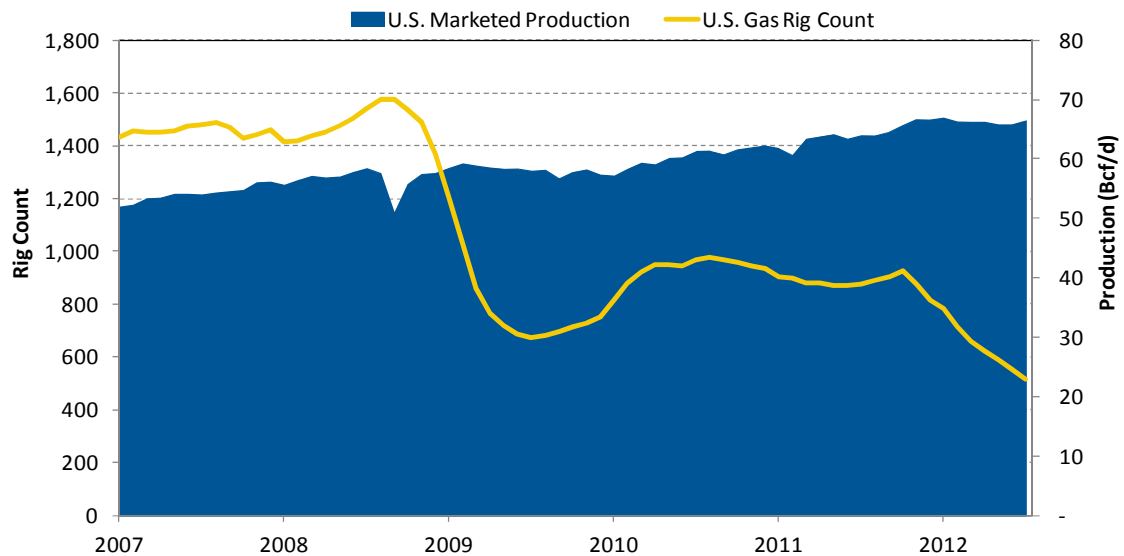
As shown in Figure 7, this supply surplus has caused prices to drop below \$4.00/MMBtu in a downward trend that is driving a shift in drilling activity. Producers have decreased capital spending on drilling and development activities while migrating to natural gas plays rich with natural gas liquids. These natural gas liquids currently command a price premium relative to natural gas due to their linkage with crude oil prices and create incremental economic uplifts typically ranging from \$1.70 to \$4.40/MMBtu over the price of dry natural gas. The uplift from natural gas liquids provides substantial value to producers' rates of return on their finding and development cost investment. Despite the decrease in rig counts, the improved efficiency of drilling has continued to bolster overall natural gas production levels in the United States, as shown in Figure 8.

Figure 7: Historical Henry Hub First of Month Prices



Source: Platts

Figure 8: U.S. Natural Gas Rig Count vs. Marketed Production

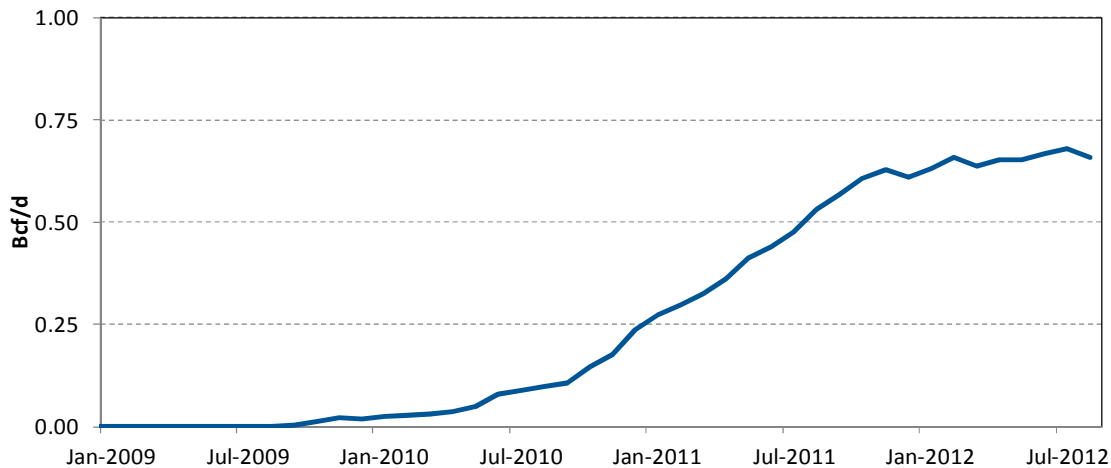


Source: Lippman Consulting

The Prospect for LNG Exports

The proposed ST LNG Project is located in South Texas with proximate access to production from the Eagle Ford Shale, which has experienced a production boom along with other North American shale basins in recent years. Although some other shale-gas plays have witnessed declining development activity as natural gas prices have remained depressed since 2011, Eagle Ford gas production has maintained robust growth because the main target in Eagle Ford is crude oil – for which prices have stayed much stronger. Oil production involves production of associated gas and even in relatively oil-depleted zones the residual gas contains high concentrations of natural gas liquids which carry a price premium relative to “dry” gas. Therefore, the economic uplift from oil and natural gas liquids makes production from this South Texas play lower in net cost compared with dry production in other plays. Figure 9 shows the increase in gas production that has occurred in the Eagle Ford shale over the past several years. There has been a steep growth in drill-rig count, especially since 2010, driven by the pursuit of crude oil and the production of associated gas has kept the gas production curve moving upward.

Figure 9: Eagle Ford Shale Natural Gas Production



Railroad Commission of Texas

Although Pangea’s customers will determine the source(s) of natural gas actually used as feed gas for the ST LNG Project, it is clear that there are ample resources available in the vicinity of the project. For example, the Eagle Ford Shale, along with its associated gas-bearing strata within the Maverick Basin, is believed to offer ample recoverable resources to supply the ST LNG Project for many years to come. Recent estimates of recoverable natural gas can significantly vary by estimator, as seen in Figure 10, but support the case for a large amount of recoverable gas within the Eagle Ford shale, ranging from 21 to 52 Tcf, if not more. A probabilistic resource assessment of the Eagle Ford oil and gas shale zones, as made by the U.S. Geological Survey in 2010², estimated the minimum volume of technically recoverable gas as 24 Tcf and with statistically plausible upper limits as high as 94 Tcf

² Assessment of Undiscovered Oil and Gas Resources in Jurassic and Cretaceous Strata of the Gulf Coast, 2010. Fact Sheet 2011–3020, U.S. Geological Survey, March 2011, page 4.

(Figure 11). At 2012 production rates (about 250-300 Bcf per year), such a level of recoverable resources would support continued Eagle Ford production for at least an additional 75-100 years.

Although the Eagle Ford oil and gas shales are the most widely publicized producing units, other gas-bearing sources co-exist with Eagle Ford within the Maverick and Gulf Coast Basins any of which could supply the ST LNG Project. For example, the U.S. Geological Survey's 2010 resource assessment also included a probabilistic estimate of 3.4-17.8 Tcf of gas technically recoverable from the Pearsall Shale. The Pearsall Shale is not an oil play and likely is much poorer in natural gas liquids than Eagle Ford. Pearsall also lies deeper than Eagle Ford and therefore is unlikely to be aggressively produced until economics improve. Even so, it represents a significant supplemental source of dry gas in the same geographic locale as Eagle Ford.

Finally, production growth in South Texas enjoys a favorable regulatory outlook compared with some other shale-gas plays. Based on lessons learned from the development of the Barnett Shale in north-central Texas, the Railroad Commission of Texas formed a working group, known as the Eagle Ford Task Force, to monitor and resolve issues pertaining to impacts of water use and waste disposal, truck traffic and road use, pipeline infrastructure needs, housing issues (including temporary and permanent expansions) and other environmental and community issues. By proactively anticipating issues that have complicated other shale-gas developments, the State of Texas has enhanced prospects for full realization of the economic potential of gas-supply developments in South Texas. These resources are likely to be developed whether or not the ST LNG Project exports natural gas, but, because of their proximity to the ST LNG Project, the South Texas producing regions are logical sources of gas to serve the ST LNG Project. Were the ST LNG Project to draw from these resources, the vast array of natural resources in other locations across the country and in Canada would adjust their production to keep supply in balance with demand.

Figure 10: Estimates of Recoverable Natural Gas among U.S. Shale-Gas Plays (Tcf)

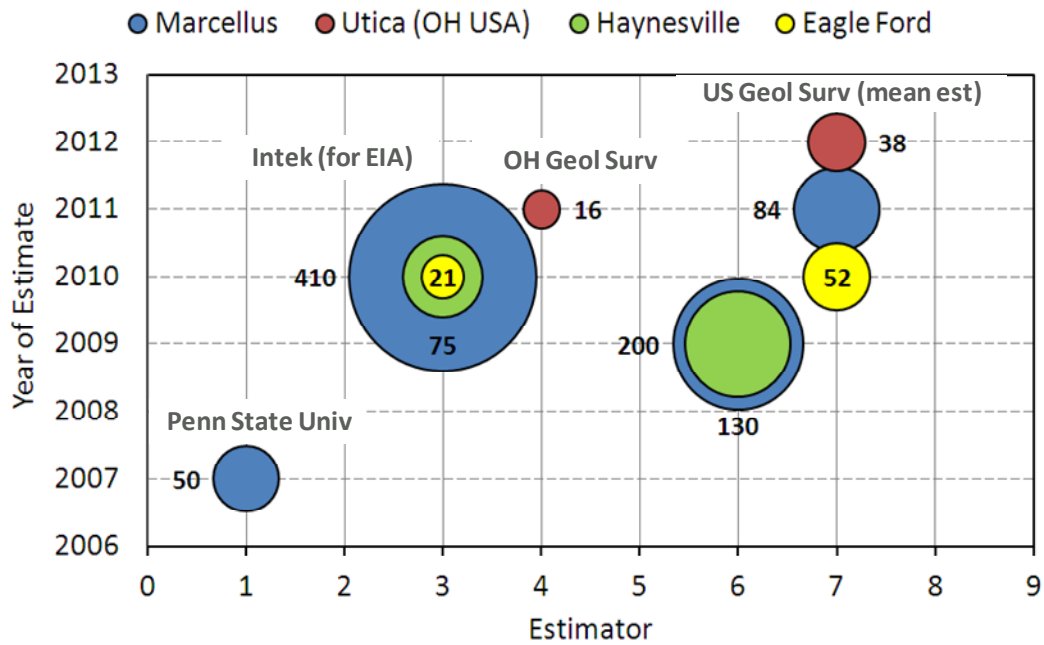
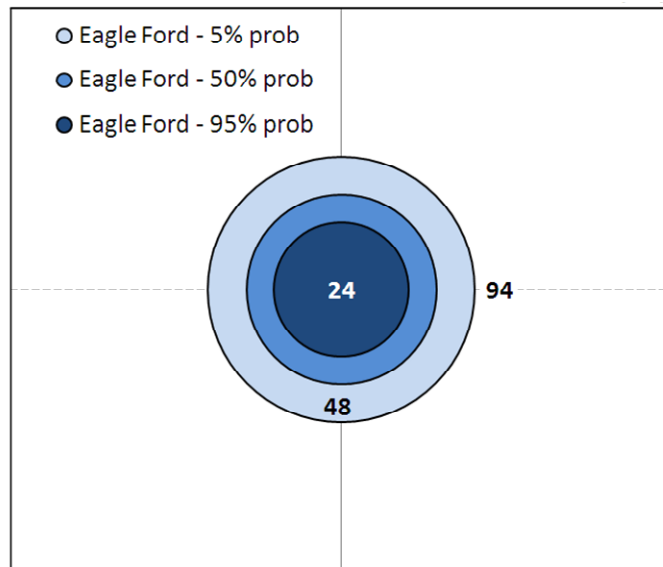


Figure 11: Probabilistic Estimates of Recoverable Natural Gas in the Eagle Ford Shale (Tcf)



Source: U.S. Geological Survey (2010)

5.0 Methodology and Base Case Assumptions

Black & Veatch’s *Base Case* analysis draws upon assumptions utilized in the Year-End 2012 EMP for detailed assumptions regarding future natural gas and power infrastructure, pricing, and the outlook on other power fuels. The EMP is an integrated twenty five year outlook on the direction of the natural gas, power, coal, and emissions markets that is updated bi-annually.

Black & Veatch estimated the price impact of the ST LNG Project using RBAC Inc’s GPCM™ model. The GPCM™ model operates using an advanced algorithm to solve for optimal equilibrium price and quantities by balancing demand and supply nodes in the market. As a network model, GPCM™ nodes represent production regions, pipelines, storage facilities, and end-use customer groups.

Supply

Black & Veatch utilized a basin-by-basin, play-by-play approach to assess the availability and cost of major supply sources in North America. For the major shale plays that will contribute to the majority of production growth, Black & Veatch utilized in-house geoscientists and geologists to assess the resource base, technology trends in drilling and natural gas liquids content. Black & Veatch also monitors trends in finding and development costs, well type curves, estimated ultimate recovery, and tax and policy changes in order to assess the relative production costs across all shales that will determine the dynamics of production growth based on competitive cost advantages.

Black & Veatch projects that North American natural gas production will grow from 89.9 Bcf/d to 134.9 Bcf/d, at a growth rate of 1.42% per annum from 2013 to 2042, as shown in Figure 12. This projected production is assumed to originate from basins that are currently producing natural gas. Black & Veatch assumed limited production to be sourced from yet-to-be developed basins, such as Utica Shale and Niobrara Shale. This conservative supply assumption was utilized in each scenario presented in this report.

Figure 12: Historical and Projected North American Production

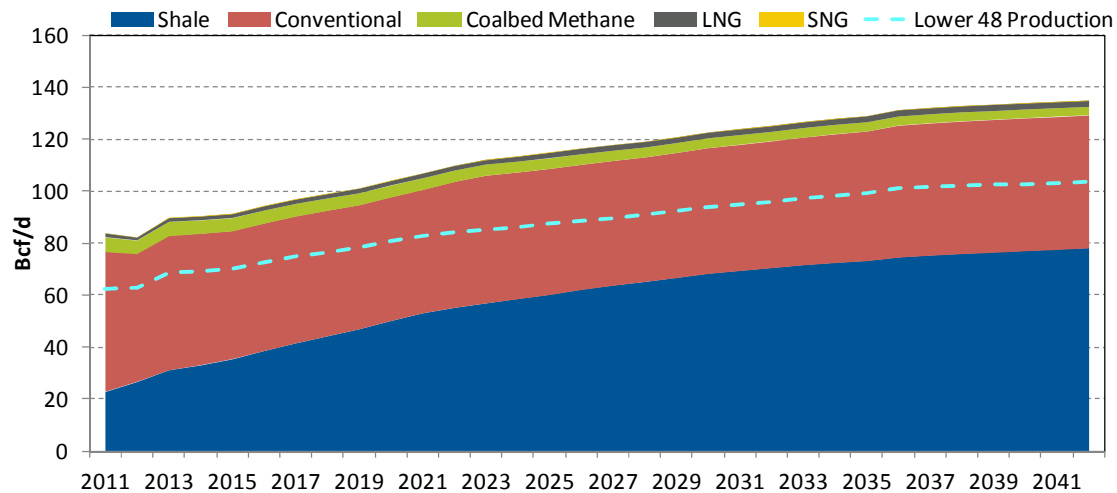
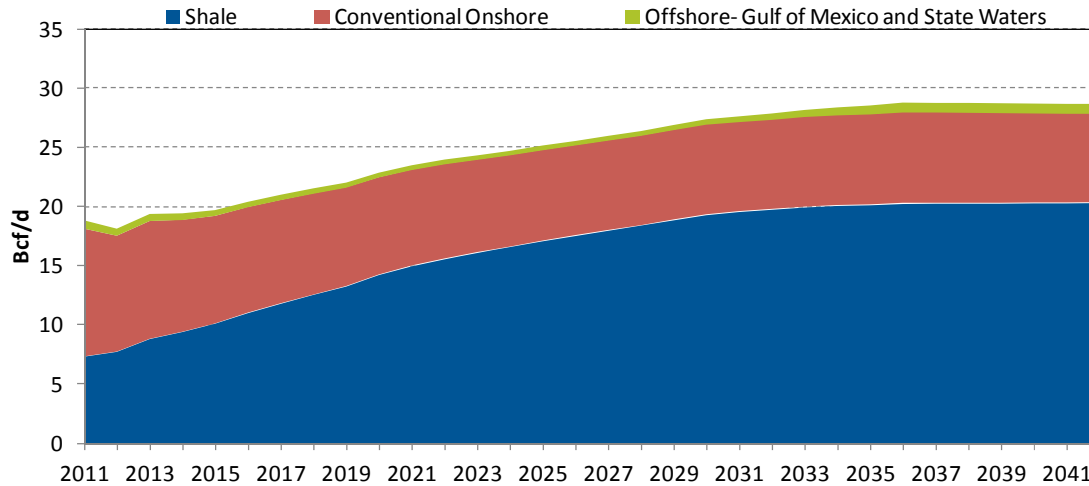


Figure 13 presents historical and projected natural gas production in Texas. Production from offshore and conventional on-shore production are projected to decline from 10.5

Bcf/d to 8.3 Bcf/d by 2042. However, the decline will be offset by growth from shale plays, (especially the Eagle Ford Shale), which results in a net increase of 9.3 Bcf/d over the analysis period. This represents a growth rate of 1.37 % per annum.

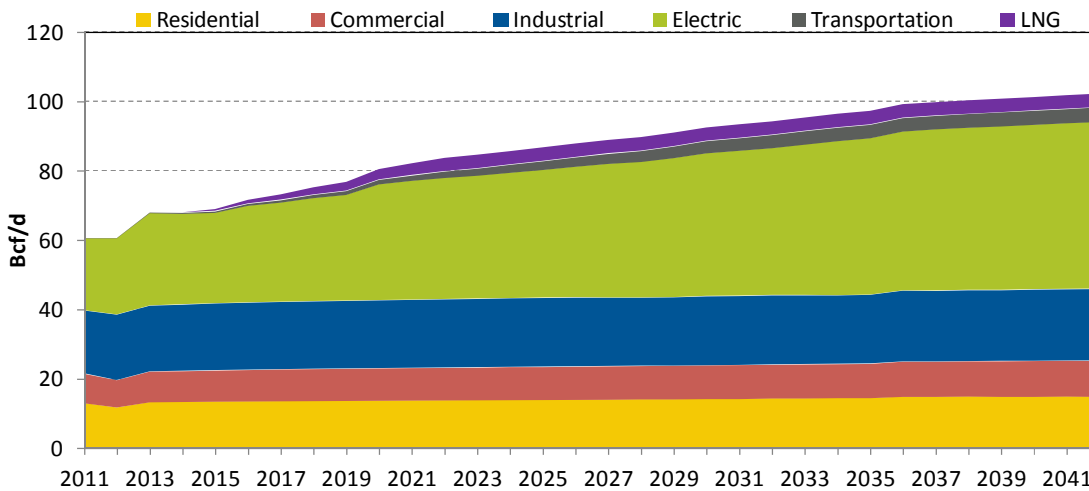
Figure 13: Historical and Projected Texas Production



Demand

Black & Veatch expects Lower 48 natural gas demand to grow from 67.9 Bcf/d to 102.2 Bcf/d, an average growth rate of 1.42% per annum, from 2013 through 2042. This growth is largely driven by growing demand for natural gas-fired power generation.

Figure 14: Historical and Projected Lower 48 Demand for Natural Gas



Power generation is expected to be the main driver of demand growth in the North American natural gas market. Historically, the generation fuel mix in the U.S. has been dominated by coal given its low and relatively stable price behavior compared to alternate fuels such as oil and natural gas. However, coal has begun to fall out of favor as the power generation fuel of choice. Several challenges with coal make natural gas a more attractive power fuel: (1) difficulties associated with citing and permitting of coal plants, (2) the long lead times associated with coal plant construction, and (3) the need for a stable and

predictable regulatory environment to ensure capital recovery. In addition, coal prices and price volatility have been on the rise since 2005 due to increasing demand-pull from developing countries such as China and India.

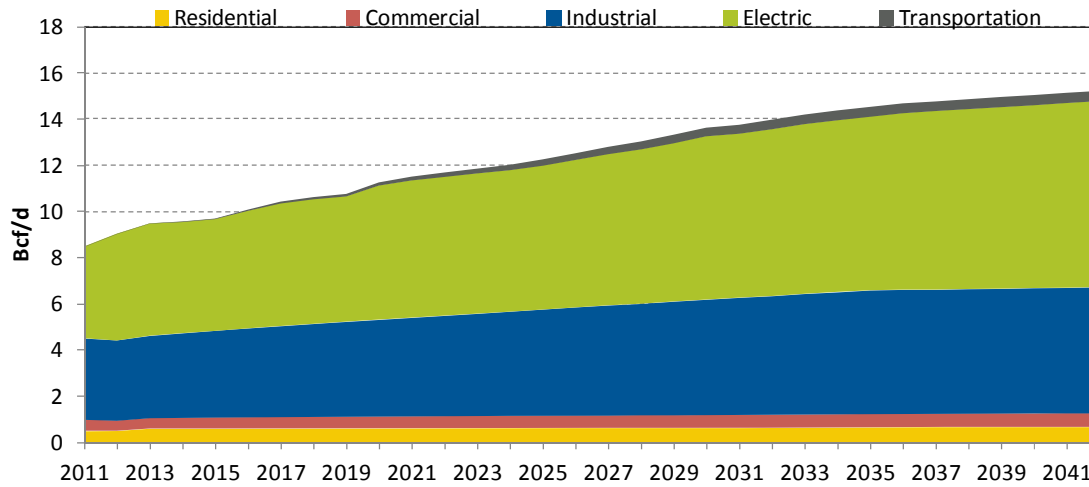
In addition, the expectation of emissions-reduction policies will substantially impact the development of coal-fired power generation plants. Various legislative actions have been proposed to regulate greenhouse gas emissions by levying additional costs that correspond to these emissions. Political disagreement and economic reality have further complicated the debate and delayed implementation. However, it is Black & Veatch's view that some form of regulation controlling greenhouse gas emissions will be adopted in the future.

When the cost of greenhouse gas compliance for fossil fuel generation is incorporated, natural gas becomes a leading choice of fuel for new generation capacity. While renewables and nuclear generation are viewed as environmentally friendly sources of electricity, the limited availability of opportunities, challenges with the transmission grid and long construction periods (especially for nuclear) make it highly unlikely that a significant portion of future load growth will be met with these resources. Natural gas-fired generation is positioned to be key to meeting the twin objectives of satisfying load growth and lowering greenhouse gas emissions. This position has only been bolstered by the substantial increase in natural gas supply enabled by shale resources. The pace of economic growth as well as the timing and extent of costs related to greenhouse gas emissions are key variables impacting both natural gas demand for power generation and the ultimate growth of the natural gas industry. Black & Veatch projections indicate that the share of natural gas in providing energy for the U.S. is expected to double between 2013 and 2037.

Overall, Black & Veatch anticipates a slight recovery of industrial demand from the past few years as the economy recovers from the current recession. As U.S. natural gas remains relatively inexpensive compared to alternative fuels and relative to other regions, industrial demand is expected to experience moderate growth in the long run. Residential and commercial demand is expected to remain flat as demand growth due to population and economic growth are offset by energy efficiency gains.

Figure 15 shows historical and projected demand for natural gas in Texas. Compared to other U.S. regions, Texas is expected to experience moderate demand growth led by the electric sector demand. Demand from the electric sector is expected to grow at 2.08% per year while demand from the residential and commercial sectors is expected to grow at 0.46% per year. Demand from the industrial sector is projected to grow at 0.2% per year during the analysis period.

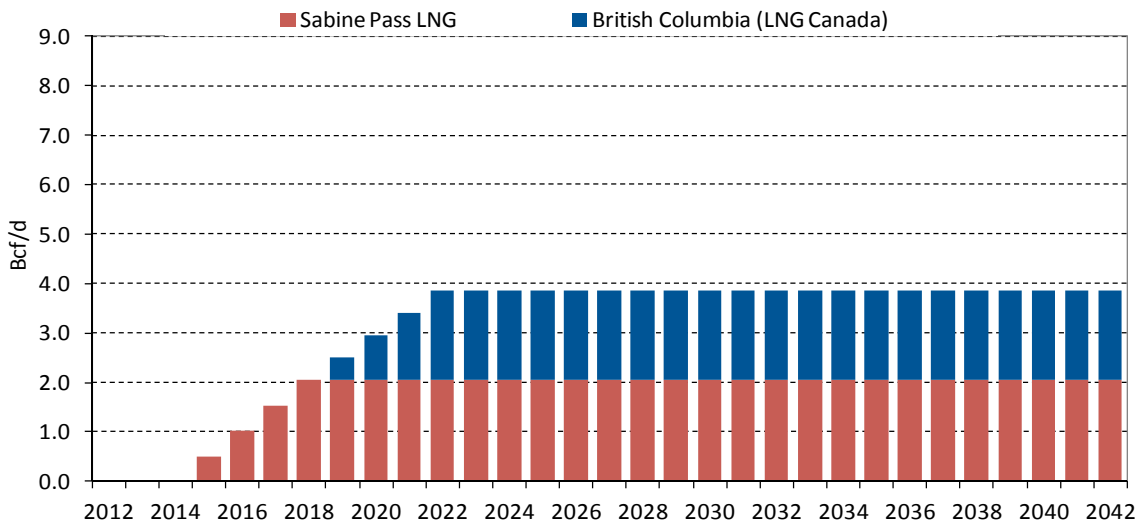
Figure 15: Historical and Projected Texas Demand for Natural Gas



LNG Exports

The shale gas phenomenon has the potential to transform the U.S. market from an import destination to a source of exports. Black & Veatch included two export terminals in its *Base Case* assumptions: A new LNG export terminal in British Columbia and the Sabine Pass liquefaction terminal developed by Cheniere Energy. Figure 16 represents Black & Veatch’s *Base Case* export assumption.

Figure 16: Projected Natural Gas Demand by LNG Export Terminal– Base Case



Pipeline Infrastructure

Black & Veatch included all existing North American natural gas pipeline infrastructure in its projection as well as proposed interstate pipeline projects that are under construction and have held a successful binding open season, or have obtained regulatory approvals. Appendix A includes the major pipeline projects that Black & Veatch incorporated in the Base Case.

6.0 Scenario Assumptions

Black & Veatch created three scenarios in addition to the *Base Case* in order to examine the potential impact of the ST LNG Project on natural gas prices across the U.S..

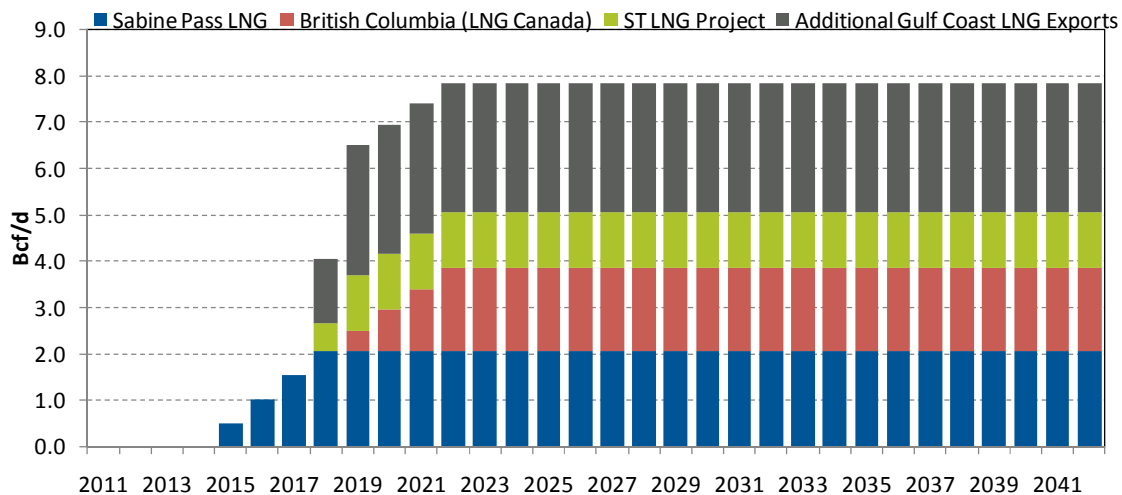
WITH ST LNG PROJECT EXPORTS SCENARIO

In the *With ST LNG Project Exports* scenario, an additional 1.2 Bcf/d of natural gas demand is created due to LNG exports from the ST LNG Project by April 2019. As currently proposed, Phase 1 of the project will consist of a single train liquefaction facility with a demand of 600 MMcf/d to be brought into service by April 2018. The facility’s capacity will be increased in a Phase 2 expansion that will add a second train and additional demand of 600 MMcf/d by April 2019.

HIGH LNG EXPORTS SCENARIOS

In the *High LNG Exports* scenario, Black & Veatch further added an additional 2.8 Bcf/d of natural gas demand due to LNG exports from the Gulf Coast to stress test the *Base Case* results. This scenario tests the market price impact of such additional Gulf Coast exports (relative to the *Base Case*) on regional and national market prices during the analysis period. As shown in Figure 17, additional natural gas demand associated with LNG exports above the *With ST LNG Project Exports* assumed starting in 2020, increasing in annual increments of 1.4 Bcf/d to 2.8 Bcf/d by 2023. Given the uncertainty regarding the timing and quantity of each train of LNG being brought online, we assumed that the LNG export volumes are phased in with equal volumes over multiple years, as an approximation. The *High LNG Exports with ST LNG Project Exports* scenario, which adds an additional assumption of 1.2 Bcf/d of demand from the ST LNG Project to the *High LNG Exports* scenario, was utilized to assess the market impact of the ST LNG project under an environment with greater North American LNG exports than assumed in the *Base Case*.

Figure 17: Natural Gas Demand By LNG Export Terminal – High LNG Exports with ST LNG Project Exports Scenario

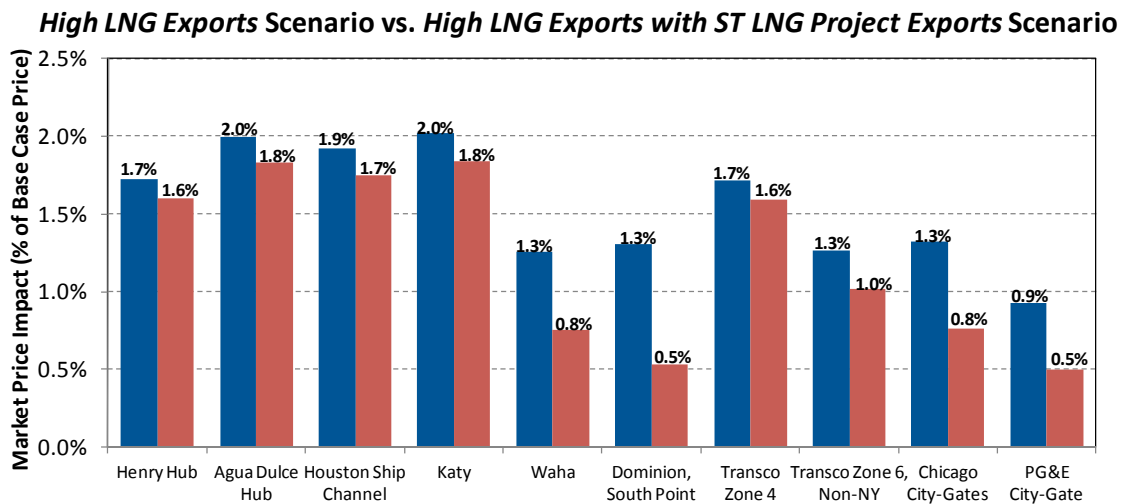
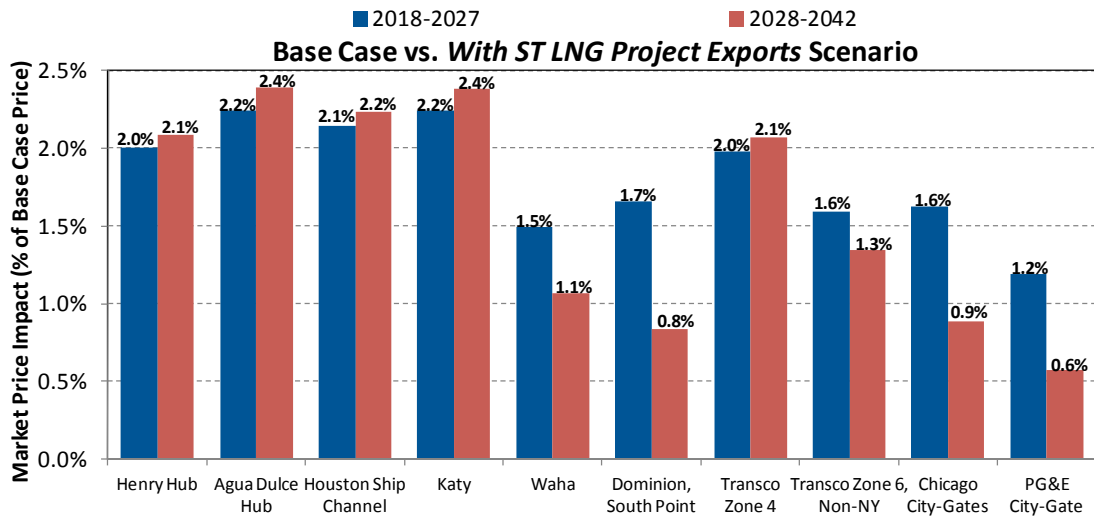


7.0 National and Regional Price Impacts

Black & Veatch’s independent assessment examined the market price impacts of the proposed ST LNG Project. Across various scenarios, we have observed that the proposed export volumes will have limited impact on regional South Texas or national price levels at Henry Hub during the analysis period, as shown in Figure 2.

The projected market price impact of the ST LNG Project is expected to be similar across the pricing points closest to the ST LNG Project. The impact estimated at more remote pricing points tends to be smaller in both the *Base Case* and *High LNG Exports* scenario, as shown in Figure 2.

Figure 2: Projected Market Price Impact across Pricing Points



At Dominion, South Point, the market price impact is muted due to the continued growth of Marcellus Shale production, which is assumed to reach 12.1 Bcf/d by 2018 and 24.4 Bcf/d by 2042. Black & Veatch expects Marcellus production to serve demand in the Northeast, Midwest, and Southeast U.S. in the face of demand growth as well as declines from

traditional supply sources. The price impact at Dominion, South point will diminish as additional supplies originate from the Appalachian basin.

The market price impact of the ST LNG Project at Dominion South is projected to be \$0.10/MMBtu (1.7%) over the first 10 years of the analysis period and \$0.06/MMBtu (0.8%) for the final 15 years the analysis period when compared to the *Base Case*. A similar price impact is observed when compared to the *High LNG Exports* scenario, leading to an increase of \$0.08/MMBtu (1.3%) from 2018-2027 that diminishes to \$0.04/MMBtu (0.5%) from 2028-2042. See Table 5.

Table 5: Market Price Impact at Dominion, South Point

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
2018-2027 Average Price (\$/MMBtu)	5.83	5.93	6.05	6.13
2018-2027 Average Diff. from Base		0.10		0.08
2018-2027 Percentage Increase		1.7%		1.3%
2028-2042 Average Price (\$/MMBtu)	7.68	7.74	7.82	7.87
2028-2042 Average Diff. from Base		0.06		0.04
2028-2042 Percentage Increase		0.8%		0.5%

Natural Gas prices in the Southeast U.S., measured at Transco Zone 4, are expected to experience a price impact due to LNG exports similar to that experienced by Gulf Coast pricing points.

Table 6: Market Price Impact at Transco Zone 4

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
2018-2027 Average Price (\$/MMBtu)	6.08	6.20	6.34	6.45
2018-2027 Average Diff. from Base		0.12		0.11
2018-2027 Percentage Increase		2.0%		1.7%
2028-2042 Average Price (\$/MMBtu)	8.56	8.74	8.92	9.06
2028-2042 Average Diff. from Base		0.18		0.14
2028-2042 Percentage Increase		2.1%		1.6%

The market price impact of the ST LNG Project at the Houston Ship Channel is projected to be \$0.13/MMBtu (2.1%) for the first 10 years of the analysis period and \$ 0.19/MMBtu (2.2%) for the remaining 15 years of the analysis period compared to the *Base Case*. A similar price impact is observed when compared to the *High LNG Exports* scenario, leading to an increase of \$0.12/MMBtu (1.9%) from 2018-2027 and \$0.16/MMBtu (1.7%) from 2028-2042. See Table 7.

Table 7: Market Price Impact at Houston Ship Channel

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
2018-2027 Average Price (\$/MMBtu)	6.02	6.15	6.28	6.40
2018-2027 Average Diff. from Base		0.13		0.12
2018-2027 Percentage Increase		2.1%		1.9%
2028-2042 Average Price (\$/MMBtu)	8.55	8.74	8.89	9.04
2028-2042 Average Diff. from Base		0.19		0.16
2028-2042 Percentage Increase		2.2%		1.7%

Table 8: Market Price Impact at Katy

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
2018-2027 Average Price (\$/MMBtu)	5.93	6.07	6.19	6.31
2018-2027 Average Diff. from Base		0.13		0.12
2018-2027 Percentage Increase		2.2%		2.0%
2028-2042 Average Price (\$/MMBtu)	8.39	8.59	8.73	8.89
2028-2042 Average Diff. from Base		0.20		0.16
2028-2042 Percentage Increase		2.4%		1.8%

Table 9: Market Price Impact at Waha

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
2018-2027 Average Price (\$/MMBtu)	5.60	5.68	5.83	5.90
2018-2027 Average Diff. from Base		0.08		0.07
2018-2027 Percentage Increase		1.5%		1.3%
2028-2042 Average Price (\$/MMBtu)	7.30	7.38	7.54	7.60
2028-2042 Average Diff. from Base		0.08		0.06
2028-2042 Percentage Increase		1.1%		0.8%

Given the projection for ample North American natural gas production, Black & Veatch’s assessment indicates that exports from the ST LNG Project will lead to minimal price increases of approximately 2% to nearby market in South Texas and Louisiana. A lesser price impact is expected in major downstream markets (the Northeast, Chicago, California), with potential price impacts ranging from \$0.05/MMBtu (0.6%) to \$0.07/MMBtu (1.6%) over the last 15 years of the analysis period of the *Base Case*. This impact is even less pronounced when a greater level of LNG exports is assumed in the *High LNG Exports* scenario.

Pangea LNG (North America) Holdings, LLC

MARKET PRICE IMPACT STUDY FOR LNG EXPORTS AT THE SOUTH TEXAS LNG PROJECT

Table 10: Market Price Impact at Chicago City-Gates

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
Average Price (\$/MMBtu)	5.83	5.92	6.06	6.14
2018-2027 Average Diff. from Base		0.09		0.08
Percentage Increase		1.6%		1.3%
Average Price (\$/MMBtu)	8.52	8.60	8.71	8.77
2028-2042 Average Diff. from Base		0.07		0.07
Percentage Increase		0.9%		0.8%

Table 11: Market Price Impact at Transco Zone 6, Non-NY

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
Average Price (\$/MMBtu)	6.34	6.44	6.57	6.66
2018-2027 Average Diff. from Base		0.10		0.08
Percentage Increase		1.6%		1.3%
Average Price (\$/MMBtu)	8.86	8.97	9.13	9.22
2028-2042 Average Diff. from Base		0.12		0.09
Percentage Increase		1.3%		1.0%

Table 12: Market Price Impact at PG&E City-Gate

	Base Case	With ST LNG Project Exports	High LNG Exports	High LNG Exports with ST LNG Project
Average Price (\$/MMBtu)	6.00	6.07	6.17	6.23
2018-2027 Average Diff. from Base		0.07		0.06
Percentage Increase		1.2%		0.9%
Average Price (\$/MMBtu)	8.85	8.90	8.98	9.02
2028-2042 Average Diff. from Base		0.05		0.04
Percentage Increase		0.6%		0.5%

Appendix A – Major Natural Gas Pipeline Expansions

PIPELINE	IN-SERVICE DATE	CAPACITY
Constitution Pipeline	Apr-2015	650
Dominion Appalachian Gateway	Sep-12	484
East Tennessee Northeastern Tennessee (NET)	Sep-11	150
Empire Tioga County Extension	Sep-11	350
ETC Tiger Expansion	Aug-11	400
Inergy Stagecoach Hub North-South Project	Nov-11	325
Inergy Stagecoach Hub MARC I Hub	Jul-12	550
Iroquois Wright Transfer Compressor	Jul-12	375
Millennium Laser Gathering Supply Link	Aug-11	400
National Fuel Northern Access	Sep-12	320
National Fuel Line N Expansion	Nov-12 & Nov-13	165 & 30
REX East to West Flow	Nov-13	100
Tennessee NE Supply Diversification	Nov-12	250
Tennessee NE Supply	Nov-13	636
Tennessee Northeast Project	Nov-13	636
Texas Eastern NJ/NY Expansion	Nov-13	800

Pangea LNG (North America) Holdings, LLC

MARKET PRICE IMPACT STUDY FOR LNG EXPORTS AT THE SOUTH TEXAS LNG PROJECT

PIPELINE	IN-SERVICE DATE	CAPACITY
Texas Eastern TEAM 2012	Nov-12	190
Texas Eastern TEAM 2014	Nov-14	600
Transco Z6 Atlantic Access	Dec-14	1100
Transco Bayonne Lateral Expansion	Jan-13	250
Transco Mid-Atlantic Connector (MAC) Expansion	Nov-12	142
Transco NE Supply Link Expansion	Nov-13	250
Transco Rockaway Lateral Expansion	Apr-14	100

APPENDIX B – THE PERRYMAN REPORT

December 2012

**The Impact of Construction and Operation of Pangea's
South Texas LNG Export Project on Business Activity in the
Corpus Christi Area**

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INTRODUCTION



INTRODUCTION

Pangea LNG (North America) Holdings, LLC (Pangea) is planning to construct and operate a liquefied natural gas (LNG) export facility and associated natural gas pipeline near Corpus Christi, Texas (the South Texas LNG Export Project). The Perryman Group (TPG) conducted an analysis of the proposed project and identified substantial, long-term economic benefits including job creation, economic investment, and tax revenue. The project as currently envisioned would involve a combination of floating and on-shore assets, as well as a 27-mile natural gas pipeline, with a total cost in the range of \$5-8 billion, though only a fraction of this investment would occur within the United States and the local area.

Direct investments to construct and operate facilities needed to export LNG through the proposed facility would lead to a sizable stimulus in a variety of sectors, as well as generating spill-over benefits for an even wider range of businesses. In addition, the potential project would support substantial fiscal revenues for governments at all levels.

To measure the total economic benefits stemming from the South Texas LNG Export Project, The Perryman Group utilized its proprietary US Multi-Regional Impact Assessment System. The economic benefits were quantified for the Corpus Christi Metropolitan Statistical Area (MSA—Aransas, Nueces, and San Patricio counties), which was found to be the primary impact area through an assessment of economic linkages in the region.

The Perryman Group estimates that construction and preoperational spending associated with the proposed South Texas LNG Project would lead to total economic gains in the Corpus Christi MSA of more than \$1.4 billion in gross product and 17,230 person-years of employment. The economic benefits of the facility once fully operational include some \$151.0 million in gross product each year for the Corpus Christi MSA, as well as creation of 1,340 permanent jobs. The local area would also see considerable incremental tax receipts. In addition to these gains in business activity, operations of the facilities would stimulate further natural gas production in a broader region, providing further economic stimulus. For the United States as a whole, The Perryman Group's summary analysis based on prior studies shows that the construction and preoperational spending for the project would result in a gain of business activity of about \$2.1 billion in gross product and 25,300 person-years of employment. Nationwide operational gains in business activity (including incremental natural gas production) would include approximately \$2.7 billion in gross product and 29,860 permanent jobs.



TPG is an economic research and analysis firm with more than 30 years of experience in assessing economic impacts, including hundreds of corporate expansions and LNG projects similar to the one proposed by Pangea. The firm developed and has maintained econometric models (providing current and forecast economic and demographic information) for the project area since the early 1980s. For further information regarding the firm, see Appendix A.



THE PROPOSED PROJECT AND PRIMARY ECONOMIC IMPACT AREA



THE PROPOSED PROJECT AND PRIMARY ECONOMIC IMPACT AREA

The Proposed South Texas LNG Export Project

As noted, the South Texas LNG Export Project would involve a combination of floating and on-shore assets as well as an associated natural gas pipeline. Plans call for construction in two phases, each of which involves four million tons of annual capacity. Phase 2 construction is anticipated to begin approximately 12-18 months¹ after Phase 1, with completion at the end of year three for Phase 1 and the end of year four for Phase 2.

The investment in on-shore infrastructure is expected to total \$975 million over the approximately four-year period. Major components of these expenditures involve dredging, approximately 27 miles of pipeline through San Patricio County and interconnects with interstate and intrastate pipelines, cryogenic piping and interconnections at the site, buildings and other construction, civil engineering, and electric generation turbine installation.

Once operational, the South Texas LNG Export Project will have an estimated send-out capacity of eight million tonnes of liquefied natural gas per year. Employment at the facility was estimated by The Perryman Group based on patterns observed and expected at similarly sized LNG operations.

Primary Impact Area

As an initial phase of this analysis, The Perryman Group defined the primary impact area associated with construction and operation of the South Texas LNG Export Project facilities. The firm's US Multi-Regional Impact Assessment System was utilized in this stage of the assessment to quantify spillover benefits to the surrounding area. It was found that the primary benefits of the project would occur within the Corpus Christi Metropolitan Area.

¹ For study purposes, construction of Phase 2 was assumed to begin 18 months after Phase 1.



Other areas beyond Corpus Christi will also see economic gains stemming from the project. The Perryman Group has performed multiple analyses of liquefaction projects located in different parts of the state and has consistently found that the benefits for the United States as a whole exceed those for the primary impact area by a significant margin.



ECONOMIC BENEFITS OF THE SOUTH TEXAS LNG EXPORT PROJECT



ECONOMIC BENEFITS OF THE SOUTH TEXAS LNG EXPORT PROJECT

Natural gas demand continues to rise, both in the US and internationally, as a result of its thermal efficiencies and clean burning qualities. Because natural gas is viewed as being environmentally superior to coal and fuel oils, it has become the fuel of choice for numerous applications. Many developing economies around the world are recognizing the value natural gas provides to facilitate growth, from its low cost to its environmentally sensitive properties, and are looking for additional sources of the fuel.

The supply of natural gas in the United States is increasing as a consequence of refined gas exploration and production technology and the discovery of numerous major shale formations containing huge quantities. Converting natural gas to LNG for export would potentially serve to ensure the ongoing development of US natural gas resources by providing access to world markets. Further, the ability to export domestic gas as LNG greatly expands the market scope and access for domestic natural gas producers, encouraging domestic production at times when US market prices might not otherwise do so.

Several sources of economic benefits stemming from the proposed South Texas LNG Export Project were measured. These include the impacts of:

- construction and pre-operational activity,
- ongoing operations, and
- additional natural gas production.

Following an explanation of the methods used in this study, key summary results for each channel of economic effects are presented. A sectoral breakout of gains in business activity is presented in the appendices to this report, together with additional methodological explanation.

Measuring Economic Impacts

Any investment or corporate activity generates multiplier effects throughout the economy. Construction and development of a facility lead to purchases ranging



from concrete to engineering services to landscaping. Ongoing operations also stimulate business activity through purchases and the expenditures by employees of payroll dollars for various goods and services.

In addition, the construction and operation of a liquefaction facility will encourage further development of natural gas resources by providing a ready market for LNG exports. Exploration, drilling, production, servicing, pipeline development and operations, royalty payments, and other direct expenditures associated with natural gas exploration and production involve substantial gains.

The Perryman Group's input-output assessment model uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. An associated fiscal model allows for estimation of tax receipts to state and local entities. The submodels used in the current analysis reflect the specific industrial composition and characteristics of the Corpus Christi MSA (the primary impact area).

Impacts were quantified for the following measures of business activity:

- **Total expenditures** (or total spending) measures the dollars changing hands as a result of the economic stimulus.
- **Gross product** (or output) is production of goods and services that will come about in each area as a result of the activity. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
- **Personal income** is dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
- **Job gains** are expressed as **person-years** of employment (one person working for one year) for temporary projects (such as construction of a facility or cumulative assessments over time) or as permanent jobs when evaluating ongoing annual effects.

All results are expressed in constant (2012) dollars. Additional information is provided in the appendices to this report. It should be noted that the planning of this project is in its early stages; as a result, some of the detail within various categories was estimated based on patterns consistently observed in other LNG facilities analyzed by TPG.



Construction and Pre-Operational Activity

As noted, a substantial capital investment will be required by Pangea to facilitate the exportation of LNG. While a sizable portion of procurement may occur outside the United States, local construction activity and other pre-operational development nonetheless lead to sizable gains in business activity.

Estimated construction costs were provided by Pangea; The Perryman Group reviewed these estimates and found that they were reasonable in light of similar initiatives (adjusted for the nature of a partially floating facility). TPG did not, however, independently verify these estimates. TPG further assumed that all initial costs conform to current projections, with direct purchases allocated to the local area based on capacity and historical patterns.

Gains in business activity for the primary impact area stemming from construction and related outlays were found to include more than \$1.4 billion in gross product and 17,230 person-years of employment. In addition, the area would also see an increase in tax receipts stemming from construction and pre-operational activities as depicted in the following table. (Although the fiscal outlays to support this project are unlikely to be significant given the nature of the Corpus Christi area economy, all fiscal effects reported throughout this analysis are determined on a “net” basis.)



The Anticipated Cumulative Impact of Construction and Other Pre-Operational Activities Associated with the Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi MSA
(Monetary Values in Millions of Constant 2012 Dollars)

ECONOMIC BENEFITS			
	Phase 1	Phase 2	Total (Phases 1 and 2)
Total Expenditures	\$1,987.2	\$966.4	\$2,953.6
Gross Product	\$953.6	\$464.0	\$1,417.7
Personal Income	\$665.8	\$323.0	\$988.7
Retail Sales	\$276.2	\$136.5	\$412.8
Employment (Total Person-Years)	11,580	5,650	17,230
Employment (Average Annual)*	3,860	2,260	4,310
FISCAL BENEFITS			
Federal	\$103.1	\$62.5	\$165.6
State (Texas)	\$74.3	\$37.2	\$111.5
Other States	\$6.2	\$6.2	\$12.4
Corpus Christi MSA	\$25.9	\$13.0	\$38.9
Other Local Governmental Entities Across the US	\$9.0	\$9.0	\$17.9
* Assumes all initial costs and timing conform to current projections. Direct purchases are allocated across geographic areas based on capacity and historical patterns.			

Based on the patterns in other projects, **employment during the peak period is likely to be in the range of 6,000-6,500 person years.**



Ongoing Operations of the Facilities

The South Texas LNG Export Project would serve as an ongoing stimulus to the area, through purchases and payroll. The Perryman Group estimates that economic benefits of ongoing operations of the South Texas LNG Export Project (based on patterns in other facilities and adjusted for volume) when Phase 1 operations begin include \$75.5 million in gross product each year in the primary impact area as well as 670 permanent jobs.² Once both phases are in place, the benefits rise to \$151.0 million in gross product and 1,340 permanent jobs. Incremental tax receipts at all levels are also notable as depicted in the table below.

² The project is still in the early stages of planning, and the likely employment at the site at maturity was derived based on analysis of patterns for similar facilities. It is possible that Phase 2 will involve some economies of scale. For simplification purposes, TPG assumed the project's overall likely impact was equally divided between Phase 1 and Phase 2, thus potentially understating effects in early years.



**The Anticipated Annual Impact of Ongoing Operations
Associated with the Implementation of the Proposed South
Texas LNG Export Project on Business Activity in the Corpus
Christi MSA**

(Monetary Values in Millions of Constant 2012 Dollars)

ECONOMIC BENEFITS			
	Phase 1	Phase 2	Total (Phases 1 and 2)
Total Expenditures	\$346.1	\$346.1	\$692.3
Gross Product	\$75.5	\$75.5	\$151.0
Personal Income	\$42.8	\$42.8	\$85.5
Retail Sales	\$18.6	\$18.6	\$37.2
Employment (Permanent Jobs)	670	670	1,340
FISCAL BENEFITS			
Federal	\$7.0	\$7.0	\$14.1
State (Texas)	\$4.9	\$4.9	\$9.8
Other States	\$0.7	\$0.7	\$1.4
Corpus Christi MSA	\$1.7	\$1.7	\$3.4
Other Local Governmental Entities Throughout the US	\$0.9	\$0.9	\$1.7

Once operational, the South Texas LNG Export Project will support jobs across a spectrum of industries as indicated in the Appendices to this report.

Enhanced Natural Gas Production

Exports through the South Texas LNG Export Project will also likely stimulate additional development of natural gas resources by providing a mechanism to export LNG. This development involves sizable investment in exploration and production activity and, thus, further economic stimulus. While this development could occur in



various parts of the United States, for study purposes it was assumed that spillover benefits occurred within the Corpus Christi MSA, which has a notable established base in relevant support industries.

The Perryman Group estimates that in a typical year, incremental natural gas production associated with each phase of the South Texas LNG Export Project would lead to spillover benefits in Corpus Christi of \$153.8 million in gross product and 1,910 jobs (\$307.6 million in gross product and 3,820 permanent jobs for the project as a whole).



**The Potential Annual Impact in a “Typical” Year of Natural Gas Exploration and Production Stimulus Required to Maintain the Level of Incremental Natural Gas Production Associated with the Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi MSA
(Monetary Values in Millions of Constant 2012 Dollars)**

ECONOMIC BENEFITS			
	Phase 1	Phase 2	Total (Phases 1 and 2)
Total Expenditures	\$322.8	\$322.8	\$645.5
Gross Product	\$153.8	\$153.8	\$307.6
Personal Income	\$96.5	\$96.5	\$193.0
Retail Sales	\$63.7	\$63.7	\$127.4
Employment (Permanent Jobs)	1,910	1,910	3,820
FISCAL BENEFITS			
Federal	\$2,647.1	\$2,647.1	\$5,294.2
State (Texas)	\$1,678.5	\$1,678.5	\$3,357.0
Other States	\$75.6	\$75.6	\$151.1
Corpus Christi MSA	\$142.7	\$142.7	\$285.3
Other Governmental Entities Throughout the US	\$755.6	\$755.6	\$1,511.2

Likely US Effects

The business model utilized by Pangea (with floating assets constructed outside of the United States) tends to reduce the preoperational economic benefits relative to other liquefaction operations of similar size. However, once the South Texas LNG Export Project is in operation, it is likely to generate a similar stimulus to the national



economy (relative to other facilities). Effects on the US balance of payments and energy security are also expected to be in line with similarly sized facilities.

Although a full analysis of the impact of the South Texas LNG Export Project facilities on business activity in the United States was beyond the scope of this study, The Perryman Group performed a summary analysis of approximate benefits for the nation as a whole based on patterns in prior studies.

During Phase 1 of construction, the gain in business activity for the United States is likely to include approximately \$1.3 billion in gross product and 15,530 person-years of employment. Phase 2 involves an additional \$823.7 million in gross product and 9,740 person-years of employment, for a total gain during the preoperational and construction period of approximately \$2.1 billion in gross product and 25,300 person-years of employment.

Once the facility is operational, ongoing gains in business activity were estimated to be approximately \$236.9 million in gross product and 2,060 permanent jobs. In addition to these benefits stemming from the facility itself, enhanced natural gas production could be expected to generate gains in business activity in the US of approximately \$2.5 billion in gross product and 27,800 jobs. The total ongoing benefits are, thus, approximately \$2.7 billion in gross product and 29,860 permanent jobs.

Other Potential Considerations

The Corpus Christi area has a large construction workforce (relative to peak requirements) with extensive experience in refining and petrochemical facilities and related construction. As a result, virtually all of the workforce will likely be available in the region, and it is not anticipated that any temporary housing will be required or that construction workers would be housed in hotels to any significant degree. (Note that this analysis is limited to the South Texas LNG Export Project facilities and does not include the potential effects of other large projects that might be developed simultaneously in the region.)

Given the availability of the necessary workforce in the local area, it is not anticipated that the project will require a significant number of net new residences. However, because of the creation of high paying direct and spinoff jobs, the value of local housing is likely to increase (as there is a greater demand for higher quality owner-occupied and rental housing).

Because it is unlikely that hotels would be used to house construction workers to a significant degree, incremental needs would stem primarily from visitors to the site

such as off-site personnel or suppliers. (Recall that, as noted earlier, this analysis does not account for other regional facilities that could possibly be developed contemporaneously.) This relatively low volume is not likely to significantly affect local market conditions.

As a conservative and simplifying assumption for study purposes, it was assumed that no additional housing or hotel space would be constructed as a result of the South Texas LNG Export Project.

Balance of Trade Benefits

Improving the US balance of trade is a stated policy goal; increasing US exports reduces the balance of trade deficit the US has experienced for many years. The South Texas LNG Export Project would help improve the balance of trade by increasing US exports of LNG.

The Perryman Group estimates that exports through the facility would have a value in the range of \$3.691 billion to \$5.969 billion per year based on current prices, and would improve the US balance of payments. (The actual amount will depend on destination, transportation costs, and other market factors.) These estimates assume displacement of imports of oil and natural gas liquids (other than ethane) and export of LNG. They are based on two scenarios which reflect alternative market situations. The “low” scenario reflects a situation characterized by distant destinations (such as Asia) with high shipping costs, low prices (50% of the oil-indexed export price), and a relatively low volume of exportable byproduct liquids. The “high” scenario reflects a situation of relatively proximate (South American) customers (and, thus, low shipping costs (90% of the indexed oil export prices)), and relatively high volumes of liquid byproducts. Although the calculations of these effects are straightforward, the wide range of unknown factors necessitates the use of scenarios to provide a reasonable range of potential outcomes.

Based on projections of future gas prices by the Energy Information Administration and other sources, this amount is expected to increase over time.



CONCLUSION



CONCLUSION

The proposed South Texas LNG Export Project would generate a substantial economic stimulus through construction and ongoing operations. The Perryman Group estimates that if costs are incurred as projected, construction and other pre-operational spending related to the South Texas LNG Export Project would lead to gains in business activity in the Corpus Christi MSA of more than \$1.4 billion in gross product and 17,230 person-years of employment for both phases of the project. Gains would occur across a broad spectrum of industries. For the United States as a whole, likely construction and preoperational gains would be approximately \$2.1 billion in gross product and 25,300 person-years of employment (based on results from similar studies).

The economic benefits of the South Texas LNG Export Project once both phases are fully operational include some \$151.0 million in gross product each year for Corpus Christi as well as 1,340 permanent jobs (\$236.9 million in gross product and 2,060 jobs nationwide). Enhanced natural gas production associated with exporting through the South Texas LNG Export Project has the potential for even larger gains of an estimated \$2.5 billion in gross product each year and 27,800 permanent jobs. Overall, the ongoing benefits for the US economy stemming from the facility are estimated to be about \$2.7 billion in gross product and 29,860 permanent jobs.

Growth in the US supply of natural gas and the emerging needs for natural gas in the form of LNG in international markets have resulted in a situation where exporting LNG is a viable and attractive option. Investments in facilities for this purpose create substantial and long-lasting economic benefits. In particular, such exports from the South Texas LNG Export Project would lead to gains in business activity and improve the balance of trade by roughly \$4.8 billion per year (+/- 24%).



APPENDICES



APPENDIX A: The Perryman Group



The Perryman Group

The Perryman Group is an economic research and analysis firm based in Waco, Texas. The firm has more than 30 years of experience in assessing the economic impact of corporate expansions, regulatory changes, real estate developments, public policy initiatives, and myriad other factors affecting business activity. TPG has conducted hundreds of impact analyses for local areas, regions, and states throughout the U.S. Impact studies have been performed for hundreds of clients including many of the largest corporations in the world, governmental entities at all levels, educational institutions, major health care systems, utilities, and economic development organizations.

Dr. M. Ray Perryman, founder and President of the firm, developed the US Multi-Regional Impact Assessment System (used in this study) in the early 1980s and has consistently maintained, expanded, and updated it since that time. The model has been used in hundreds of diverse applications and has an excellent reputation for reliability.

The firm has conducted numerous investigations related to the oil and gas industry. These analyses have included, among others, forecasts, impact assessments, regulatory and environmental issues, and legislative and policy initiatives. Previous work by The Perryman Group includes an assessment of the effects of offshore drilling for the U.S. Department of the Interior, several studies of specific production areas, and projections of natural gas prices and output. Information has been prepared for the Interstate Oil Compact Commission, the U.S. Department of Energy, the Texas Railroad Commission, and numerous legislative committees regarding energy policy. Additionally, over the past several years, TPG has performed multiple comprehensive assessments of the impact of the Barnett Shale on the local northeast Texas area and the state of Texas, as well as a detailed analysis of the labor market in the Permian Basin oil and gas producing area of west Texas. The firm has also completed in-depth analyses of numerous refineries and petrochemical facilities, various aspects of natural gas taxation in Texas and Arkansas, as well as an analysis of another proposed liquefaction export project in Corpus Christi, as well as ones in other areas.

In addition, TPG has conducted several projects related to the manufacturing benefits associated with a major international pipeline project. The firm has also completed numerous studies specifically dealing with changes in the cost of energy resources, including electricity, oil, and natural gas on both a regional and national basis.

Dr. Perryman developed an econometric model of the area more than 30 years ago and has provided projections for the region on a continuing basis since the early 1980s. TPG has also conducted several projects specific to the region including comprehensive analysis of local housing values in the refinery area, assessments of local electricity demand and pricing, numerous economic development initiatives, and impact assessments for several local facilities.



APPENDIX B: Detailed Methodology



US Multi-Regional Impact Assessment System

The basic modeling technique employed in this study is known as dynamic input-output analysis. This methodology essentially uses extensive survey data, industry information, and a variety of corroborative source materials to create a matrix describing the various goods and services (known as resources or inputs) required to produce one unit (a dollar's worth) of output for a given sector. Once the base information is compiled, it can be mathematically simulated to generate evaluations of the magnitude of successive rounds of activity involved in the overall production process.

There are two essential steps in conducting an input-output analysis once the system is operational. The first major endeavor is to accurately define the levels of direct activity to be evaluated. In the case of a prospective evaluation, it is necessary to first calculate reasonable estimates of the direct activity. In this instance, data regarding construction costs and schedules and capacity was provided by Pangea and reviewed by The Perryman Group for reasonableness relative to similar initiatives. TPG did not conduct any independent verification. Anticipated staffing was estimated based on patterns in other facilities.

A variety of sources of data regarding natural gas markets, oil and gas exploration and production patterns, and other information necessary to the analysis were collected and analyzed by The Perryman Group. TPG made use of available studies by major private groups and the Energy Information Administration regarding natural gas supplies and pricing. In addition, allocations of local direct contributions made use of extensive databases from the Bureau of Economic Analysis. In particular, TPG used pricing projections developed for Pangea by Black & Veatch.

The second major phase of the analysis is the simulation of the input-output system to measure overall economic effects. The present study was conducted within the context of the US Multi-Regional Impact Assessment System (USMRIAS) which was developed and is maintained by The Perryman Group. This model has been used in hundreds of diverse applications across the country and has an excellent reputation for accuracy and credibility. The systems used in the current simulations reflect the unique industrial structure and characteristics of the Corpus Christi Metropolitan Area economy. The system was also used in defining the Impact Area, as simulations indicated sufficient spillover activity to establish benefits to the Corpus Christi MSA.

The USMRIAS is somewhat similar in format to the Input-Output Model of the United States and the Regional Input-Output Modeling System, both of which are maintained by the US Department of Commerce. The model developed by TPG, however, incorporates several important enhancements and refinements. Specifically, the expanded system includes (1) comprehensive 500-sector coverage for any county, multi-county, or urban region; (2) calculation of both total expenditures and value-added by industry and region; (3) direct

estimation of expenditures for multiple basic input choices (expenditures, output, income, or employment); (4) extensive parameter localization; (5) price adjustments for real and nominal assessments by sectors and areas; (6) measurement of the induced impacts associated with payrolls and consumer spending; (7) embedded modules to estimate multi-sectoral direct spending effects; (8) estimation of retail spending activity by consumers; and (9) comprehensive linkage and integration capabilities with a wide variety of econometric, real estate, occupational, and fiscal impact models. Moreover, the model uses specific local taxing patterns to estimate the fiscal effects of activity on a detailed sectoral basis. The models used for the present investigation have been thoroughly tested for reasonableness and historical reliability.

The impact assessment (input-output) process essentially estimates the amounts of all types of goods and services required to produce one unit (a dollar's worth) of a specific type of output. For purposes of illustrating the nature of the system, it is useful to think of inputs and outputs in dollar (rather than physical) terms. As an example, the construction of a new building will require specific dollar amounts of lumber, glass, concrete, hand tools, architectural services, interior design services, paint, plumbing, and numerous other elements. Each of these suppliers must, in turn, purchase additional dollar amounts of inputs. This process continues through multiple rounds of production, thus generating subsequent increments to business activity. The initial process of building the facility is known as the *direct effect*. The ensuing transactions in the output chain constitute the *indirect effect*.

Another pattern that arises in response to any direct economic activity comes from the payroll dollars received by employees at each stage of the production cycle. As workers are compensated, they use some of their income for taxes, savings, and purchases from external markets. A substantial portion, however, is spent locally on food, clothing, healthcare services, utilities, housing, recreation, and other items. Typical purchasing patterns in the relevant areas are obtained from the *ACCRA Cost of Living Index*, a privately compiled inter-regional measure which has been widely used for several decades, and the *Consumer Expenditure Survey* of the US Department of Labor. These initial outlays by area residents generate further secondary activity as local providers acquire inputs to meet this consumer demand. These consumer spending impacts are known as the *induced effect*. The USMRIAS is designed to provide realistic, yet conservative, estimates of these phenomena.

Sources for information used in this process include the Bureau of the Census, the Bureau of Labor Statistics, the Regional Economic Information System of the US Department of Commerce, and other public and private sources. The pricing data are compiled from the US Department of Labor and the US Department of Commerce. The verification and testing procedures make use of extensive public and private sources. Note that all monetary values are given in constant (2012) dollars to eliminate the effects of inflation. The USMRIAS generates estimates of the effect on several measures of business activity. The most comprehensive measure of economic activity used in this study is **Total**



Expenditures. This measure incorporates every dollar that changes hands in any transaction. For example, suppose a farmer sells wheat to a miller for \$0.50; the miller then sells flour to a baker for \$0.75; the baker, in turn, sells bread to a customer for \$1.25. The Total Expenditures recorded in this instance would be \$2.50, that is, $\$0.50 + \$0.75 + \$1.25$. This measure is quite broad, but is useful in that (1) it reflects the overall interplay of all industries in the economy, and (2) some key fiscal variables such as sales taxes are linked to aggregate spending.

A second measure of business activity frequently employed in this analysis is that of **Gross Product**. This indicator represents the regional equivalent of Gross Domestic Product, the most commonly reported statistic regarding national economic performance. In other words, the Gross Product of Arkansas is the amount of US output that is produced in that state; it is defined as the value of all final goods produced in a given region for a specific period of time. Stated differently, it captures the amount of value-added (gross area product) over intermediate goods and services at each stage of the production process, that is, it eliminates the double counting in the Total Expenditures concept. Using the example above, the Gross Product is \$1.25 (the value of the bread) rather than \$2.50. Alternatively, it may be viewed as the sum of the value-added by the farmer, \$0.50; the miller, \$0.25 ($\$0.75 - \0.50); and the baker, \$0.50 ($\$1.25 - \0.75). The total value-added is, therefore, \$1.25, which is equivalent to the final value of the bread. In many industries, the primary component of value-added is the wage and salary payments to employees.

The third gauge of economic activity used in this evaluation is **Personal Income**. As the name implies, Personal Income is simply the income received by individuals, whether in the form of wages, salaries, interest, dividends, proprietors' profits, or other sources. It may thus be viewed as the segment of overall impacts which flows directly to the citizenry. The fourth measure, **Retail Sales**, represents the component of Total Expenditures which occurs in retail outlets (general merchandise stores, automobile dealers and service stations, building materials stores, food stores, drugstores, restaurants, and so forth). Retail Sales is a commonly used measure of consumer activity.

The final aggregates used are **Permanent Jobs and Person-Years of Employment**. The Person-Years of Employment measure reveals the full-time equivalent jobs generated by an activity. It should be noted that, unlike the dollar values described above, Permanent Jobs is a "stock" rather than a "flow." In other words, if an area produces \$1 million in output in 2010 and \$1 million in 2011, it is appropriate to say that \$2 million was achieved in the 2010-2011 period. If the same area has 100 people working in 2010 and 100 in 2011, it only has 100 Permanent Jobs. When a flow of jobs is measured, such as in a construction project or a cumulative assessment over multiple years, it is appropriate to measure employment in Person-Years (a person working for a year). This concept is distinct from Permanent Jobs, which anticipates that the relevant positions will be maintained on a continuing basis.

APPENDIX C: Detailed Sectoral Results

Construction and Pre-Operational Activity



The Anticipated Cumulative Impact of Construction and Other Pre-Operational Activities Associated with the Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Phase 1

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Person-Years)</i>
Agriculture	\$32,201,614	\$9,162,356	\$6,037,721	96
Mining	\$24,316,596	\$6,444,471	\$3,591,947	25
Construction	\$684,241,278	\$322,583,450	\$265,828,853	3,748
Nondurable Manufacturing	\$158,169,632	\$34,993,697	\$18,061,059	253
Durable Manufacturing	\$86,162,295	\$35,065,325	\$21,748,222	346
Transportation and Utilities	\$119,758,343	\$49,036,318	\$28,933,452	335
Information	\$28,642,416	\$17,649,953	\$7,643,418	72
Wholesale Trade	\$52,945,194	\$35,829,823	\$20,659,794	231
Retail Trade	\$276,237,225	\$208,410,572	\$121,368,626	3,680
Finance, Insurance, and Real Estate	\$213,292,351	\$47,067,529	\$18,211,388	185
Business Services	\$129,335,580	\$82,576,764	\$67,361,481	820
Health Services	\$64,768,724	\$45,276,928	\$38,282,063	632
Other Services	\$117,158,501	\$59,551,647	\$48,034,595	1,159
TOTAL	\$1,987,229,749	\$953,648,833	\$665,762,619	11,583

Source: US Multi-Regional Impact Assessment System, The Perryman Group

*Assumes all initial costs conform to current projections. Direct purchases are allocated across geographic areas based on capacity and historical patterns.

The Anticipated Cumulative Impact of Construction and Other Pre-Operational Activities Associated with the Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Phase 2

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Person-Years)</i>
Agriculture	\$15,692,125	\$4,497,598	\$2,963,324	47
Mining	\$10,696,851	\$2,784,561	\$1,562,960	10
Construction	\$341,620,396	\$162,491,832	\$133,903,390	1,888
Nondurable Manufacturing	\$74,638,847	\$16,972,445	\$8,756,641	122
Durable Manufacturing	\$51,008,694	\$20,612,341	\$12,847,505	203
Transportation and Utilities	\$57,115,810	\$23,178,695	\$13,622,195	157
Information	\$13,737,811	\$8,464,378	\$3,664,974	35
Wholesale Trade	\$27,579,778	\$18,663,201	\$10,761,367	120
Retail Trade	\$136,545,355	\$103,224,914	\$60,146,299	1,818
Finance, Insurance, and Real Estate	\$103,283,925	\$22,779,002	\$8,837,894	90
Business Services	\$47,409,211	\$29,942,866	\$24,425,707	297
Health Services	\$31,430,744	\$21,973,390	\$18,578,705	307
Other Services	\$55,590,631	\$28,418,609	\$22,916,119	553
TOTAL	\$966,350,178	\$464,003,832	\$322,987,080	5,648

Source: US Multi-Regional Impact Assessment System, The Perryman Group

*Assumes all initial costs conform to current projections. Direct purchases are allocated across geographic areas based on capacity and historical patterns.

The Anticipated Cumulative Impact of Construction and Other Pre-Operational Activities Associated with the Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Total (Phases 1 and 2)

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Person-Years)</i>
Agriculture	\$47,893,739	\$13,659,954	\$9,001,045	143
Mining	\$35,013,447	\$9,229,032	\$5,154,907	36
Construction	\$1,025,861,674	\$485,075,282	\$399,732,243	5,637
Nondurable Manufacturing	\$232,808,479	\$51,966,142	\$26,817,700	375
Durable Manufacturing	\$137,170,989	\$55,677,666	\$34,595,727	549
Transportation and Utilities	\$176,874,153	\$72,215,013	\$42,555,647	491
Information	\$42,380,228	\$26,114,332	\$11,308,392	107
Wholesale Trade	\$80,524,972	\$54,493,024	\$31,421,161	351
Retail Trade	\$412,782,580	\$311,635,486	\$181,514,925	5,499
Finance, Insurance, and Real Estate	\$316,576,276	\$69,846,531	\$27,049,282	275
Business Services	\$176,744,791	\$112,519,630	\$91,787,188	1,117
Health Services	\$96,199,468	\$67,250,318	\$56,860,768	939
Other Services	\$172,749,131	\$87,970,255	\$70,950,714	1,712
TOTAL	\$2,953,579,927	\$1,417,652,665	\$988,749,699	17,231

Source: US Multi-Regional Impact Assessment System, The Perryman Group

*Assumes all initial costs conform to current projections. Direct purchases are allocated across geographic areas based on capacity and historical patterns.

Ongoing Operations of the Facilities



**The Anticipated Annual Impact of Ongoing Operations
Associated with the Implementation of the Proposed South
Texas LNG Export Project on Business Activity in the Corpus
Christi Metropolitan Statistical Area: Phase 1**

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$2,324,940	\$694,329	\$453,427	7
Mining	\$45,544,580	\$10,026,567	\$4,673,186	24
Construction	\$8,302,980	\$4,537,394	\$3,739,096	54
Nondurable Manufacturing	\$203,778,910	\$18,147,472	\$8,679,354	77
Durable Manufacturing	\$2,856,806	\$1,159,910	\$747,875	11
Transportation and Utilities	\$19,042,741	\$5,897,347	\$3,358,363	37
Information	\$2,341,234	\$1,445,461	\$624,231	6
Wholesale Trade	\$4,913,632	\$3,321,150	\$1,915,005	22
Retail Trade	\$18,594,037	\$13,787,029	\$7,991,863	254
Finance, Insurance, and Real Estate	\$20,453,599	\$6,078,697	\$2,039,957	20
Business Services	\$5,658,684	\$3,300,343	\$2,692,234	34
Health Services	\$4,263,188	\$2,983,153	\$2,522,283	43
Other Services	\$8,063,474	\$4,105,390	\$3,320,533	83
TOTAL	\$346,138,804	\$75,484,240	\$42,757,405	672

Source: US Multi-Regional Impact Assessment System, The Perryman Group

**The Anticipated Annual Impact of Ongoing Operations
Associated with the Implementation of the Proposed South
Texas LNG Export Project on Business Activity in the Corpus
Christi Metropolitan Statistical Area: Phase 2**

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$2,324,940	\$694,329	\$453,427	7
Mining	\$45,544,580	\$10,026,567	\$4,673,186	24
Construction	\$8,302,980	\$4,537,394	\$3,739,096	54
Nondurable Manufacturing	\$203,778,910	\$18,147,472	\$8,679,354	77
Durable Manufacturing	\$2,856,806	\$1,159,910	\$747,875	11
Transportation and Utilities	\$19,042,741	\$5,897,347	\$3,358,363	37
Information	\$2,341,234	\$1,445,461	\$624,231	6
Wholesale Trade	\$4,913,632	\$3,321,150	\$1,915,005	22
Retail Trade	\$18,594,037	\$13,787,029	\$7,991,863	254
Finance, Insurance, and Real Estate	\$20,453,599	\$6,078,697	\$2,039,957	20
Business Services	\$5,658,684	\$3,300,343	\$2,692,234	34
Health Services	\$4,263,188	\$2,983,153	\$2,522,283	43
Other Services	\$8,063,474	\$4,105,390	\$3,320,533	83
TOTAL	\$346,138,804	\$75,484,240	\$42,757,405	672

Source: US Multi-Regional Impact Assessment System, The Perryman Group

**The Anticipated Annual Impact of Ongoing Operations
Associated with the Implementation of the Proposed South
Texas LNG Export Project on Business Activity in the Corpus
Christi Metropolitan Statistical Area: Total (Phases 1 and 2)**

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$4,649,880	\$1,388,659	\$906,855	15
Mining	\$91,089,161	\$20,053,134	\$9,346,372	48
Construction	\$16,605,961	\$9,074,789	\$7,478,191	108
Nondurable Manufacturing	\$407,557,820	\$36,294,944	\$17,358,708	153
Durable Manufacturing	\$5,713,613	\$2,319,820	\$1,495,750	22
Transportation and Utilities	\$38,085,482	\$11,794,694	\$6,716,726	75
Information	\$4,682,467	\$2,890,921	\$1,248,461	12
Wholesale Trade	\$9,827,264	\$6,642,300	\$3,830,009	44
Retail Trade	\$37,188,074	\$27,574,057	\$15,983,726	509
Finance, Insurance, and Real Estate	\$40,907,198	\$12,157,393	\$4,079,913	41
Business Services	\$11,317,367	\$6,600,685	\$5,384,468	67
Health Services	\$8,526,375	\$5,966,305	\$5,044,566	85
Other Services	\$16,126,947	\$8,210,779	\$6,641,066	165
TOTAL	\$692,277,608	\$150,968,480	\$85,514,810	1,343

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Potential Benefits from Incremental Natural Gas Production



The Potential Annual Impact in a “Typical” Year of Natural Gas Exploration and Production Stimulus Required to Maintain the Level of Incremental Natural Gas Production Associated with Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Phase 1

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$7,563,852	\$2,113,658	\$1,400,544	23
Mining	\$7,257,774	\$1,764,097	\$976,609	6
Construction	\$10,955,281	\$5,872,293	\$4,839,135	70
Nondurable Manufacturing	\$40,214,341	\$9,058,861	\$4,634,734	64
Durable Manufacturing	\$15,764,194	\$6,292,413	\$4,003,549	60
Transportation and Utilities	\$33,863,424	\$14,908,835	\$8,995,433	111
Information	\$6,810,216	\$4,179,730	\$1,808,502	17
Wholesale Trade	\$13,942,909	\$9,436,047	\$5,440,909	62
Retail Trade	\$63,694,205	\$47,909,179	\$27,872,727	871
Finance, Insurance, and Real Estate	\$58,454,549	\$15,492,491	\$6,328,424	68
Business Services	\$20,400,933	\$11,922,662	\$9,725,837	121
Health Services	\$15,208,814	\$10,625,808	\$8,984,219	152
Other Services	\$28,625,977	\$14,203,412	\$11,497,983	285
TOTAL	\$322,756,468	\$153,779,486	\$96,508,607	1,911

Source: US Multi-Regional Impact Assessment System, The Perryman Group

The Potential Annual Impact in a “Typical” Year of Natural Gas Exploration and Production Stimulus Required to Maintain the Level of Incremental Natural Gas Production Associated with Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Phase 2

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$7,563,852	\$2,113,658	\$1,400,544	23
Mining	\$7,257,774	\$1,764,097	\$976,609	6
Construction	\$10,955,281	\$5,872,293	\$4,839,135	70
Nondurable Manufacturing	\$40,214,341	\$9,058,861	\$4,634,734	64
Durable Manufacturing	\$15,764,194	\$6,292,413	\$4,003,549	60
Transportation and Utilities	\$33,863,424	\$14,908,835	\$8,995,433	111
Information	\$6,810,216	\$4,179,730	\$1,808,502	17
Wholesale Trade	\$13,942,909	\$9,436,047	\$5,440,909	62
Retail Trade	\$63,694,205	\$47,909,179	\$27,872,727	871
Finance, Insurance, and Real Estate	\$58,454,549	\$15,492,491	\$6,328,424	68
Business Services	\$20,400,933	\$11,922,662	\$9,725,837	121
Health Services	\$15,208,814	\$10,625,808	\$8,984,219	152
Other Services	\$28,625,977	\$14,203,412	\$11,497,983	285
TOTAL	\$322,756,468	\$153,779,486	\$96,508,607	1,911

Source: US Multi-Regional Impact Assessment System, The Perryman Group.

The Potential Annual Impact in a “Typical” Year of Natural Gas Exploration and Production Stimulus Required to Maintain the Level of Incremental Natural Gas Production Associated with Implementation of the Proposed South Texas LNG Export Project on Business Activity in the Corpus Christi Metropolitan Statistical Area: Total (Phases 1 and 2)

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(2012 Dollars)</i>	<i>(Permanent Jobs)</i>
Agriculture	\$15,127,704	\$4,227,315	\$2,801,088	46
Mining	\$14,515,547	\$3,528,195	\$1,953,217	13
Construction	\$21,910,562	\$11,744,585	\$9,678,270	140
Nondurable Manufacturing	\$80,428,682	\$18,117,723	\$9,269,468	128
Durable Manufacturing	\$31,528,388	\$12,584,826	\$8,007,098	120
Transportation and Utilities	\$67,726,848	\$29,817,670	\$17,990,866	222
Information	\$13,620,431	\$8,359,460	\$3,617,005	35
Wholesale Trade	\$27,885,817	\$18,872,094	\$10,881,818	125
Retail Trade	\$127,388,410	\$95,818,358	\$55,745,454	1,742
Finance, Insurance, and Real Estate	\$116,909,099	\$30,984,982	\$12,656,848	137
Business Services	\$40,801,867	\$23,845,323	\$19,451,674	243
Health Services	\$30,417,627	\$21,251,616	\$17,968,438	304
Other Services	\$57,251,955	\$28,406,825	\$22,995,967	569
TOTAL	\$645,512,936	\$307,558,972	\$193,017,213	3,822

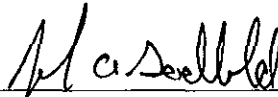
Source: US Multi-Regional Impact Assessment System, The Perryman Group.

APPENDIX C – VERIFICATION

UNITED STATES OF AMERICA DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

VERIFICATION

John Godbold, first being sworn, states that he is Project Director for Pangea LNG (North America) Holdings, LLC with responsibility for the proposed South Texas LNG Export Project; that he is duly authorized to execute this Verification; that he has read the foregoing filing and is familiar with the contents thereof; and that all of the statements of fact therein contained are true and correct to the best of his knowledge and belief.



John Godbold
On behalf of
Pangea LNG (North America) Holdings, LLC

STATE OF TEXAS)

COUNTY OF MONTGOMERY)

Subscribed and sworn to before me on this 19th day of December 2012, by John Godbold proved to me on the basis of satisfactory evidence to be the person who appeared before me.



NOTARY PUBLIC SIGNATURE

NOTARY PUBLIC SEAL



APPENDIX D – OPINION OF COUNSEL

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December 18, 2012

Mr. John Anderson
Office of Fuels Programs, Fossil Energy
U.S. Department of Energy
Docket Room 3F-056, FE-50
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585


Re: Pangea LNG (North America) Holdings, LLC
FE Docket No. 12- -LNG
Application for Long-Term, Multi-Contract Authorization to Export Liquefied
Natural Gas to Non-Free Trade Agreement Countries

Dear Mr. Anderson:

This opinion of counsel is provided in accordance with the requirements of Section 590.202(c) of the U.S. Department of Energy's regulations, 10 C.F.R. § 590.202(c) (2012). I have examined the organizational and governance documents of Pangea LNG (North America) Holdings, LLC, a Delaware limited liability company ("Pangea"), and other documents and authorities as necessary for purposes of this opinion. On the basis of the foregoing, it is my opinion that the proposed long-term, multi-contract export of liquefied natural gas by Pangea, as described in the above-referenced application, is within the limited liability company powers of Pangea.

Respectfully submitted,

COGAN & PARTNERS LLP



John P. Cogan, Jr.
Counsel for Pangea LNG (North America)
Holdings, LLC

JPCjr/lw