Interior Energy Project

Feasibility Report

Proposed Project - North Slope LNG Plant

July 2013

AIDEA Alaska Industrial Development and Export Authority

InteriorEnergyProject.com

ALASKA ENERGY AUTHORITY

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ACRONYMS, ABBREVIATIONS	
ADEC	Alaska Department of Environmental Conservation
AEA	Alaska Energy Authority
AIDEA	Alaska Industrial Development and Export Authority
BAT	best available technology
Bcf	billion standard cubic feet
EPA	Environmental Protection Agency
EPC	engineering, procurement, and construction
FNSB	Fairbanks North Star Borough
FOB	free-on-board
gpd	gallons per day
IEP	Interior Energy Project
LLC	limited liability company
LNG	liquefied natural gas
Mcf	thousand standard cubic feet
NAAQS	National Ambient Air Quality Standards
NS LNG	North Slope LNG
PBU	Prudhoe Bay Unit
RCA	Regulatory Commission of Alaska
SETS	Sustainable Energy Transmission and Supply Development Fund
SPE	Special Purpose Entity

1.0 EXECUTIVE SUMMARY

1.1. Interior Energy Project

On April 12, 2013, the Alaska Legislature passed the Interior Energy Project (IEP) (SB 23 and HB 74), providing a financing package to begin developing a natural gas conditioning and liquefaction plant located on the North Slope as part of a larger initiative to quickly bring affordable natural gas to Interior Alaska. Governor Parnell signed the IEP legislation in Fairbanks on May 24, 2013. The overall project includes: (1) construction of a North Slope Liquefied Natural Gas (NS LNG) to provide Liquefied Natural Gas (LNG) to Interior Alaska, and (2) assistance in the financing of LNG storage, re-gasification, and natural gas distribution systems to bring natural gas to residential and commercial customers in the Fairbanks North Star Borough (FNSB). The project is also designed for the NS LNG Plant to serve industrial and transportation customers in Interior Alaska – possibly with both LNG and propane.

The Alaska Industrial Development and Export Authority's (AIDEA's) involvement in financing the NS LNG Plant is intended to enable the delivery of low-cost natural gas as a transitional step to alternative gas supplies, including a potential gas pipeline from the North Slope to tidewater. LNG transportation, storage, re-gasification, and natural gas distribution system build-out within the medium- and high-density areas of the FNSB is to be provided through private or public entities and facilitated by the Alaska Energy Authority (AEA), as well as the SB 23-authorized $150 million AIDEA bond issue. The build-out of the distribution system is designed to provide a base of demand for natural gas from alternative sources of gas which could include a potential North Slope natural gas pipeline. This early FNSB gas demand will better utilize the pipeline capacity at start-up and reduce the delivered price of pipeline gas.

1.2. NS LNG Plant / Special Purpose Entity

The legislation-approved project financing for the North Slope plant includes $57.5 million in general fund appropriation and $125 million in low interest rate loans through the Sustainable Energy Transmission and Supply (SETS) development fund. The financing plan also includes private financing to complete a full financing package for construction of a 9 billion standard cubic feet of gas (Bcf) per year LNG plant. AIDEA and AEA's analysis indicates that the 9 Bcf plant is the best size to meet the immediate demand while providing a foundation for long-term demand, if needed. The NS LNG Plant project provides the potential for expansion on-site to serve, if necessary, as the long-term source of Interior Alaska natural gas.

AIDEA proposes to develop the NS LNG Plant through the creation of a "special purpose entity" (SPE), owned by AIDEA and one or more private partners. The SPE will contract with North Slope natural gas suppliers, plan, develop, and operate the NS LNG Plant, and sell LNG to interested utilities (both private and public) and commercial entities free-on-board (FOB) North Slope. These entities would be responsible for the transportation and storage of LNG and distribution of natural gas. AEA is investigating potential propane and LNG uses for the FSNB's low-density areas and Rural Alaska communities. The IEP signifies the first step in getting stranded North Slope gas to market through a redundant and reliable supply chain.

1.3. Feasibility Analysis Summary

Based on the economic and financial analysis conducted for this report, the NS LNG Plant SPE is projected to be feasible, with natural gas delivered to FNSB at prices sufficiently below current energy costs to support the economics of the NS LNG Plant. AIDEA expects the significantly lower cost of LNG (vs. heating oil) to be a driver for conversion of the majority of commercial and residential space heating customers.

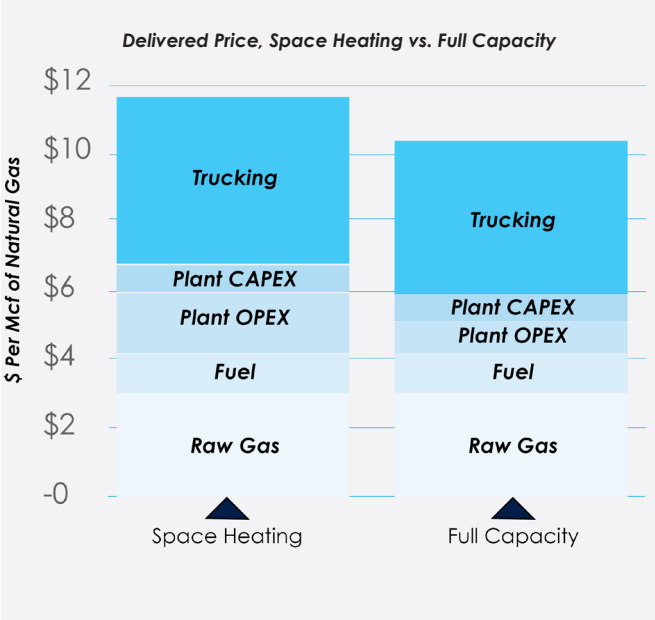
AIDEA's analysis projects that deliver a price of LNG to FNSB between $10.52 and $11.59 per thousand standard cubic feet (Mcf), depending on the utilization of the NS LNG Plant. The lower price, $10.52, assumes the NS LNG Plant runs at full capacity year-round. The higher price, $11.59, assumes the IEP only serves the FNSB space heat market, with the NS LNG Plant providing winter capacity to follow the space heating market's seasonal demand swing. Selling gas to other customers, either year-round

or during the summer months only, has the potential to increase the capacity factor of the plant and reduce the price of gas. For purposes of this feasibility analysis, AIDEA assumes LNG is only sold to the FNSB space heating market and costs $11.59 per Mcf.

AIDEA did not investigate storage, re-gasification, or distribution costs as part of this feasibility analysis. Prior estimates indicate that a price range of $2.50 to $5.50 per Mcf is reasonable. This results in a delivered LNG price to the customer of $14.09 to $17.09 per Mcf.

Currently, most FNSB residents heat with fuel oil that costs about $4.00 per gallon, which is equivalent to $30.00 per Mcf natural gas. Natural gas from the NS LNG Plant will significantly reduce the cost of heating for FNSB residents.

Based on the feasibility analysis showing that the project is technically and financially feasible, AIDEA's IEP project team will continue to move forward with developing a financial plan, deal structuring, and due diligence with a target to bring the project to AIDEA's Board in October 2013.



2.0 Project Overview

2.1. Project Location and Description

The proposed project would include a natural gas liquefaction plant located on the North Slope of Alaska near Deadhorse. From the Plant, LNG would be trucked almost 500 miles south to Fairbanks, primarily along the 470-mile long Dalton Highway.

Both the surface and the sub-surface estate are owned and managed by the Alaska Department of Natural Resources, Division of Oil and Gas and Division of Mining, Land, and Water. AIDEA will submit a Right-of-Way application to the State Pipeline Coordinator's Office in July 2013.

The purpose of the NS LNG Plant is to meet the initial FNSB space heating demand with the capacity to expand, if needed, to meet the full build-out of the space heating market. AIDEA and AEA's analysis indicates that the 9Bcf plant is the best size to serve this purpose. As a result, AIDEA is only pursing the development of an expandable 9 Bcf plant on the North Slope. However, the NS LNG Plant will allow for expansion if determined necessary by demand.

The NS LNG Plant design would initially include multiple liquefaction trains with a total production capacity of 300,000 gallons per day (gpd) LNG (sufficient for a total annual capacity of 9 Bcf natural gas), and all required gas treatment, electric power generation, and related infrastructure. Production expansion beyond 9 Bcf would require a second pretreatment system and additional power generation equipment.

The project will provide utility systems including plant and instrument air, gaseous and liquid nitrogen, fire protection systems, potable water, and wastewater systems. Electric power will be supplied using on-site gas turbine generators. In addition, the system will include a technologically-advanced feed gas receiving facility, and design and construction of the field pipeline tie-in and custody transfer metering. Finally, the plant will incorporate an LNG truck loading dock and truck fueling station.

Control systems will be designed for efficiency and safety including redundant control architecture, control automation, site improvements, and maintenance equipment. Emissions and waste disposal will be minimized using the best available technology (BAT) in compliance with applicable laws and regulations.

2.2. Overall Plan of Finance

AIDEA intends to build an expandable 9 Bcf LNG plant on the North Slope to serve the initial FNSB space heat demand. The total capital cost of the NS LNG Plant is estimated to be $207.7 million. This estimate includes $8.4 million for natural gas pretreatment and $199.3 million for the liquefaction aspects of the plant. The pretreatment and liquefaction portions of the plant are constructed and operated as one facility.

AIDEA expects to invest $50 million of SETS funds as equity receiving no return. AIDEA also expects to invest $125 million of SETS funds with a 3 percent return. An additional $32.7 million investment is anticipated to finance the remaining project costs. AIDEA assumes this $32.7 million comes from private financing.

2.3. Development Process and Schedule

The IEP is directed toward providing significant quantities of natural gas to the FNSB by the 2015-2016 heating season. Find the schedule in Figure 8 on page 19.

2.4. AIDEA Mission Suitability/Estimated Economic Development Impact

The NS LNG Plant is suitable as an AIDEA investment for the following reasons:

- The IEP represents a major economic development and sustainability initiative for Interior Alaska.
- The NS LNG Plant supports the economic life of the North Slope oil and gas infrastructure.
- The IEP NS LNG Plant qualifies as a SETS investment as prioritized by the State's economic development goals.
- The IEP NS LNG Plant provides the impetus for parties in the FNSB to build-out the distribution system earlier than would otherwise be possible.
- The NS LNG Plant can also work along with, or as backup to, Cook Inlet or other LNG supplies to ensure that FNSB will have gas until a gas-line is constructed.
- The approximately $182 million investment in the NS LNG Plant will leverage $20 to $50 million of private investment in the plant itself, and many millions more in trucking, storage, re-gasification and distribution systems.
- The NS LNG Plant project is expected to create Alaskan jobs (service companies, engineering, and construction) and enable additional jobs during the construction program. Specifically, AIDEA expects the IEP will create the following jobs:
  - NS LNG Plant construction, 192 full-time employees
  - NS LNG Plant operations, 23 full-time employees
  - LNG trucking, 105 full-time employees.
- The NS LNG Plant is a "project" under AIDEA's statute Sec. 44.88.900(10)(A), in relevant part: "…a plant or facility used or intended for use in connection with making, processing, preparing, transporting, or producing in any manner, goods, products, or substances of any kind or nature or in connection with developing or utilizing a natural resource…"

2.5. Community Support

There is widespread support for the IEP in the FNSB, and support for the NS LNG Plant in the North Slope Borough and other portions of Interior Alaska. The legislation authorizing the IEP and AIDEA's investment in the NS LNG Plant passed the Alaska Legislature unanimously, and both the Executive and Legislative branches (particularly the Interior Delegation) have been actively involved in program direction.

The Fairbanks community is largely dependent on oil as a source of heat and electrical power generation. According to a home heating survey conducted for the Alaska Department of Environmental Conservation (ADEC) in 2010, roughly 68 percent of home heating needs in Fairbanks were met with heating fuel.[1] This reliance on heating fuel creates a financial burden for FNSB residents, as fuel prices have increased dramatically since 2005.

The high cost of space heating has also become a barrier to economic development in the FNSB, resulting in lost commercial employment growth and potential risk of lost industrial / institutional employment.

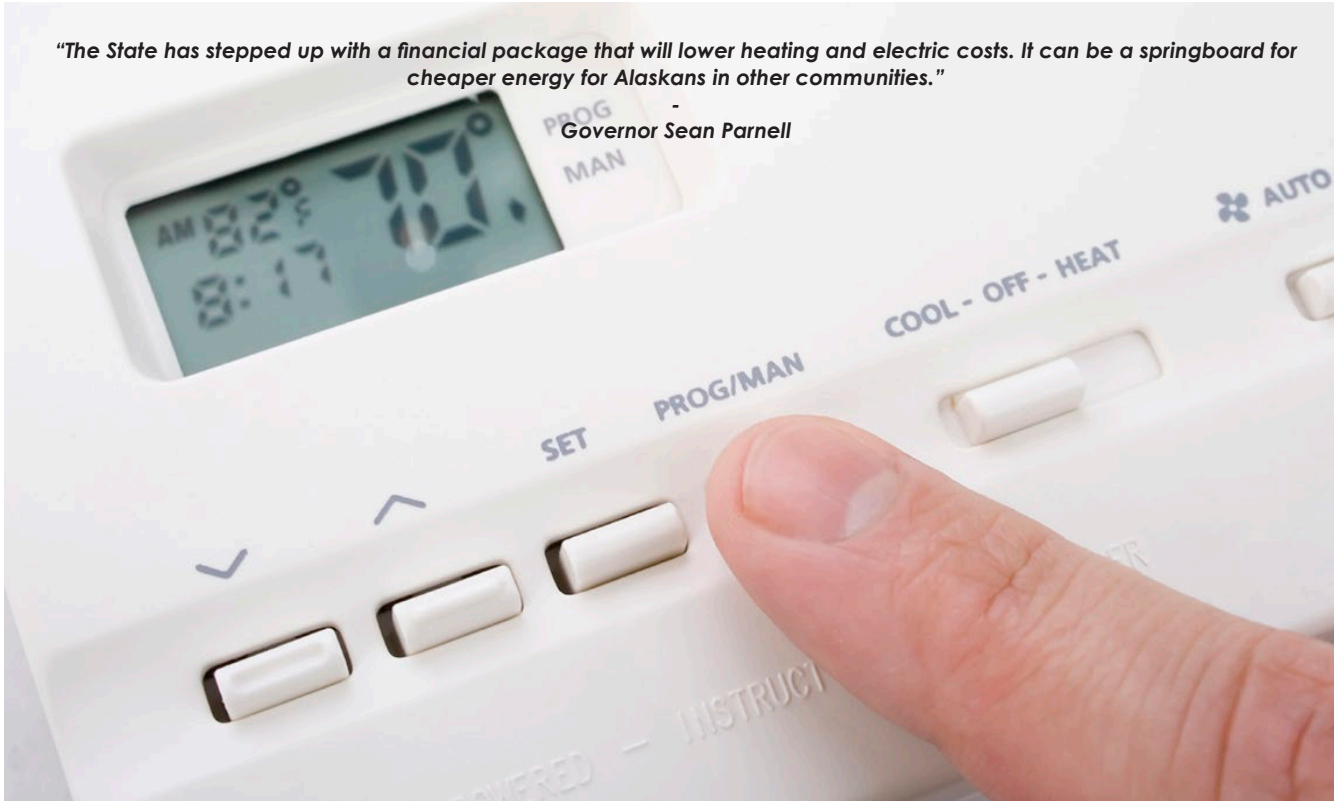
[1] Carlson, T.R., S. Yoon, and R.G. Dulla. 2010. 2010 Fairbanks Home Heating Survey. Prepared by Sierra Research, Inc, Sacramento, CA, for the Alaska Department of Environmental Conservation. Report No. SR2010-06-01.

Wood provides an alternative source of heat for many residents. Just over 17 percent of households surveyed in 2010 used wood as their primary fuel source for home heating. However, the widespread use of wood for heat has led to air quality issues in the FNSB area. A temperature inversion layer, largely due to the geography of the Fairbanks area, regularly traps pollutants released from burning wood and prevents their dispersal during the coldest parts of the winter.

Because of the particulate pollutants prevalent in the FNSB area, an expanded part of the Borough is designated by the Environmental Protection Agency (EPA) as having non-attainment status of the National Ambient Air Quality Standard (NAAQS) 24-hour fine particulate (PM2.5) standard. The fine particles in the smoke can easily be inhaled and lead to serious respiratory health effects for area residents. Additionally, the air quality issues put Fairbanks in danger of losing federal funding if air quality standards are not met. By making available a low cost, cleaner-burning natural gas supply for the Fairbanks area, the use of both heating fuel and wood for home heating is expected to decline, resulting in cleaner air and a healthier population.

In addition to the health benefits, this project will be the first commercial sale of North Slope natural gas to be used outside of the North Slope. Furthermore, this project will be the first commercial gas sales contract between a major oil company and a State of Alaska entity.

AIDEA and AEA are engaged in an ongoing public involvement process, which includes regular communication with FNSB community leaders, the public, North Slope Borough governing bodies, relevant State agencies, and utilities to ensure that all are informed of progress on the NS LNG Plant as an element of the IEP.



"The State has stepped up with a financial package that will lower heating and electric costs. It can be a springboard for cheaper energy for Alaskans in other communities."
-
Governor Sean Parnell

3.0 PROJECT ELEMENTS

The overall IEP encompasses two project components, both of which include several elements: (1) the NS LNG Plant; and (2) the "downstream" portions that include transportation, storage and re-gasification, and distribution systems. The downstream project elements are not included in the scope of the NS LNG SPE.

3.1. NS LNG Plant System Elements

3.1.1. Natural Gas Supply

As part of AIDEA's project planning effort, AIDEA and its IEP Consultant Team conducted a reconnaissance to the North Slope, met with BP Exploration, and confirmed that an ample gas supply is available to meet FNSB demand. Assuming the project proceeds, AIDEA will work with the North Slope parties to secure purchase agreements for sufficient gas to meet the supply needs of the NS LNG Plant

3.1.2. Natural Gas Processing and Liquefaction

It is estimated that a NS LNG Plant with three 100,000 gpd liquefiers operating at 92.5 percent reliability will be able to meet the projected demand for gas by medium- and high-density residential and commercial customers through the winter of 2018. It is assumed, in this portion of the analysis, that gas from an alternative source will be available in 2019 to provide some or all of the gas demand, and into the future.

3.1.3. North Slope Siting and Permitting

Once a gas source is secured, the site selection and associated permitting process for a pad will be the critical path tasks for timely execution of the project. Firms responding to AIDEA's request for letters of interest identified possible pad sites, and initial conversations with BP have identified two other pad locations for evaluation. Following dialogue with regulatory agencies, and evaluation of these alternative locations a suitable pad will be identified.

Air quality permitting and authorizations related to working in wetlands and waters of the United States require the longest lead-time for review and approval. While there are potential permitting efficiencies to be gained through obtaining background air quality data through BP, the air permitting process will still require at least 12 to 24 months for approval. The U.S. Army Corps of Engineers permitting process will require a minimum of 120 days after the receipt of a complete permit application for review and approval. Additional permitting processes through State, Federal, and North Slope Borough agencies may not require as much time but are equally important for project sanctioning.

3.2. "Downstream" System Elements

3.2.1. LNG Transportation

AIDEA anticipates that this component of the project would be serviced by an existing or future trucking company and would not be funded by AIDEA as part of this project. However, it is an important project element because of the costs associated with manufacturing rigs – both tractors and LNG trailers, as well as operational costs.

Hauling LNG is a well-established practice with a strong safety and reliability record in Alaska and elsewhere. Presently, more than 100 trucks per day carrying diesel and other products travel the 1,017 miles round trip from Deadhorse to Fairbanks during winter months. In conversations with the Alaska Department of Transportation and Public Facilities, AIDEA was told the Dalton Highway was constructed to withstand 10,000 trucks per day.

The distribution system will be buffered from transportation delays due to inclement weather and other factors typically experienced on the Dalton Highway through provision of LNG storage in FNSB as presented in the following sections.

To deliver LNG during the peak demand period in the winter of 2015-2016, approximately seven 10,500-gallon trailers will be on the road at any one time, which will necessitate a minimum of 10 units in the fleet. By 2019, the maximum number of 10,500-gallon trailers on the road per day during the winter will be approximately 56 (28 trailers traveling each direction). The per trip delivery cost for one 10,500-gallon trailer is $3,855. AIDEA has determined that the trucking equipment could be delivered to Alaska within four to six months after an order is placed. These costs would result in a cost to the customer of $4.53 per Mcf for LNG transportation.

PROLOG, Canada, a transportation logistics company, was used to develop transportation costs for moving product from Prudhoe Bay to Fairbanks. The estimated truck costs displayed in the Table 1 provides trip costs and unit rates flowing from a 24/7 operation providing one–way trip, totaling 15 hours of total service including loading and unloading time. It further assumes that the trucks are pulled from service for 40 days per year to provide major overhauls to both tractors and trailers. Each truck, therefore, provides 185,000 miles per year of operating performance.

Unit operating costs and performance indicators used in the analysis are from PROLOG files and previous discussions with northern Canadian and Alaskan motor carriers, equipment manufacturers, trucking industry associations (hours and conditions of work), and highway regulators (axle weights and vehicle dimensions).

3.2.2. FNSB Storage and Re-gasification

The purpose of LNG storage in FNSB is to provide a reserve in case of interruptions in LNG supply and to allow LNG to be stored to meet peak winter demands. Based on modeling of heating degree-days to estimate peak demand, AIDEA's technical consultants estimate that one 5 million-gallon LNG storage tank appears to be sufficient to meet initial gas demands, with an additional 5 million-gallon tank likely required to meet full 2019 demand. It may be more economical to build the 10 million gallons of capacity at start-up.

3.2.3. FNSB Distribution System

A critical element for a successful LNG project is the build-out of a distribution system. The build-out schedule for the distribution system will affect the cost of delivered gas and system demand. Development of a distribution system will provide a significant economic incentive for a future gas supply alternative.

As part of the project planning effort, AIDEA and its Consultant Team continue to work with AEA to establish a baseline cost and schedule for a potential distribution system to reach the high-density and medium-density areas of the FNSB. Based on a review of the existing plans, it is estimated that it will take at least 6 years to build-out the distribution system to serve the high- and medium- density areas of the FNSB. SB 23 provides $150 million of financing, which AIDEA expects will be used to assist in the build-out of the distribution system. Based on projected initial build-out of the distribution system, it is projected that the plant will be able to produce enough gas to meet the initial demand of FNSB, with the ability to expand if necessary to satisfy future demand growth.

Table 1: Alaska North Slope LNG Liquefaction Plant Options and Trucking Analysis

Truck Type	Status	Tractor Fuel Type	Net Capacity (Cu. Meters)	Net Capacity (USG)	Trip Cost (s) Deadhorse	Trip Cost Per USG Deadhorse	Annual Cost per Truck(s) Deadhorse	Annual LNG Fuel Saving(s) Deadhorse
Quad	Legal - AK	diesel	43.5	11,500	4,661	$0.41	$900,527	-
Quad	Legal - AK	LNG	43.5	11,500	3,855	$0.34	$754,060	$146,467
Tridem (2)	Legal - Canada	diesel	54	14,000	4,661	$0.33	$904,294	-
Tridem	Legal - Canada	LNG	54	14,000	3,817	$0.27	$747,060	$157,293
Yukon A Train (3)	In Approvals	diesel	95.3	25,000	5,876	$.024	$1,125,417	-
Yukon A Train	In Approvals	LNG	95.3	25,000	4,810	$0.19	$931,396	$194,021

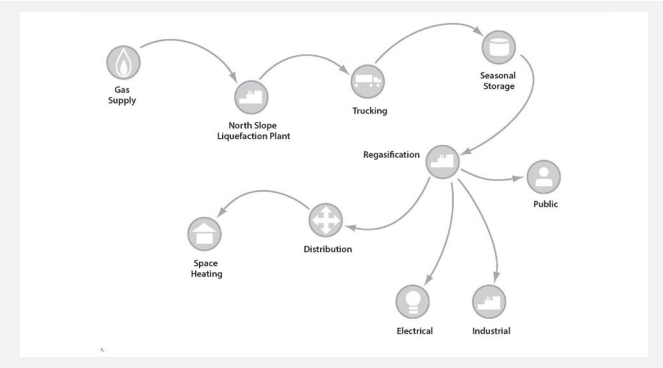
Notes:
1. Annual cost per truck includes: tractor and trailer fixed and variable operation costs; administration; insurance; and profit margin, Includes camp cost at Deadhorse.
2. Three-axle tridem trailers are legal in Alaska, but have lower allowable axel group weights than in Canada
3. The Yukon A Train was recently approved for hauling LNG in Yukon. Requires certification in other jurisdictions. This work is currently in progress.
4. Assume 22.721 MMBtu's in one cu. meter (1,000 liters). 1GJ = .95 MMBtu 1Mcf = 1 MMBtu 3.78 Liters - 1 USG
5. Deadhorse option required LNG truck fuel carrying a Fairbanks re-fueling cost increment; and slightly different liquefaction cost at Deadhorse.

4.0 NORTH SLOPE LNG PLANT – BUSINESS STRUCTURE

4.1. Business Structure

AIDEA's participation in the IEP, and particularly the LNG Plant, is being carried out in conformity with business principles, public policies, community objectives, and legislative directives. The NS LNG Plant will be financed by a combination of public funds, an AIDEA-issued loan, and private capital achieving an agreed upon rate of return. The financing package in SB 23 will serve as the majority of funding used in the development of the NS LNG Plant. SB 23, therefore, provides a public basis for financing, but will be used in conjunction with private capital.

The primary policy goals of the IEP are to provide competitively priced natural gas and other fuels to the Interior by the fourth quarter of 2015. The IEP represents a commitment to bring cost effective supplies of gas consistent with demand initially to the FNSB and then to other Alaska communities. It should be recognized that sales of gas to existing or new utilities will be subject to review by the Regulatory Commission of Alaska (RCA), which will affect the pricing of the gas.



Against this background, the financing package in SB 23 consists of three parts:
(1) A budget appropriation to AIDEA's revolving fund
(2) Authorization for a loan
(3) Bond authorization for AIDEA

Given that the majority of funds used in the development the LNG Plant will derive from financing made available by SB 23, coupled with the important public policy goals of the IEP, AIDEA will exercise control over the legal structure used to finance, develop, and operate the project.

AIDEA's involvement is appropriate given the fact that another source for the supply of gas may be available in the Interior of Alaska, which could affect the tenure of the LNG Plant as a source of supply for a space heating distribution system. AIDEA will pursue new markets for the NS LNG Plant capacity in the event an alternative supply for the FNSB is available. At this time, it is uncertain whether these markets will materialize or how much LNG they will demand. This uncertainty over the useful life of the project could require private investors to price the potential loss of demand into the capital structure of the Plant or the LNG produced by the Plant or seek a capital structure that minimizes exposure to alternative supply risk.

Because the structure of SB 23 financing, the IEP's principles, and AIDEA's business objectives all require private investment in the LNG Plant, AIDEA will establish a structure for the project that meets the objectives of the IEP and that is consistent with significant private participation with an appropriate risk allocation.

4.2. LNG Plant Objectives

AIDEA's statutory and policy directive for the IEP as set forth in SB 23 is to provide assured natural gas supply at affordable pricing FOB the LNG Plant located on the North Slope so that gas is available in the fourth quarter of 2015 for residential, institutional, and commercial space heating, as well as being available to utilities and other industrial users. Initial demand will be based on FNSB space heating peak demand, as projected in the winter of 2017-18, as well as on committed utility and industrial demand.

After this 2017-18 period, the plant may provide just-in-time capacity with a 24-36 month planning horizon. This will entail an annual reassessment of Plant operation and pricing. It is anticipated that if an alternative supply is available for FNSB space heating after 2017-18 the Plant could offer LNG to industrial users or for transportation needs that support development of mining and other natural resource development or serves to reduce energy costs. Alternatively, components of the LNG Plant could be re-purposed or relocated to meet changing supply and demand conditions.

4.3. AIDEA Development Strategy for the LNG Plant

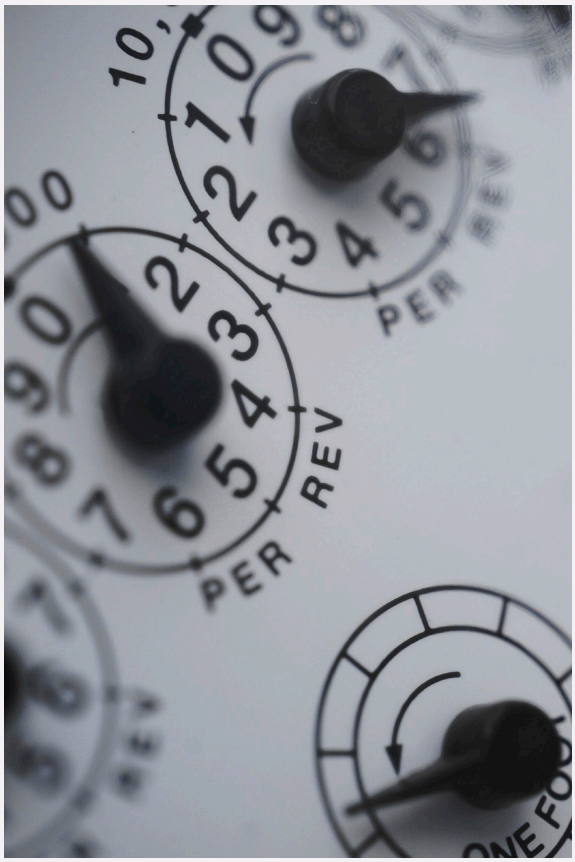
Based on these background, context, and policy objectives, AIDEA intends to undertake the LNG Plant development as a primary sponsor, with the following goals for the business. AIDEA will sponsor the LNG Plant as a development project under AS 44.88.172 and create an SPE using a limited liability company ("LLC") with AIDEA as a member in conjunction with private LLC members. AIDEA will have control over the SPE LLC through agreed-upon means of governance, but will work with LLC members to develop a business structure (LNG pricing, etc.) consistent with the goals of the IEP and sales into regulated and unregulated markets.

Under this approach, AIDEA will manage the project financing needed to develop the LNG Plant. Using AIDEA funding and administrative support, and working in cooperation with the private members that have made an equity investment, the SPE LLC will seek to achieve mutually agreed-upon goals. These will include: (1) securing a long term supply of North Slope gas for the Plant; (2) management of the initial stages of the development project by AIDEA; and (3) securing required leases, environmental permits, local government permits, and agreements from North Slope operators.

AIDEA will also work with private investors in completing the functional and design specifications for the LNG Plant. This may entail the need for AIDEA to place orders for long lead-time equipment by the purchase of production positions to ensure that certain equipment is available to meet the time goals of the IEP.

The SPE LLC will manage the development and construction of the project and contract with an operating entity for the startup of the plant and its operation. The SPE LLC will select a suitable site for the plant located on the North Slope (which is a requirement of two segments of SB 23 financing); site selection will encompass permitting, logistical considerations, intermodal planning, and gas delivery considerations.

This structure is based on the participation in the SPE by members who contribute a specified level of equity and which will be engaged in the planning and construction of the plant on the North Slope. Later on, the SPE may seek proposals from firms offering engineering-procurement-construction (EPC) services or construction services that do not want to be equity participants in the SPE. Similarly, the SPE may, at a later date, seek sources of additional capital and/or debt that will be used to finance the project.



4.4. AIDEA LNG Commercial and Finance Strategy

AIDEA's commercial strategy for the LNG Plant will be based on the following certain principles that include the following:

- The LNG SPE LLC will own the plant as a "cost-plus" facility with transparency to the public and customers regarding costs, margins, investor returns and pricing.
- AIDEA's SB 23 cash contribution and financing from the sustainable energy transmission and supply development fund ("SETS") authorized by the legislature will be dedicated first to fund LNG production to meet initial space heating needs, so as to ensure lowest practical cost for space heating using re-gasified LNG.
- Additional funding required to construct and expand the Plant will be financed with private equity of between $20 million and $50 million at a negotiated, capped return in order to maintain affordable space heating costs and to achieve competitive cost for industrial customers.
- Depending on the development project structure, AIDEA will assume some level of project completion risk.
- AIDEA will assume a negotiated level of "alternative supply" risk resulting in:
  - "Stranded capital"
  - NS LNG Plant "redeployment" costs

Based on this structure, private members of the SPE LLC can anticipate receiving a preferred return that is ahead of any loan payments to AIDEA based on the use of the SETS loan. Priority access to the LNG produced by the Plant will be formulated by the governance structure of the SPE LLC. This will provide that LNG produced by the Plant be used first for space heating purposes using a gas distribution system in the FNSB financed in part by the financing package in SB 23. The next use of LNG will be for sales to electric utilities. Then sales will be made as LNG is available to industrial customers and for transportation purposes.

Members of the SPE LLC will agree to the use of cost plus, competitive pricing with respect to LNG that is purchased by a member of the LLC, with a negotiated and capped return on any non-utility portion. AIDEA anticipates that over time it will offer the opportunity to LLC members to purchase AIDEA's membership interests in the LLC for non-space heating capacity.

4.5. AIDEA Portfolio and Financial Objectives

The IEP and the NS LNG Project are atypical for AIDEA, given that the funding sources are largely being legislatively appropriated, as opposed to being funded from AIDEA's balance sheet. As a result, the business and financing structure is designed to meet both legislative and community objectives (e.g. lowest practical cost natural gas for Interior Alaska) and AIDEA's statutory and policy obligations for fiscal prudence.

AIDEA's financial planning for the project assumes that the NS LNG Project SPE is structured and managed as a self-supporting enterprise, but with a very low cost of capital due to the appropriated funds. No return is assumed on the ~$50 million of AIDEA equity funds dedicated to the project, and the SETS $125 million loan has a mandated low rate of return.

5.0 ECONOMIC AND FINANCIAL ANALYSIS

5.1. Overall Economic Base

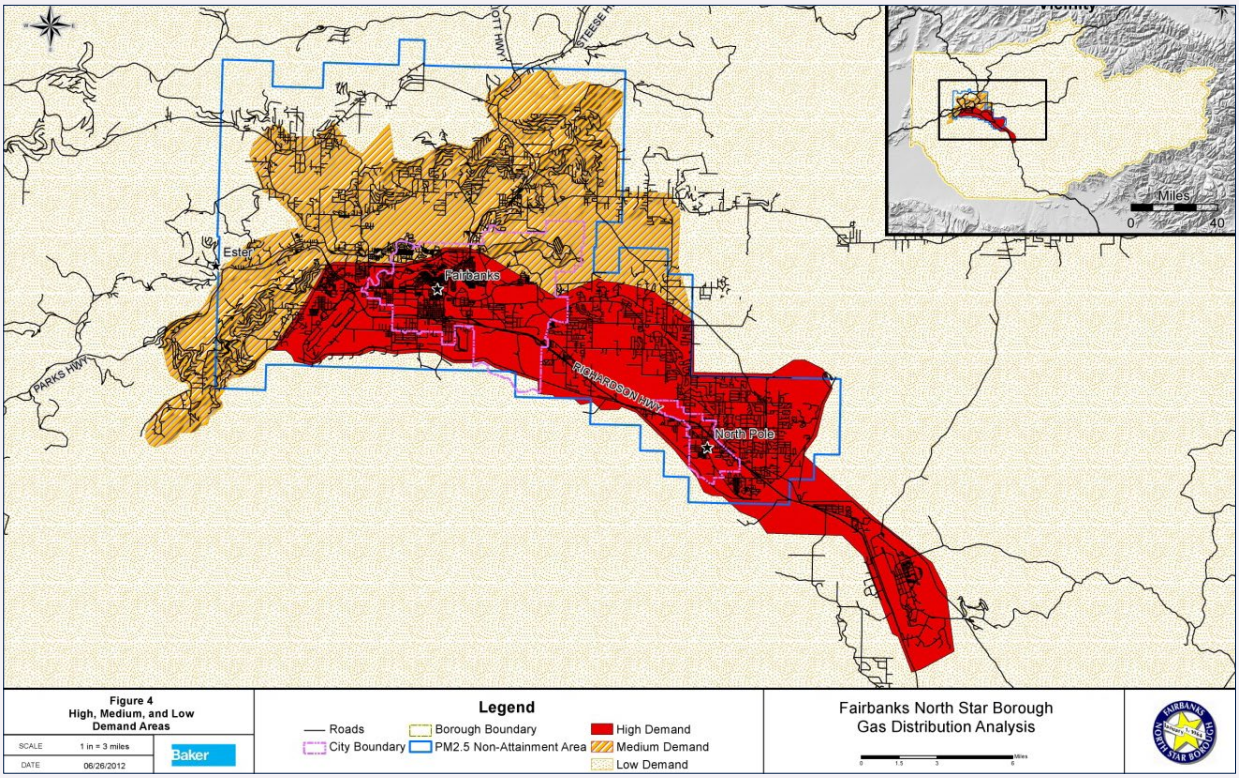
During 2012, the FNSB and affiliated groups funded a major study of energy costs, potential alternative supplies, and alternative strategies for meeting space heating needs, particularly residential and commercial space needs. The major findings of that study were summarized in the paragraph below:

Construction and operation of a piped natural gas distribution system in the high-density and medium-density areas of the FNSB, and a propane distribution system in the low-density areas of the borough, has the potential to reduce fuel costs for space heating of residential and commercial structures from approximately $524 million in 2021, the first full year of operations, to about $210 million, a savings of roughly $315 million annually, a savings of 60 percent compared to the status quo using fuel oil and wood. These estimates will change with different assumptions or if capital costs or commodity costs change, but the magnitude of the savings is so large that it is evident that substantial savings will accrue under almost any future scenario that employs natural gas and propane.

The findings of this study were re-confirmed by AIDEA and AEA's economic analysis conducted as part of the IEP project planning process. The bottom line for the potential LNG SPE is that considerable potential demand exists for natural gas in the "high and medium" density areas of the FNSB, and that the economic benefits to the community are substantial.

Figure 1 displays the three demand zones within the FNSB overlaid (in blue) by the boundary of the $PM_{2.5}$ zone of non-attainment – the area identified by the US EPA as the highest priority for air pollution reduction.

Figure 1: Map of Fairbanks North Star Borough with Three Zones of Demand



Source: Michael Baker, Jr. Inc., adapted from FNSB GIS Maps

5.2. Market Analysis

The NS LNG Plant will first serve the FNSB space heating market. AIDEA and AEA published a report of estimated space heating demand conducted by Northern Economics in June 2013. This report, which had results consistent with a 2012 report sponsored by FNSB parties, projected growing natural gas demand starting in 2015 and reaching a total annual demand of 8.6 Bcf per year in 2025. Tables 2 and 3 display space heating demand and number of customers from fourth quarter 2015 until 2025. The demand projection, which is depicted in Figure 2, was based on the existence of an assured source of natural gas at competitive prices, as well as robust conversion rates when natural gas becomes available. One potential obstacle to projected demand growth – the cost of converting residential space heating systems – is the subject of potential legislation to establish a financing mechanism to reduce the up-front impact of those costs.

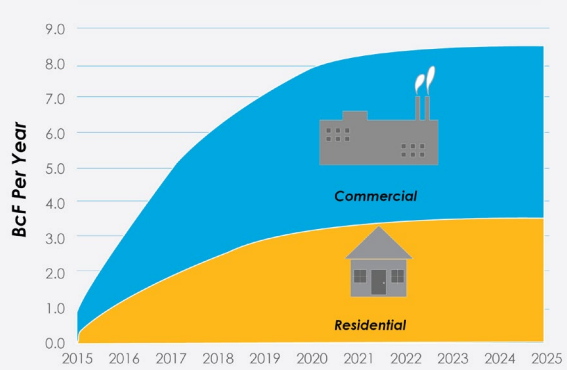
Table 2: Space Heating Natural Gas Demand (Bcf)

	2015 Q4	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	.2	1	1.9	2.5	2.9	3.2	3.4	3.5	3.6	3.6	3.6
Commercial	.6	1.8	3.3	3.9	4.5	4.8	4.9	4.9	4.9	4.9	4.9
Total	.8	2.9	5.2	6.4	7.4	8.0	8.3	8.4	8.5	8.5	8.6

Table 3: Space Heating Customers (thousands)

	2015 Q4	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	1.6	6.4	9.4	12	13.7	14.8	15.4	15.8	16	16.2	16.2
Commercial	.8	1.4	1.7	1.9	2	2.1	2.1	2.1	2.1	2.1	2.1
Total	2.4	7.9	11.1	13.9	15.7	16.9	17.6	18	18.2	18.3	18.4

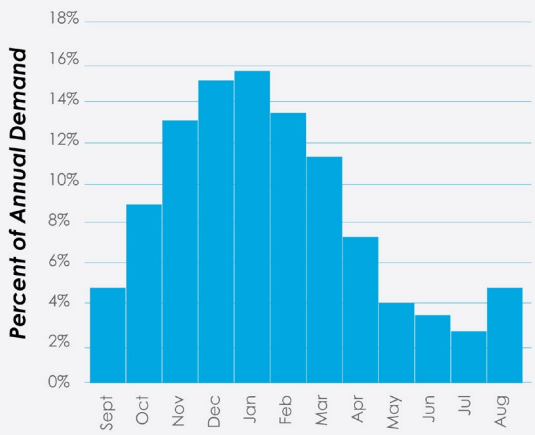
Figure 2: LNG Demand Per Year



5.3. Natural Gas Demand Seasonal Swing

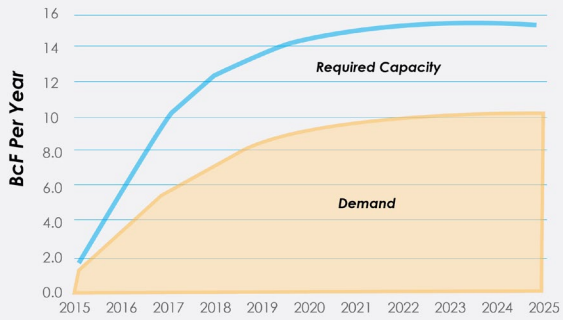
Space heat demand is seasonal with more gas demanded in the winter than the summer. Figure 3 shows the percentage of the annual demand needed each month for space heating.

Figure 3: Seasonal Natural Gas Demand



To provide for seasonal demand, the plant will operate at full capacity in the winter and at a much lower capacity during the summer. As a result, the plant will have an annual capacity utilization factor of about 60 percent. Additionally, about 6 percent of the produced LNG will be needed for trucking fuel and re-gasification fuel. As a result, the initial 9 Bcf plant can only serve an annual space heat demand of about 5.2 Bcf. Figure 4 compares the annual demand with the amount of needed LNG plant capacity.

Figure 4: LNG Plant Capacity vs. Demand



AIDEA and AEA will also pursue customers that may increase the NS LNG Plant's capacity factor. This includes interruptible customers to purchase LNG during the summer and industrial or institutional customers that will purchase LNG year round. Both types of customers can increase the overall capacity factor of the LNG plant, thereby reducing cost for all customers.

5.4. Initial NS LNG Plant Capital Elements

The NS LNG Plant design would initially include multiple liquefaction trains with a total production capacity of 300,000 gpd LNG (sufficient for a total annual capacity of 9 Bcf natural gas, as well as all required gas treatment and electric power generation). Production expansion beyond 9 Bcf would require a second pretreatment system and additional power generation equipment. The contractor will provide utility systems including plant and instrument air, gaseous and liquid nitrogen, fire protection systems, potable water, and wastewater systems. Electric power will be supplied using on-site gas turbine generators. In addition, the Contractor will provide a technologically-advanced feed gas receiving facility, and design and construction of the field pipeline tie-in and custody transfer metering.

Major components include:

- Feed gas pipeline extension (approximately 1,800 Linear Feet of 8-inch pipeline)
- New gravel pad (approximately 10 acres) and access road
- One receiving area with fiscal meter and front-end clean-up and purification equipment
- Sour gas thermal oxidizer to destroy hydrogen sulfide (H_2S) and volatile organic compounds (VOC) emissions
- Mercury guard-bed
- Multiple electric drive, nitrogen (N_2) refrigerant cycle liquefiers able to collectively produce 300,000 gpd LNG and 15,000 gpd propane
- Bullet-type LNG "surge" holding tanks (up to 280,000 gallons total capacity)
- Bullet-type propane holding tank (up to 30,000 gallons total capacity)
- Two (2) LNG trailer loading stations (500 gallons per minute) with associated tractor LNG fueling stations
- Gas turbine drive electric power generation and distribution as required to supply all facility power demands and turndown
- Flare stack
- Plant process control, interface, and monitoring systems
- Safety systems for fire and gas hazard detection, closed-circuit television and alarms, and appropriate fire protection systems

Control systems will be designed for efficiency and safety, including redundant control architecture, control automation, site improvements, and maintenance equipment planning. Emissions and waste disposal will be minimized using BAT.

5.5. Long Term NS LNG Plant Capital Elements

While the IEP is intended to serve the initial FNSB space heat market as a transition to an alternative supply from a North Slope natural gas pipeline, a key requirement of the IEP is the ability to serve the entire FNSB space heat demand if necessary.

In the event an alternative supply does not become available, AIDEA has developed plans for expansions to the NS LNG Plant to supply natural gas for the full build-out of the Interior Alaska natural gas system. The NS LNG Plant would need to expand to 15 Bcf to serve the entire demand at full build-out. The plant would be expanded in two stages, each adding 3 Bcf of capacity. The first expansions would be completed in 2018 and the second in 2019.

Table 4: Demand Growth and Plant Capacity (BcF)										
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Demand	2.9	5.2	6.4	7.4	8.0	8.3	8.4	8.5	8.5	8.6
Required Capacity	5.0	9.0	11.2	12.9	14	14.5	14.7	14.9	14.9	15
Plant Capacity	9.0	9.0	12	15	15	15	15	15	15	15

5.6. NS LNG Plant Capital Costs and Financing

5.6.1. Planned NS LNG Plant

The planned NS LNG Plant is designed to be 9 Bcf and serve the initial FNSB space heat market. This planned plant is expected to cost $207.7 million. As discussed in the Project Overview section, AIDEA expects to invest $50 million of SETS funds as equity receiving no return, as well as $125 million of SETS funds with a 3 percent return. An additional $32.7 million investment, planned to be from private equity, is needed to finance the remaining project costs.

Table 5: Capital Sources for Planned Plant ($ millions)	
AIDEA Equity	50
SETS Loan	125
Private Equity	32.7
Total	207.7

5.6.2. Potential Ultimate Plant Expansion

In the event the NS LNG Plant is expanded to meet the full demand due to delay in alternative sources, two expansions of $28.0 million would be required and are anticipated to be funded entirely with private investment. Table 5 shows the investment by source for the initial plant and the two expansions. **For the simplicity of modeling, this analysis assumes the plant starts operating the beginning of 2016. Actual startup is expected in the third quarter of 2015.**

Table 6: Capital Sources with Potential Plant Expansion ($ millions)					
	2016	2017	2018	2019	Total
AIDEA Equity	50	-	-	-	50
SETS Loan	125	-	-	-	125
Private Investment	32.7	-	28	28	88.7
Total	207.7	-	28	28	263.7

5.6.3. Financing Elements and Assumptions – Planned NS LNG Plant

AIDEA equity

AIDEA will invest $50 million dollars from a FY 14 State Capital Appropriation for equity in the project. This equity does not earn a return during the modeled project life. Instead, the equity investment directly buys down the price of gas by reducing the amount of capital earning a return and being repaid.

SETS Loan

The expected $125 million of SETS loans has a fixed 3 percent interest rate paid back over 30 years (estimated life of plant). AIDEA anticipates both the interest and principal payments will be deferred for the first 5 years of the loan. The deferred interest is then capitalized and recovered over the remaining 25 years along with the existing principal. The annual debt service on the SETS loan is recovered through the cost of gas beginning in year 6.

- Loan amount: $125 million
- Interest rate: 3 percent
- Finance term: 30 years
- Delayed interest: 5 years
- Delayed principal: 5 years

Private Investment

Private investment supplies all needed capital in excess of the SETS loan and the AIDEA equity investment, with $32.7 million expected for the initial 9 Bcf plant and an additional $56.0 million needed if the plant must expand to 15 Bcf. The private investment is estimated to earn an annual pre-tax return of 10 percent of its total investment for the entire economic life of the project. The principal is only paid back after the end of the useful life of the project.

- Initial investment: $32.7 million
- Potential total investment: $88.7 million
- Estimated Rate Return: 10 percent
- Principal repaid: end of life

5.7. Operating Costs of the NS LNG Plant

5.7.1. Direct Operating Costs

The NS LNG Plant direct operating costs are essentially fixed and do not directly increase with plant production or with expansion. As a result, the direct operations cost provide the LNG plant economies of scale should future expansion be necessary. The cost per unit of LNG is anticipated to decrease as the plant is expanded and more LNG is produced.

Table 7: Direct Operating Costs ($ millions per year)	
Labor Exempt	1.9
Labor Nonexempt	3.6
Consumable Materials	.1
Replacement Parts and Tools	1.5
Rented Equipment and Vehicles	.3
Outside Services	1.7
Total	9.1

5.7.2. Natural Gas Source and Use

Raw natural gas will be purchased on the North Slope at a projected price of $3.30 per Mcf. This raw natural gas is expected to include 12.1 percent carbon dioxide (CO_2) that will be removed in the pretreatment process. During the pretreatment and liquefaction process, 13.5 percent of the treated gas is expected to be used for fuel

- Natural gas price: $3.30 per Mcf
- Raw natural gas: 12.1percent CO_2
- Fuel gas: 13.5 percent of treated gas

5.7.3. Total Annual Operating Costs

Total annual operating costs for the NS LNG Plant are expected to be passed directly through to the consumer in the price of gas. Operating costs include four main components:

- Purchase of raw natural gas
- Fuel gas to operate the plant
- LNG plant operations, including labor
- Other miscellaneous expenses and taxes

5.8. LNG Pricing Plan and Analysis

In order to determine financial feasibility, AIDEA has estimated the price of natural gas at the point it is delivered to Interior Alaska. That price includes the trucking costs but no unloading, storage, or re-gasification costs. The NS LNG Plant will not necessarily be rate regulated, but AIDEA's pricing model uses a cost recovery method that is similar to a rate regulated utility.

5.8.1. Rate Normalization

For this analysis, prices are calculated annually but normalized over a period of five years.

This project's rates are normalized for two reasons: First, the plant is not fully utilized in the first year and rate normalization prevents first year natural gas prices from being high. Second, rate normalization stabilizes rates for a period of years instead of recalculating and changing the price each year.

- No working capital costs
- No construction finance cost
- No capital cost contingency included
- LNG plant price normalized 5 years
- Price estimate: Average for first 5 years

Revenues, including the agreed-upon rate of return on private investment, to the SPE owner do not necessarily equal the expenses (including debt payments and depreciation) each year over the normalized period. Instead, the revenues are intended to be balanced each five year normalized period.

5.8.2. Delivered Price Estimates

This feasibility analysis estimates the price of LNG delivered to the FNSB under a set of assumptions to determine the feasibility of the project. First, this analysis assumes that an alternative source of natural gas from a pipeline is delayed in order to demonstrate that the project is capable of serving the full build-out if needed. Second, this analysis assumes that the NS LNG Plant only serves the FNSB space heating demand, and no other customers are available to improve the capacity factor of the plant.

AIDEA estimates the delivered price of LNG for the space heating market will be $11.59 per Mcf. This estimate includes all costs to produce LNG on the North Slope and truck it to the FNSB. It does not include storage, re-gasification, or distribution costs. The $11.59 per Mcf cost is based on a 60 percent utilization factor of the North Slope LNG plant.

Space Heating Only vs. Full Capacity

AIDEA estimates the delivered price of LNG for the space heating market will be $11.59 per Mcf based on a 60 percent utilization factor of the North Slope LNG plant. AIDEA and AEA analysis indicates the FNSB space heat market will have a plant utilization factor of 60 percent. This spreads the full cost of plant capacity over only 60 percent of the potential production, resulting in a relatively higher price ($/Mcf) for the fixed cost components of the LNG plant. The benefit of a 60 percent utilization factor is more LNG production in the winter allowing the natural gas utility to reduce its need for LNG storage in the FNSB. This shifts some of the cost from LNG storage to the North Slope plant but reduces the overall delivered price of gas.

AIDEA estimates the delivered price of LNG is $10.52 if the plant runs at full capacity year round. The difference between these two prices, $1.07 per Mcf, can be considered virtual storage as it is a premium the space heating customer pays to avoid additional downstream storage costs. If summer-only or year-round customers use the NS LNG Plant, the overall capacity factor will increase and reduce the price from $11.59.

Figure 5: Delivered Price, Space Heating vs. Full Capacity

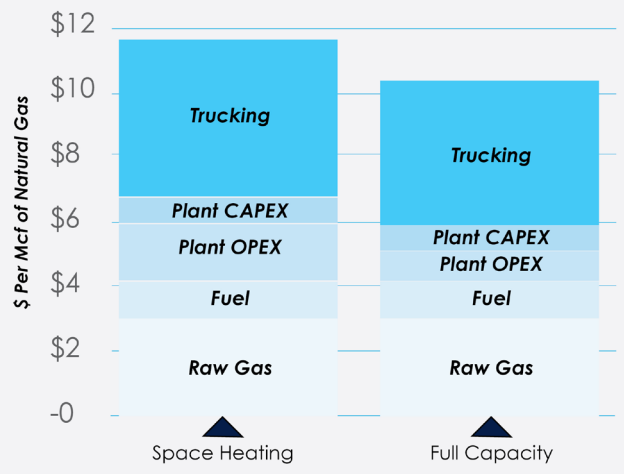
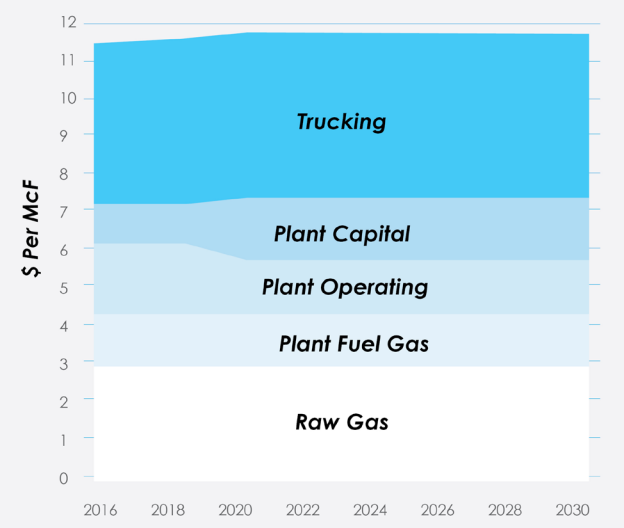


Figure 6: Delivered Price Over Time by Price Component



Price Trends Over Time

The rate of change in the price of LNG will vary over time depending on the rate recovery structure. The current rate recovery structure results in fairly steady LNG prices over the first 15 years. This is a result of four rate recovery factors:

- Rate normalization: Prices are averaged over 5-year periods.

Price Trends Over Time *(continued)*

- Delayed SETS payments: SETS is not paid back for the first 5 years of the loan, resulting in a year 6 increase in the "Plant Capital" price component.
- Operating economies of scale: The operating costs do not increase with the expanding production reducing the "Plant Operating" price component after the first 5-year normalized period.
- Property taxes: Property taxes are assessed on the un-depreciated value of the plant and are minimal after 5 years. For tax purposes, the plant is depreciated over 5 years. Property taxes are included in "Plant Operating."

5.9. Projected Operating Results – Financial Feasibility

5.9.1. NS LNG Plant SPE Projected Cash Flow

Rate normalization creates an average rate for 5-year periods. The plant has a negative operating cash flow of $4.2 million because it is underutilized in the first year. This results in prices that are too low to generate an operating profit in the first year but are high enough to cover all costs and achieve the private investment's agreed-upon rate of return for the entire 5-year period.

5.9.2. Costs

The plant costs (cash out-flows) include recovery of AIDEA investments and operating costs. Property taxes and fuel gas are broken out from operating costs. Raw gas is not included in the cash flow analysis as it will be a direct pass through to customers.

5.9.3. Revenue

This analysis separates revenue (cash inflow) into two categories: (1) plant capacity; and (2) LNG sales, which represents one possible revenue structure that AIDEA is exploring.

Plant capacity revenue is associated with the fixed cost of operating the plant and is based on the amount of plant capacity needed to serve space heating. It is the cost component that is impacted by rate normalization and in the first year the revenue from plant capacity is significantly lower due to plant underutilization.

LNG sales revenue is associated with the variable cost of producing LNG and consists entirely of fuel gas costs. The cost of raw gas is not included in the LNG sales revenue.

5.9.4. Net Cash Flow

The 10 percent annual return on private investment is calculated annually to generate normalized rates, but it is not included in the Costs section. Instead, it is recovered through the Net Cash Flow. As a result, the return on private investment varies year-to-year, but earns an average 10 percent return over the course of the normalized 5-year periods.

Table 8: Cash Flows ($ millions)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Costs										
SET Equity	-	-	-	-	-	-	-	-	-	-
SETS Loan	-	-	-	-	-	7.2	7.2	7.2	7.2	7.2
Operating Costs	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Property Tax	3.3	2.9	2	1.5	.4	.2	.1	-	-	-
Fuel Gas	3.2	5.7	7.1	8.1	8.8	9.1	9.3	9.4	9.4	9.4
Total Costs	15.6	17.7	18.2	18.7	18.4	25.6	25.7	25.7	25.7	25.7
Revenue										
Plant Capacity	8.2	14.9	18.5	21.3	23.1	24.7	25.1	25.3	25.5	25.5
LNG Sales	3.2	5.7	7.1	8.1	8.8	9.1	9.3	9.4	9.4	9.4
Total Revenue	11.4	20.6	25.6	29.5	31.9	33.8	34.4	34.7	34.9	35
Net Cash Flow	(4.2)	2.9	7.4	10.7	13.5	8.2	8.7	9.1	9.2	9.2

5.9.5. Financial Feasibility

Based on the economic and financial analysis above, the NS LNG Plant SPE is projected to be feasible, with natural gas delivered to FNSB at prices sufficiently below current energy costs to drive conversion of the majority of commercial and residential space heating customers.

5.9.6. Project Price Targets

The NS LNG Plant is intended to reduce the cost of heating for FNSB residents and business and provide gas in order to start the build-out of distribution system for gas from a pipeline. This analysis has found that delivery of LNG to FNSB is financially feasible and will be delivered at a cost that meets the project's targets. This analysis has not specifically examined the cost of storing and re-gasifying the LNG after it has been delivered or the cost of distributing natural gas to customers. This work is underway by AEA and is part of the overall IEP.

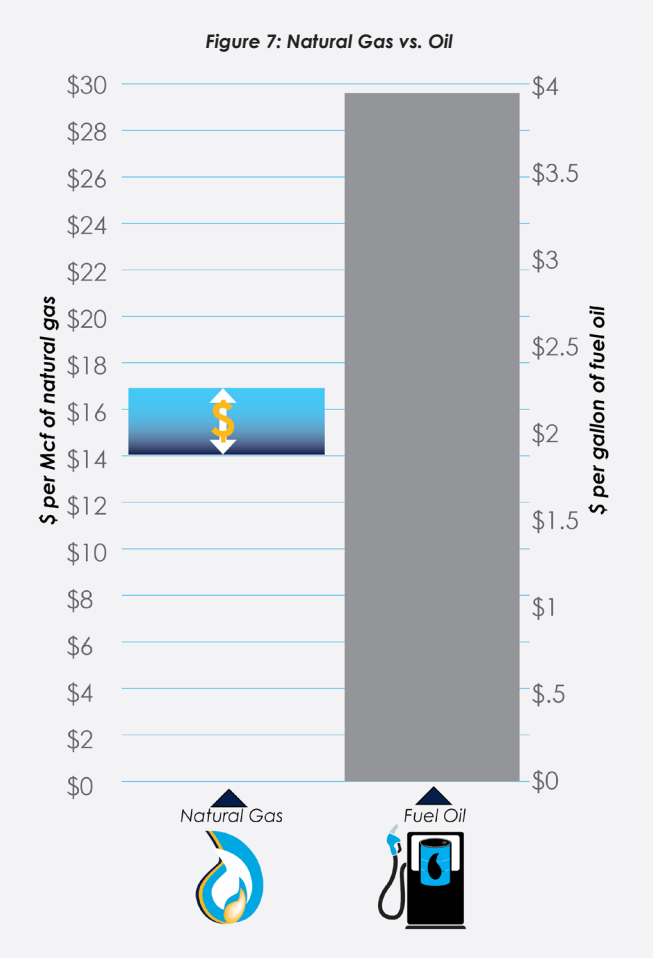
The delivered price of LNG purchased FOB at the plant and delivered to FNSB is expected to be $11.59 for a customer using plant capacity to follow much of the seasonal demand swing. Using the plant to meet demand swing is expected to reduce the amount of LNG storage needed in FNSB and concomitantly would reduce the overall cost to the customer. AIDEA is developing a strategy to find customers that will increase the utilization of the plant allowing for a larger capacity factor that in turn should reduce the space heating market price.

The cost of LNG storage, re-gasification and distribution downstream of the LNG plant is not examined in this report. Instead, we will use a range of reasonable cost assumptions to estimate the customer price of gas. Preliminary analysis indicates that a price range of $2.50 to $5.50 per Mcf is reasonable for storage, regas and distribution. This should result in a delivered LNG price to the customer of $14.09 to $17.09.

Currently, most FNSB residents heat with fuel oil that costs about $4.00 per gallon, which is equivalent to $30.00 per Mcf natural gas. Natural gas from the NS LNG Plant will significantly reduce the cost of heating for FNSB residents.

Table 9: Price of Natural Gas and Fuel Oil		
	$/McF Equivalent	$/Gallon Equivalent
Natural Gas Low	14.09	1.88
Natural Gas High	17.09	2.28
Fuel Oil	30.00	4.00

We estimate that the average home in the FNSB will use 190 Mcf of gas per year. If FNSB residents convert from heating with fuel oil to natural gas, they can expect to save $2,450 to $3,000 per year, reducing their energy costs 43-53 percent.



The North Slope LNG plant is projected to successfully meet the community's energy price targets and reduce the annual heating cost of FNSB residents and business. If the project reaches full build-out by supplying 8.6 Bcf per year, the project is designed to reduce the total FNSB energy costs by $111 to $137 million per year.

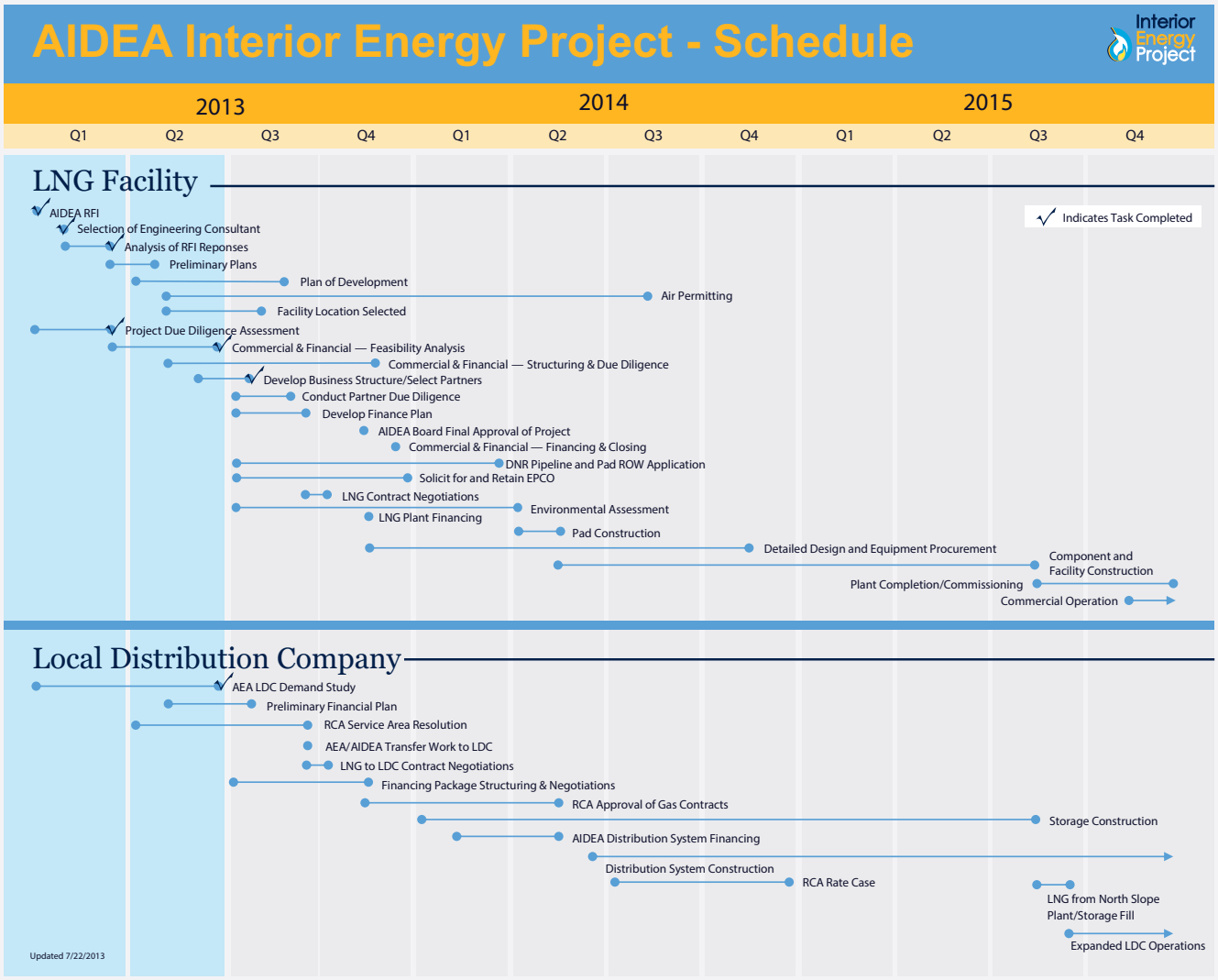
Table 10: Household Energy Savings ($ per year)			
	$/McF Equivalent	$/Gallon Equivalent	Savings %
Natural Gas Low	2,677	3,023	53%
Natural Gas High	3,247	2,453	43%
Fuel Oil	5,700	-	-

6.0 ENTERPRISE DEVELOPMENT PROCESS AND SCHEDULE

6.1. Overall AIDEA IEP Schedule/Process Milestones

An overview of the schedule for both the NS LNG Plant project and a Local Distribution Company (FNSB natural gas utility) elements of the IEP is depicted in Figure 8.

Figure 8: Schedule



6.2. NS LNG Plant Development Schedule

Based on the results of the feasibility analysis, AIDEA's management proposes to move forward to the Deal Structuring and Due Diligence phase of the NS LNG Plant project. AIDEA will continue to move forward with initial project development and provide to the AIDEA Board a full Due Diligence report in October in order for the Board to make a final determination on whether or not to move forward with development of the project.

With the right levels of support, an aggressive schedule can be met to bring gas to FNSB no later than the fourth quarter of 2015. In order for this to occur, key elements in the development and implementation of the plant funding, design, and construction must be successfully managed, such as expedited permit delivery and acquisition of a lease site, early selection of an equity partner, and firm commitments from manufacturing companies for key components of the necessary infrastructure.

Due to the complex nature of this project, adjustments to the schedule may be needed as planning and work progress. However, the sequence of development is expected to be static. Updated schedules will be provided as needed. Beginning with project definition in the third quarter of 2013 and ending with full operations in the fourth quarter of 2015, the project is expected to take just over two years to complete. The following table outlines the major project milestones.

Table 11. NS LNG Plant Development Schedule

Date	Activity
Q3 2013	Project Defined
Q3 2013	Initiate Air Permitting
Q3/4 2013	Field Assessment of Pad for SHPO/Wetlands Permits
Q4 2013	Development contracts executed
Q4 2013 – Q4 2014	Engineering Design and Procurement
Q2/Q3 2014	Construction of Pad
Q3 2014	ADEC Issues Air Permit
Q2 2015	Installation of Pipeline
Q4 2014 – Q2 2015	Construct LNG Facilities
Q3 2015	Plant Commissioning
Q4 2015	Full Operations

7.0 RISKS AND RISK MITIGATION

7.1. Risk Category Summary

Potential project risks associated with the NS LNG Plant fall into three major categories:

- Transactions risks
  - Gas supply agreements
  - LNG purchase agreements
  - Distribution system development
  - RCA contract approval delays
- Development risks
  - Site adequacy / future expansion
  - Arctic conditions / North Slope technical requirements
  - Project schedule
- Demand / Market risks
  - Conversion / connection delays
  - Conversion financing
  - Distribution system build-out costs
  - Alternative natural gas supply

7.2. Risk Analysis and Mitigation

Risk Analysis and Mitigation Table		
Potential Risks	**Description and Analysis**	**Mitigation**
Transaction Risks		
Gas Supply Agreements	*An uninterruptable supply of gas in winter months of not less than approximately 31 million standard cubic feet per day (MMscfd) is important to enable the LNG plant to achieve its capacity of 9 Bcf per year and maintain the required LNG supply to FNSB.* *The IEP project requires a long-term, predictable price gas supply contract.*	■ *AIDEA will work with the North Slope working interest parties to secure long-term contracts with predictable pricing. This may involve seeking assignment of one of the two existing agreements between NS natural gas suppliers and FNSB interests.* ■ *If, for whatever reason, the gas supply agreements are not completed by the "closing" dates anticipated at the end of 2013, the project would not proceed.*
LNG Purchase Agreements	*The NS LNG SPE will need to secure purchase agreements for LNG to be trucked to Interior Alaska. There is no assurance that there will be credit-worthy entities willing and able to enter into long term purchase agreements*	■ *Once the development process is designed, and NS LNG SPE partnership established, the SPE will pursue purchase agreements with all relevant potential customers. Ultimately, the overall demand for natural gas in Interior Alaska will drive this process.* ■ *If, for whatever reason, the LNG purchase agreements are not completed by the "closing" dates anticipated at the end of 2013, the project would not proceed.*

Risk Analysis and Mitigation Table		
Potential Risks	**Description and Analysis**	**Mitigation**
Distribution System Development	*In order to meet projected demand for the NS LNG Plant, the FNSB distribution system build-out will need to be assured. There are potentially competing service territories and ability of utilities to expand distribution systems are uncertain.*	■ *Even without expansion of the territory, or if the area outside the current FNG territory stays in dispute, FNG's existing territory includes the potential for more than one-half of the projected initial demand.* ■ *AIDEA and AEA are working with the relevant FNSB parties to plan for deployment of AIDEA's $150 mm authorized financing for this purpose to spur development of the system as rapidly as possible.*
RCA Contract Approvals	*Contracts by distribution utilities with the LNG SPE will likely be subject to RCA approval and those approvals will likely not occur before the SPE must commit funds in order to meet the winter 2015-16 heating season.*	■ *AIDEA's policy and business structure for the NS LNG SPE are oriented toward the pricing expected from an economically regulated utility and should be consistent with RCA expectations.*
Development Risks		
Site Adequacy / Future Expansion	*The LNG plant may potentially need to expand in the future to meet industrial and commercial demand. Site size, location and other features may not be appropriate to future expansion*	■ *AIDEA's technical team has developed site criteria with the specific objectives of providing for future expansion even if the NS LNG Plant has to meet ultimate long-term demand – and therefore would require expansion.* ■ *Assuming available gas supply, no limitations to future expansion of the plant are anticipated if it is properly sited.*
North Slope Requirements	*Industrial facilities on the North Slope are subject to climatic extremes and therefore must be designed, engineered and constructed to withstand arctic conditions.* *Facilities that connect to Prudhoe Bay Unit infrastructure and facilities must meet certain guidelines in order to access natural gas supplies and to operate in proximity to existing PBU facilities.* *Failure to adequately provide for either arctic conditions or PBU requirements could prevent appropriate development of the NS LNG Plant*	■ *AIDEA's technical team has developed very specific plans and specifications for the NS LNG plant, including all factors related to this type of industrial facility in arctic conditions.* ■ *AIDEA has also worked with the Operator of the Prudhoe Bay Unit to make sure that project planning is consistent with best-practices for development in or near the PBU.*
Project Schedule	*The schedule for NS LNG Plant development to meet the winter 2015-16 space heating season is aggressive, particularly as it relates to long-lead-time equipment and environmental permitting. A conventional financing and development process would not meet the target timeline.* *As a result, it is likely that AIDEA and the SPE will need to accelerate the permitting process and place orders for long-lead-time equipment well before all relevant business agreements (with natural gas suppliers and LNG customers) are negotiated.*	■ *AIDEA has been funding an intensive permitting process in order to make the 2015-16 heating season possible.* ■ *AIDEA is also pursuing the possibility of securing "production line positions" for the key equipment. While this involves certain up-front payments, those payments would be a fraction of the total cost of the equipment, and could possibly be sold to other parties if this project does not move forward.*

Risk Analysis and Mitigation Table		
Potential Risks	**Description and Analysis**	**Mitigation**
Demand / Market Risks		
Conversion Financing	*Market analysis has indicated that the cost of converting space heating equipment from current fuels to natural gas could be a barrier to meeting current LNG demand projections.*	■ *There is potential legislation planned for the 2014 session that may provide for financing mechanisms for residential (and possibly commercial) conversions.* ■ *AEA is also exploring non-legislative options for financing conversions, including mechanisms used by utilities in other states based on regulatory (vs. legislative) mechanisms.* ■ *Continue to refine demand projections for space heating use and alternative industrial use (including transportation).*
Distribution System Build-Out Costs	*There are differing estimates among the FNSB parties regarding the cost of local distribution system build-out.* *It is possible, if the higher estimates are determined to be more accurate, that the all-in cost of natural gas in the FNSB would be higher than currently projected, and that demand would therefore be substantially lower.*	■ *AIDEA and AEA are working with the various FNSB parties to narrow the range of distribution cost estimates and determine the effect of the likely costs on ultimate customer rates. If those costs are determined to be so high that the LNG project would not be competitive, AIDEA could decide to stop the project.* ■ *The refined distribution system cost estimates should be available before the expected closing of the transactions at the end of 2013.*
Alternative Gas Supply	*AIDEA and AEA anticipate that alternative sources of natural gas will become available in FNSB during the expected operating period of the NS LNG Plant.* *It is possible that those alternative supplies will offer lower cost natural gas in that market and that the NS LNG Plant SPE will not meet projected sales and revenues.*	■ *AIDEA is designing and engineering the NS LNG Plant with the potential that certain elements of the system could be redeployed to a different site if demand for LNG at that location is inadequate.* ■ *AIDEA and AEA are exploring the potential for alternative markets for NS LNG, including Interior Alaska industrial facilities and LNG as a transportation fuel.*

8.0 CONCLUSION

AIDEA, in conjunction with AEA, has determined that a 9 Bcf NS LNG Plant is technically and economically feasible for serving the initial FNSB space heating demand. The NS LNG Plant is projected to successfully meet the community's energy price targets and reduce FNSB residents' and businesses' annual heating cost.

The plant will be expandable, if necessary, to provide continued LNG supply in the event an alternative supply from new sources or a natural gas pipeline is delayed. This analysis estimates the delivered price of LNG in this scenario and projects that the project can provide a long term supply of affordable natural gas to FNSB if it is necessary.

Based on the results of the feasibility analysis, AIDEA's management proposes to move forward to the Deal Structuring and Due Diligence phase of the NS LNG Plant project. AIDEA will continue to move forward with initial project development and provide to the AIDEA Board a full Due Diligence report in October, in order for the Board to make a final determination on whether or not to move forward with development of the project. With the right levels of support, an aggressive schedule can be met to bring gas to FNSB no later than the fourth quarter of 2015.