Interior Energy Plan:
North Slope / Fairbanks LNG Project
Engineering Brief and Consultant Team Recommendations

Prepared by

Alaska Industrial Development and Export Authority
In Partnership with the Alaska Energy Authority

April 23, 2013

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1.0 EXECUTIVE SUMMARY

The Interior Energy Plan ("IEP") was introduced by Gov. Parnell during the 28th Alaska Legislative Session to provide a catalyst to bring natural gas to the Fairbanks area and lower the region's high heating costs. Senate Bill 23 passed the Alaska Legislature unanimously in April 2013 and authorizes the Alaska Industrial Development and Export Authority (AIDEA) to provide a financing package to partner with the private sector to build a liquefied natural gas (LNG) plant on the North Slope and a distribution system in Interior Alaska, specifically including downtown Fairbanks and North Pole.

The purpose of this brief is to set forth AIDEA's cost feasibility assessment of a North Slope LNG trucking project to supply the Fairbanks North Star Borough (FNSB) with natural gas to decrease energy costs and improve air quality. To support this effort, AIDEA made use of a consultant team consisting of HDR Alaska, Inc. and MEI, LLC, Northern Economics, Inc. ("NEI"), PROLOG Canada Inc., and Western Financial Group.(collectively "IEP Consultant Team"). Using both internal and external resources, AIDEA conducted a feasibility analysis of the project. AIDEA's IEP consultant team recommends advancing the project in the form of a Plan of Development and completing the necessary financial due diligence.

The IEP Consultant Team's conclusion is that developing this project is feasible from an engineering perspective. With the right levels of support, an aggressive schedule can be met to bring gas to FNSB no later than the fourth quarter (Q4) of 2015. Project capital cost for the initial North Slope development is estimated at $208 million (MM); this includes the feed gas pipeline, pad, and LNG processing facility (9 billion standard cubic feet [Bcf] annual capacity). Project capital cost for the initial FNSB development is estimated at $86 MM; this includes the LNG storage and regasification expansion and distribution build-out required through 2015. Total project cost to serve the entire FNSB residential and commercial space heat demand would be $519 MM (accumulated capital expenditure by 2025 provided a pipeline alternative is not implemented). This total cost includes the necessary LNG infrastructure on the North Slope and gas distribution system build-out to supply the entire the medium- and high-density areas within the FNSB including the areas most affected by poor air quality. At full build-out, nearly 25,000 residential structures will be served (Figure 1). In order for this to occur, key elements in the development and implementation of the supply chain 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. Additional detail is provided below outlining demand, supply, infrastructure requirements, permitting, cost, and risk mitigation requirements.

It should be noted that the intent of this project is to provide initial gas supply and distribution system development in the FNSB prior to, and in concert with, the development of an alternative source of gas.

2.0 DEMAND

The residential and commercial demand for natural gas in the FNSB is an important baseline metric for determining the LNG production needs, and affects the size of the project's components. Demand also affects the project's economic viability. Work is continuing to be done to define and refine demand figures. The demand is projected to range as shown on Figure 2. Annual demand is anticipated to level off just below 12 Bcf by 2030, but could increase with additional industrial demand and growth in the community.

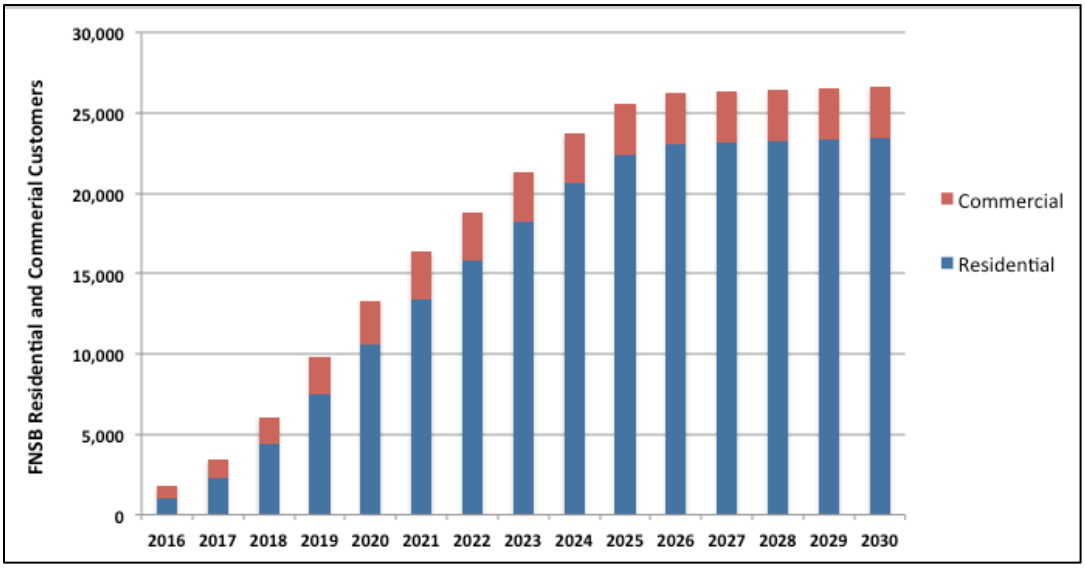

Figure 1. Projected Residential and Commercial Customer Count in the High- and Medium-Density Areas

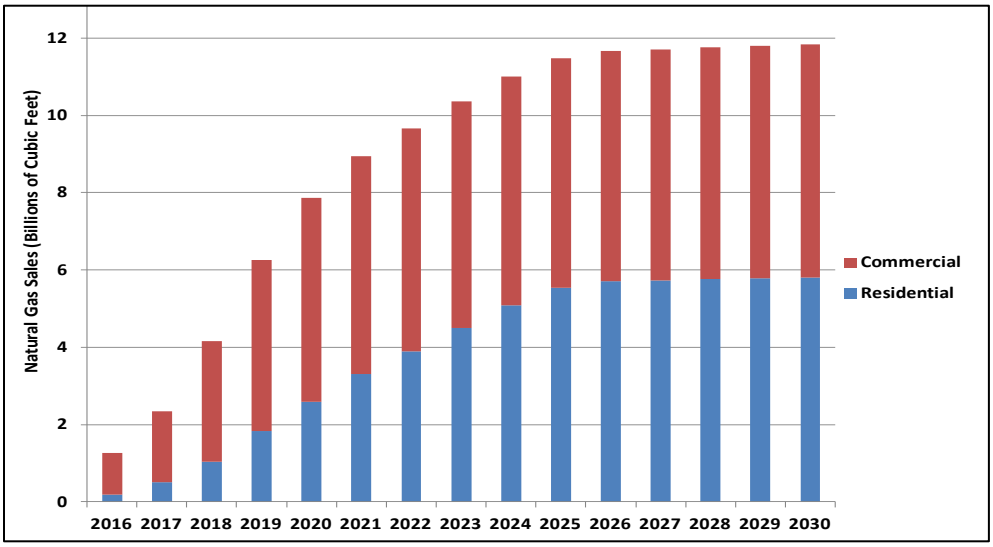

Figure 2. Projected Annual Natural Gas Sales in the High- and Medium-Density Areas

The annual volume estimates shown above assume that the residential and commercial conversion rates apply to all new customers over time. Figure 2 does not show the potential annual peak or winter demand, nor does it show the potential annual demands of 2 Bcf for electric generation and 2.5 Bcf for industrial use.

Some large commercial and some residential customers will have the capacity to heat with both natural gas and heating oil. These customers may decide to enter into "interruptible gas service contracts" where they agree to gas service without a guarantee of constant supply in return for discounted gas rates. Customers holding interruptible service contracts are subject to the supplier's right to suspend service at any time in order to ensure adequate service to existing customers with firm service contracts.

3.0 SUPPLY

As part of this due-diligence effort, AIDEA's 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 the demand in the FNSB.

LNG Delivery Design Concept

A design concept for the development of natural gas supply to Interior Alaska includes a North Slope LNG processing, storage, and trailer filling facility; LNG trucking; FNSB storage and regasification facility; and FNSB distribution system build-out. The design concept would incorporate decision points to determine whether and when expansions would be needed based on the development of alternative gas supplies.

It is estimated that a North Slope LNG facility with three 100,000 gallon per day (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 that gas from an alternative source will be available in 2019 to provide some or all of the gas demand, and into the future (Figure 3).

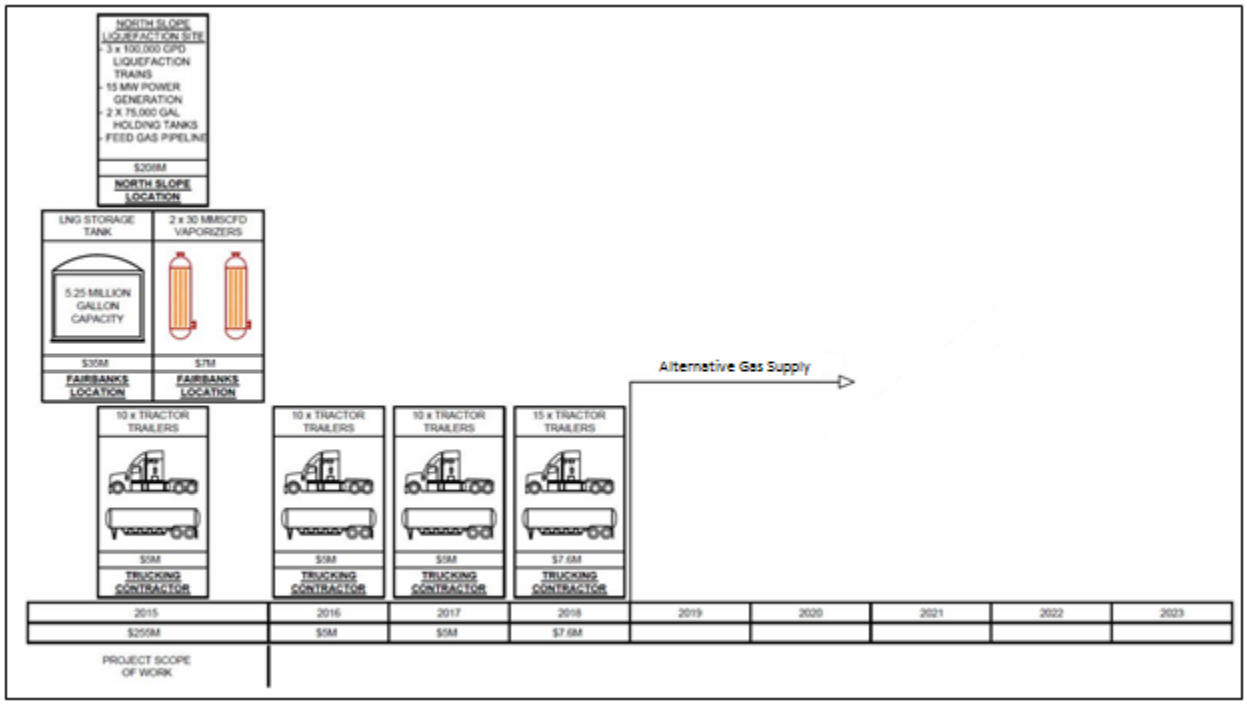

Figure 3. Build-Out Assuming Availability of Alternative Gas Source

If an alternative source of gas supply is delayed beyond 2019, additional liquefiers could be added to the North Slope LNG facility to ensure supply for the projected increase in demand. The capital build-out required for ultimate demand in the absence of an alternative source of gas is show below (Figure 4).

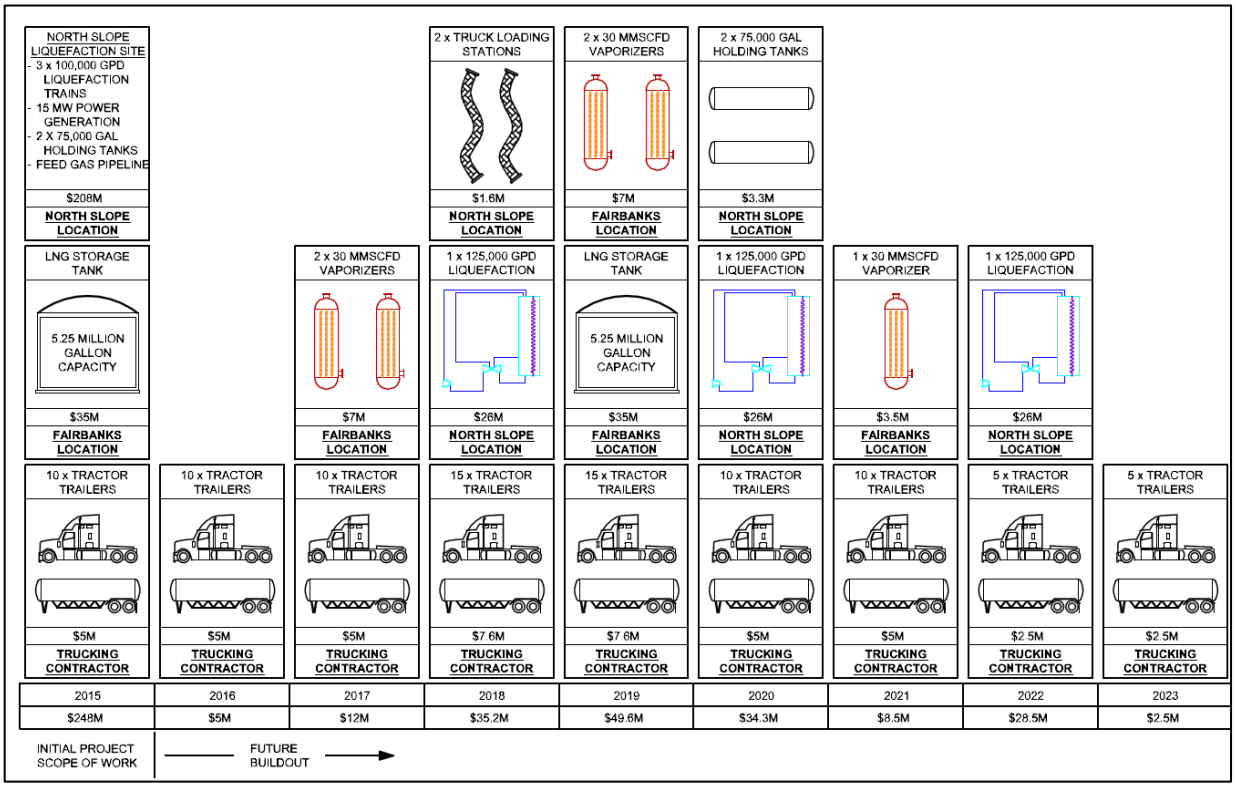

Figure 4. FNSB Natural Gas Project Design Concept Full Build-Out

3.1 North Slope Siting and Permitting

Prior to initiating permits for the LNG facility on the North Slope, the source of gas will need to be secured and a location determined for the LNG plant. The Working Interest Owners' (WIO) Balloting Process has been identified as a key process in determining the optimal location of the facility. Securing gas contracts through the WIO process will ensure that the placement of the facility will be aligned not only with an appropriate tie-in location but also with North Slope security and safety considerations.

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.

The consultant group team has the following recommendations regarding location constraints and permits:

- Following the securing of gas through the WIO balloting process and subsequent site selection, engage regulatory agencies to optimize permitting processes.
- Identify and promptly initiate the most efficient air quality permitting review and approval process with the Alaska Department of Environmental Conservation, working in conjunction with the Department of Natural Resources' Office of Project Management and Permitting.

3.2 North Slope Infrastructure

The North Slope infrastructure will be developed in three phases: (1) initial build-out; (2) expansion of the initial build-out should one of several alternative gas supply projects be delayed; and (3) development of alternative uses for the LNG plant once another gas supply is in place.

The North Slope LNG facility will be designed to produce sufficient LNG to achieve an initial gas supply in the FNSB of at least 6,500 thousand standard cubic feet of gas (Mcf) per day in early 2016. Depending on alternative gas developments, the plant could be incrementally increased up to 56,500 Mcf per day by 2025. These demand figures were developed based on the projected residential and commercial heating demand requirements within the medium- and high-density areas of the FNSB.

The initial North Slope LNG facility is anticipated to be operational in Q4 2015 with a total installed capacity to produce 300,000 gpd of LNG (equivalent to 9.05 Bcf per year[1]) and approximately 15,000 gpd of HD-5 grade propane.

To meet forecasted natural gas demand growth (excluding any industrial demand), the plant would be designed so that its production capacity could be increased every two years starting in 2018 (Figure 5), should an alternative source of gas be delayed. In this event, the North Slope LNG facility could be expanded to produce approximately 675,000 gpd of LNG (20.36 Bcf per year) and approximately 33,000 gpd HD-5 grade propane using a total of six liquefaction trains installed by 2022.

[1]

300,000	gallons per day	675,000	gallons per day
109,500,000	gallons per year	246,375,000	gallons per year
9,049,586.8	mcf per year	20,361,570.2	mcf per year
9.05	BCF	20.36	BCF

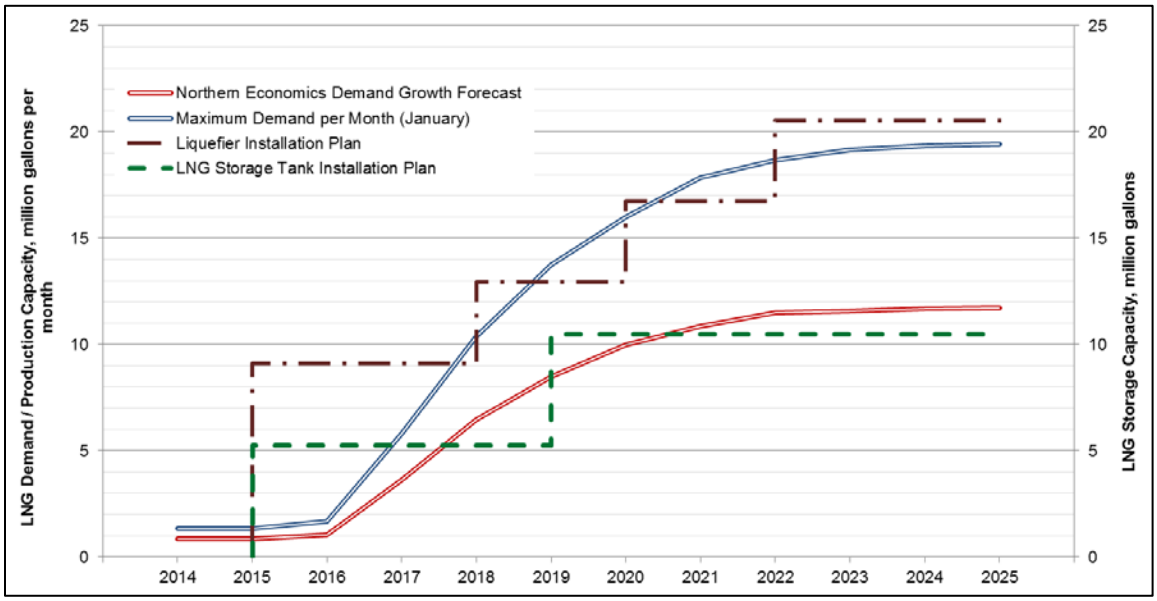

Figure 5. Liquefier and LNG Storage Tank Installation Plan (Based on Demand)

The estimated cost for the initial North Slope facility to be completed in late 2015 is approximately $208 MM, with a full build-out cost of $291 MM by 2025 if needed.

The IEP Consultant Team has the following recommendations regarding the North Slope LNG facility design:

- Secure gas supply contracts sufficient to satisfy both residential and commercial heating as well as possible industrial power demands.
- Secure the services of an Engineering, Procurement, and Construction (EPC) like entity to develop the project using alternative delivery methodology to deliver a suitable facility.
- Secure suppliers of key LNG facility equipment elements and reserve manufacturing timeslots.

3.3 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 both Alaska and Canada. Presently, more than 100 trucks per day carrying diesel and other products travel the 1017 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 Fairbanks as presented in the following sections.

To deliver LNG during the peak demand period in the winter of 2015-16, 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 2025 the maximum (January) number of trailers on the road will increase to an estimated fleet size of approximately 90 10,500-gallon trailers. 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.

3.4 FNSB Storage and Regasification

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, one 5million-gallon LNG storage tank appears to be sufficient to meet the gas demands until summer 2019.

If gas is still being trucked by 2019, the IEP Consultant Team recommends a second 5-million-gallon tank with regasification be installed to provide redundancy and additional reliability of the gas supply to the gas distribution system. The estimated storage and regasification component cost is $42 MM (without the cost of land). This additional storage would not be needed if an alternative source of gas becomes available.

As a result, the recommendations for FNSB regasification and storage are as follows:

- Initiate an agreement with a suitable entity to lock in the existing regasification and planned storage facility.
- Identify a site for LNG receiving, storage, and regasification facilities that can deliver gas to meet the forecast demands in 2019 and beyond if necessary.
- Coordinate gas supply tie-in locations with any alternative source of gas supply.

3.5 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 pipeline alternative.

As part of the due-diligence effort, AIDEA, and its Consultant Team working with AEA, conducted a comparison of recent build-out proposals to establish a baseline cost and schedule for a potential distribution system to reach the high- and medium-density areas of the FNSB. Based on a review of the existing plans it is estimated that it will take 6-years to build out the distribution system to serve the high and medium density areas of the FNSB (Figure 6). This build-out, if based on expansion of the current system, would cost approximately $170 MM.

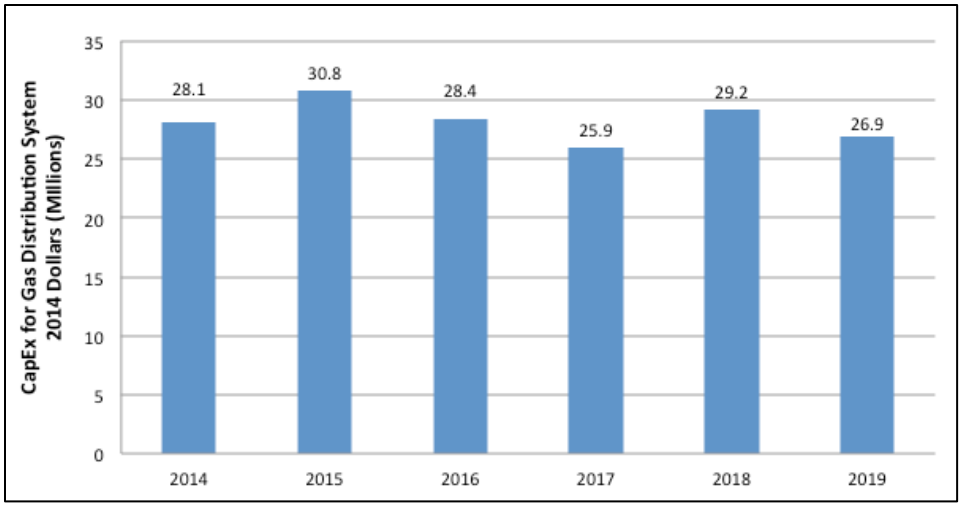

Figure 6. Proposed 6-Year Distribution System Build-Out Capital Expenditure 2014 Dollars (Millions)

4.0 COST

AIDEA and its Consultant Team have developed estimated costs for the project based on the due-diligence effort, including costs for infrastructure to support initial gas sales and expansion to meet projected future demand. Based on projected FNSB natural gas demand and corresponding infrastructure requirements, the team estimates the overall cost of the proposed project in 2015 to be $294MM with a cost of $519 MM in 2025 if an alternative source of gas is not in use at that time.[2] This cost includes construction of an LNG plant on the North Slope; and storage, regasification and distribution system expansion to the medium- and high-density areas within the FNSB (Table 1).

Table 1. Engineer's Estimate of Probable Construction Cost[2]

Project Component	2015 Cost - 9 Bcf ($MM-2014)	2025 Cost – 20.36 Bcf ($MM-2014)
North Slope Facility	$208	$291
FNSB Regasification and Storage	$42	$88
Storage Tax Credit[3]	-$15	-$30
FNSB Distribution System	$59	$170
Total Conceptual Cost Estimate	**$294**	**$519**

[2] Per the Association of Advancement of Cost Estimating, Recommended Practice 17R-97 for feasibility level project this constitutes a Class 4 cost estimate with a Value of 3 with an implied Accuracy Range is +30 to -15 percent. This probable cost estimate is an Order of Magnitude cost opinion in 2014 dollars, and does not include future inflation, financing costs or operation and maintenance costs. Contractor bids and final construction costs will depend on actual labor and material costs, actual site conditions, productivity, fuel and expendable pricing, competitive market conditions, final project scope, final schedule and other variable factors. As a result, the final project costs will vary from this estimate.

[3] One storage tank is assumed to qualify for the State of Alaska refundable tax credit of 50 percent of the capital costs, up to the maximum credit of $15 million.

5.0 SCHEDULE

The anticipated project schedule is based on a number of critical items including, but not limited to, prompt development of business entities, a gas supply contract, retention of an EPC-like contractor, completing permitting, and efficient procurement and construction. Figure 7 outlines a conceptual schedule for the project. (Note: The Alaska Legislature approved the financing package in April, 2013.)

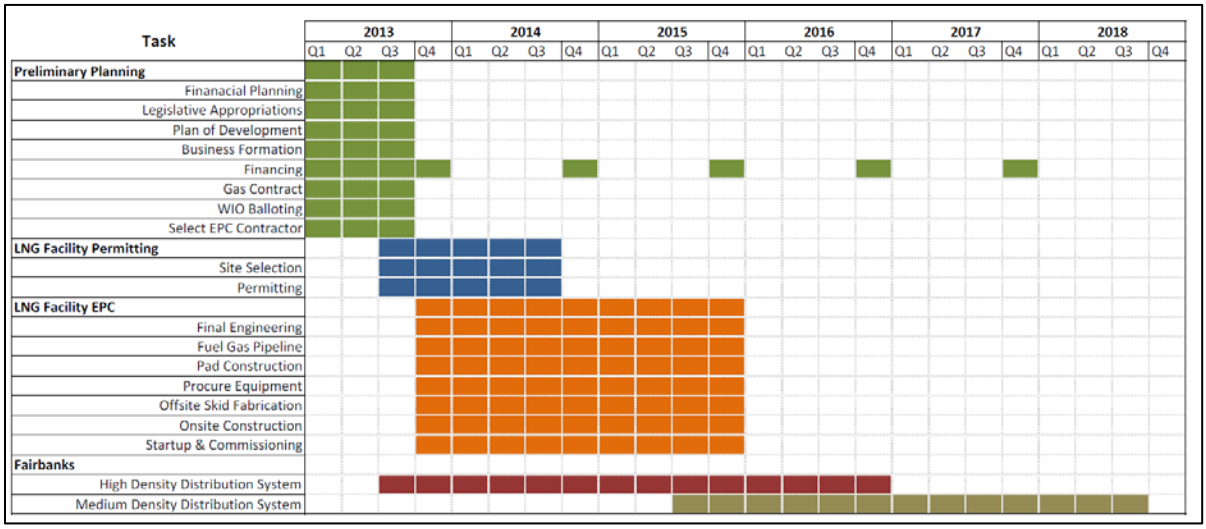

Figure 7. Conceptual LNG Project Schedule

6.0 CONCLUSIONS

The IEP Consultant Team has determined that the LNG delivery design concept, as proposed in this brief, is feasible from an engineering perspective. With the right levels of support, an aggressive schedule can be met to bring gas to the Fairbanks area no later than Q4 of 2015. In order for this to occur, key elements in the development and implementation of the supply chain must be managed to success, such as expedited permit delivery, early selection of an equity partner, and firm commitments from manufacturing companies for key components of the necessary infrastructure.