

# PHOENIX CLEAN FUELS PROJECT SUMMARY

## PROPOSAL SUMMARY

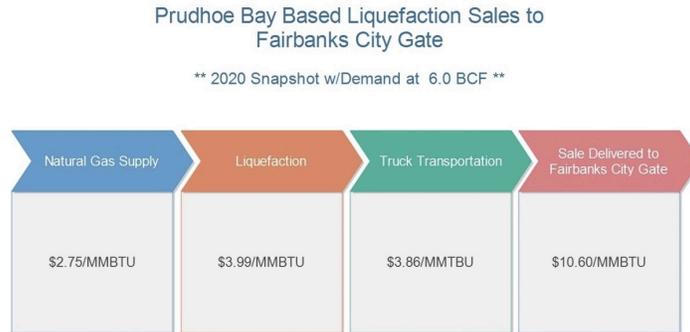
In response to the issuance of the Interior Energy Project (IEP) liquefaction Request for Proposal (RFP), a new project entity has been organized named “Phoenix Clean Fuels”. Phoenix has been organized to serve as a project development and operations company for a proposed North Slope liquefaction facility in response to the RFP. Phoenix has identified and organized a group of companies with expertise in project management, engineering, permitting, technology, construction and operations and there are currently seven firms working together with Phoenix to develop the project.

Several of our team members were subcontractors to the MWH team that participated in the IEP project in 2014 to provide operation and maintenance (O&M) expertise for the proposed North Slope liquefaction plant. Following MWH’s withdrawal from the project in early 2015, the O&M subcontractor team began discussions with AIDEA to share ideas of how to construct and operate the North Slope liquefaction facility and supply chain more efficiently.

Phoenix has provided an attractive business proposition for supplying liquefied natural gas (LNG) to Fairbanks at a price that has been suggested as a target in order to make the IEP successful. The RFP requested the respondents develop a proposal for Cook Inlet LNG capacity, with alternate proposals being encouraged for (but not limited to) a North Slope liquefaction facility.

Phoenix has proposed to manage all facets of the supply chain including: source and contract the natural gas feedstock, construct and operate a 6.0 BCF/year liquefaction facility on the North Slope (with expansion up to 9.0 BCF/year), manage the LNG sales agreements, and finally provide the transportation of LNG to Fairbanks. The proposed liquefaction facility will be located on AIDEA’s recently constructed pad in Prudhoe Bay.

Phoenix plans on delivering LNG to Fairbanks utilizing project owned trailers and contracting with a reputable transportation and logistics company to provide the tractors and drivers. The following value chain analysis depicts LNG delivered to Fairbanks from Phoenix in 2020 when the liquefaction plant will be running at capacity.



## BACKGROUND AND EXPERIENCE

The Phoenix project team consists of Scimation (project development/management), TDX Power and Norgasco (who will provide O&M of the liquefaction facility), General Electric Oil and Gas (the technology provider), SLR Consulting (environmental consulting and permitting), Alaska Industrial (transportation and logistics), and Crowley Marine (future business development to potentially expand the liquefaction plant and supply LNG to other remote Alaska markets).

*Scimation* is the project development/project management lead for Phoenix and has assembled the group of companies presented in this proposal. Scimation was founded in 2003 by several senior energy industry professionals with backgrounds in operations, engineering, process technology development, remote logistics, business development, project finance and strategic business planning. Scimation has a track record of pulling

together complex teams to address large process industry projects including the design, construction and installation of an advanced fuel processing plant in Deadhorse in 2014.

*TDX Power* serves as a technology advisor and plant operations O&M provider on the Phoenix team. TDX Power has over twenty-five years of experience of O&M in some of the most austere and protected environments of Alaska, including on the North Slope. TDX Power has also been providing remote power generation services in support to the U.S. Government at multiple remote international locations since 2009. TDX Power provides O&M, upgrades, and total engineering solutions both for its regulated utility assets, as well as assets they install (and often operate) for their clients.

*Norgasco* serves as a technology and natural gas handling advisor as well as a plant operations O&M provider on the Phoenix team. Since 1989, Norgasco has delivered approximately 22 BCF to customers in the Deadhorse area. Norgasco's skilled staff on the North Slope performs all routine and non-routine O&M of plant and gas distribution assets.

*GE Oil & Gas* has designed systems for LNG production, liquefaction, regasification & storage - both onshore & offshore since the 1990's. GE has extensive experience as one of the world's foremost developers of compression technology for LNG production, having supplied compression trains since the inception of the industry. All of their products are fully supported by one of the industry's most comprehensive global networks of manufacturing, testing and service facilities.

*SLR Consulting* is a leading international environmental consultancy specializing in providing advice and support on a wide range of strategic and site-specific issues to the oil and gas industry sector. A selection of SLR's global Oil & Gas clients includes: Shell, BP Exploration, Total, and Alyeska Pipeline Service Company.

*Alaska Industrial* currently operates a 35-tractor fleet, specializing in transportation from Fairbanks to Prudhoe Bay. They are mainline carriers for Halliburton Energy Services supporting Baroid's fracking services. Alaska Industrial currently averages approximately 2,300 loads per year between Fairbanks and the North Slope oil fields.

*Crowley LNG* and Phoenix have been in discussions about the future potential to develop additional LNG markets, which may justify further expanding the liquefaction facility. These markets include remote villages, mines, etc.

*On-site EPC Contractor (TBD)*, Phoenix intends to solicit competitive bids for the site preparation and construction portion of the project from well-qualified Alaska companies that have extensive work experience on the North Slope, once the front end engineering and design of the facility is complete. A selection of the companies likely to be solicited for proposal are: Peak Oilfield Services; Conam Construction; CH2MHILL; and ASRC.

## **PROJECT DESCRIPTION AND COSTS**

### Capital Costs

The initial capacity of the liquefaction facility will be 6.0 BCF/year, with the ability to increase to 9.0 BCF/year by adding a second modular liquefaction train. Phoenix elected to pursue two different paths when evaluating the technology solutions and constructability of a liquefaction facility for the North Slope: 1) a "design-build" approach for a hybrid expander/cascade propane/ethylene system much like the existing plant in Pt. Mackenzie, AK; and 2) an open loop methane expander system from GE Oil and Gas provided in a modular "plug-and-play" design.

The result of this exercise determined that the GE Oil and Gas solution could provide the liquefaction processing equipment, storage tanks, truck loading bays, and associated piping using their modular design, at a competitive cost and on a delivery schedule which will meet the project's challenging economic needs and implementation schedule. All modules, interconnecting piping and cable trays are mechanically fit-tested, and an end-to-end test of the control system is performed at GE's Texas fabrication facility. The plant is then disassembled and shipped to the construction site for reassembly. This approach reduces the risk of cost overruns due to breaks in the scope between multiple major equipment vendors, fabricators, and installation contractors.

Once a preliminary design package (PDP) for the major equipment is complete, Phoenix will utilize a turnkey firm price-contracting strategy and develop an RFP for the installation activities. The installation RFP will be sent to qualified construction companies that operate on the North Slope and include all labor, consumables, heavy equipment and fuel necessary to complete the installation of the liquefaction facility.

The Phoenix liquefaction facility will be located on the recently constructed gravel pad south of Flow Station 3 (FS3). A geotechnical study of the gravel pad will be performed to better define what site improvements are needed and an 8” diameter 1,100’ transmission line will be constructed to connect the liquefaction facility to the natural gas source line.

Phoenix will capitalize the LNG trailers for the project as the costs for a transportation company to capitalize the number of trailers needed for the project is cost prohibitive. Based on the annual demand forecasts and seasonality included in the RFP, Phoenix has forecasted the number of trailers needed each year to support the project. The trailers will be procured as demand increases, and during off-peak seasons can be utilized as rolling storage for peak months.

In order to facilitate the startup of the plant and ensure the project has cash reserves on-hand, a working capital advance has been included in the initial funding requested. Additionally, a contingency of 20% was added to the total expected capital costs in order to account for any overruns or additional uncertainties during the constructing the Phoenix liquefaction facility.

The estimated total capital cost of the proposed Phoenix IEP project is approximately \$115 MM for the 6.0 BCF/year liquefaction facility, and \$52 MM for the 3.0 BCF/year expansion. The following table lists the capital costs (in thousands) by equipment group and activity.

<b>6 BCF Liquefaction Facility and Trailers</b>	
6 BCF Liquefaction Facility	\$59,850
Project Management, Engineering, Installation Labor & Equipment	11,500
LNG Trailers	20,297
Working Capital Advance	4,000
Contingency	19,130
	<u>\$114,777</u>
<b>3 BCF Liquefaction Facility Expansion and Additional Trailers</b>	
3 BCF Liquefaction Facility Expansion	\$30,250
Installation Labor & Equipment	1,750
LNG Trailers	11,372
Contingency	8,524
	<u>\$51,896</u>
<b>Total Project Capital Costs</b>	<b>\$ 166,673</b>

### Operating Costs

Qualified TDX/Norgasco operators will staff the plant with relevant experience in gas handling and processing.

Phoenix is proposing that natural gas will be purchased from GVEA (through an existing agreement with BP) for feedstock as well as utility power generation and will be metered through the newly constructed 8” transmission line from BP’s FS3 to the liquefaction facility.

LNG will be transported to Fairbanks in Phoenix owned 10,500 gallon trailers, by Alaska Industrial. The estimated cost of transportation activities includes a tractor and operator as well as a fuel surcharge (FSC).

The Phoenix liquefaction facility will utilize natural gas driven reciprocating compressors for the liquefaction process and natural gas driven power generation (utility heat, lighting, control power). The costs for the liquefaction are variable and have been modeled as such in the economic model.

The estimated repair and replacement costs include preventative maintenance activities, major equipment overhauls, scheduled maintenance and inspections (including vessels), trailer maintenance, and DOT pipeline inspections.

Qualified management personnel will be required to support the project. The costs for operations management, commercial/contract management, plant accounting and financial reporting, legal, engineering consulting, and office related costs have been estimated and included.

Other costs include the pad site lease, insurances, property tax, waste disposal, chemicals, communication and IT costs. The pad site lease costs are based on the current lease costs with AIDEA and the State of Alaska, and insurance based on property value and recent experience with new facilities Scimation has installed on the North Slope.

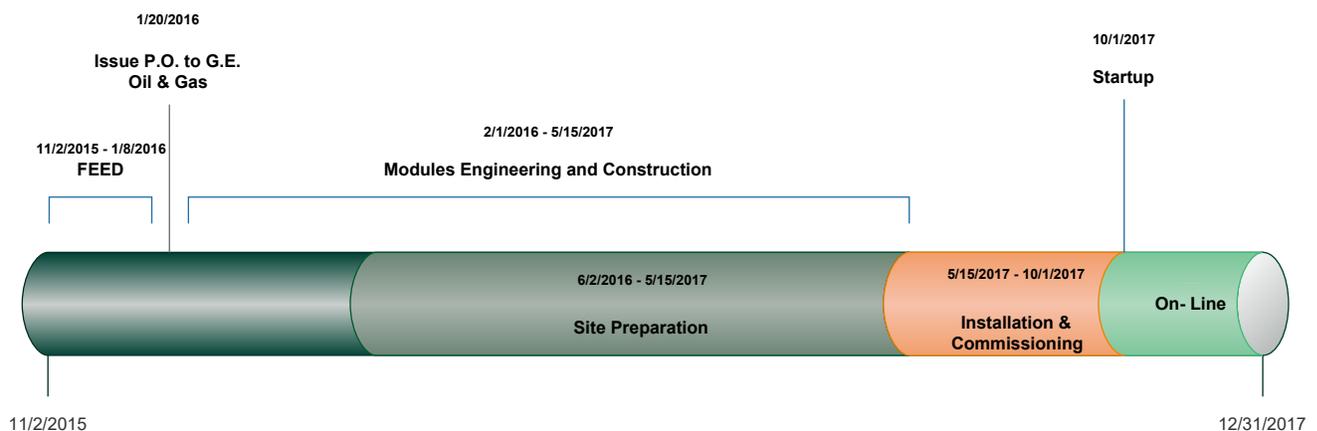
A contingency of 15% was added to the total expected fixed operating capital costs in order to account for uncertainties in operating the Phoenix liquefaction facility at this early stage of the development.

The following table provides operating cost estimates (in thousands) for the Phoenix liquefaction facility for year 2020, when demand is forecasted to be 6.0 BCF/year.

	2020
<b>Operating Costs</b>	
Labor	3,047
Purchased Natural Gas Feedstock (A)	16,500
LNG Transportation & Logistics (A)	23,153
Natural Gas for Power Generation and Compression (B)	1,009
Repair and Replacement	1,934
Overhead/General & Administration	1,844
Other	2,457
Contingency	1,027
<b>Total Operating Costs</b>	<b>\$50,971</b>
(A) Variable Cost	
(B) Variable and Fixed Cost Components	

### TIMELINE TO FIRST GAS

Assuming that the project kickoff and initial funding take place in January 2016, the start of normal operations is projected in Q4 2017. Below is a project timeline with important milestones.



### MAJOR ASSUMPTIONS / FINANCING CONSIDERATIONS

The total cost to construct the plant and procure the necessary trailers is estimated to be \$167 MM, including

contingency. In order to complete a project of this magnitude, outside financing is required and Phoenix is proposing to use the AIDEA financing tools presented in the RFP in the following manner:

AIDEA Financing	Amount	Interest Rate	Payback period	Assumed Payment Terms	Total Principle	Total Interest
Capital Budget Appropriation	\$45,000	0.0%	N/A	Capital contribution to the project with a corresponding equity stake		
AIDEA SB23 SETS	72,200	3.0%	20 years	Principle repayments begin after year 5; Interest payments begin year 1	72,200	28,158
AIDEA SB23 Bonds	49,473	3.5%	15 years	Principle repayments begin after year 1; Interest payments begin year 1	49,473	13,853
	<u>\$166,673</u>				<u>\$121,673</u>	<u>\$42,011</u>

The Phoenix economic model is based on the Fairbanks utilities committing to the natural gas demand volumes in the RFP. Until other LNG markets can be identified through business development efforts, Phoenix is asking for long term (20 year) take or pay agreements from the utilities to support the project investment.

**ABILITY TO MEET IEP GOALS**

The Phoenix liquefaction facility is projected to startup Q4 2017 with an initial capacity of 6.0 BCF/year (200,000 gal/day) of LNG. In order to satisfy the IEP demand numbers provided in the RFP a 3.0 BCF/year (100,000 gal/day) expansion is planned for construction in 2020, with peak production available in 2021. Additional expansions may be justified to address other demands discovered through Phoenix business development efforts.

Based on current economic models and the goals of the IEP, Phoenix will deliver LNG to Fairbanks beginning in Q4 2017 at \$10/MMbtu. Over the next four years (2018- 2021) the price will escalate by 2% annually (to compensate for escalating operating costs) until reaching \$11/MMbtu in 2022. The price will then be locked in at \$11/MMbtu until 2036.

**CONCLUSION**

In summary, Phoenix has determined that a liquefaction facility in Prudhoe Bay is in the best interest of the State and consumers requiring a clean affordable energy source. Potential delays to the permitting activities and the uncertain (and high) cost of natural gas feedstock in the Cook Inlet is more likely be prohibitive to delivering affordable LNG and in the timeframe requested. In economic modeling exercises completed by the Phoenix team, delivered Cook Inlet sourced gas was \$3-5/MMbtu more expensive than the proposed project on the North Slope due to feedstock costs.

The Phoenix team has engineered a project solution that entails experience, track record, technology and sustainability and is capable to meet the IEP goals and an accelerated project timeline.