

03/15/16

AIDEA

Presentation

on Gas

Supplier,

Interior

Energy

Project

<TARGET><BILL></BILL><SUBJECT>03-15-16 AIDEA Presentation on
Gas Supplier, Interior Energy
Project</SUBJECT><COMM>HENE29</COMM></TARGET>



Interior Energy Project



IEP Project Update

House Energy Committee

3/15/16

IEP GOALS

- **Supply natural gas to Interior Alaska:**
 - **At the lowest cost possible**
 - **As many Alaska customers as possible**
 - **As soon as possible**
- **IEP investments compliment eventual sources of gas supply from a natural gas pipe line**
- **Lower PM2.5 in nonattainment areas of Interior**

LEGISLATIVE HISTORY



- **2013: SB23 authorized IEP, funding provided**
 - **Source of LNG supply limited to North Slope**
 - **Funding: \$125mm SETS loans, \$57.5mm capital appropriation, \$150 bond authorization**

- **2015: HB 105 allowed AIDEA to explore more options to achieve the IEP goals**
 - **Cook Inlet supply option authorization**
 - **Propane and pipeline authorization**
 - **Limited AIDEA's direct involvement in the market**
 - **"Open and competitive" intent language**
 - **Reporting requirements**

INTERIOR ENERGY PROJECT FULL SUPPLY CHAIN FOCUS

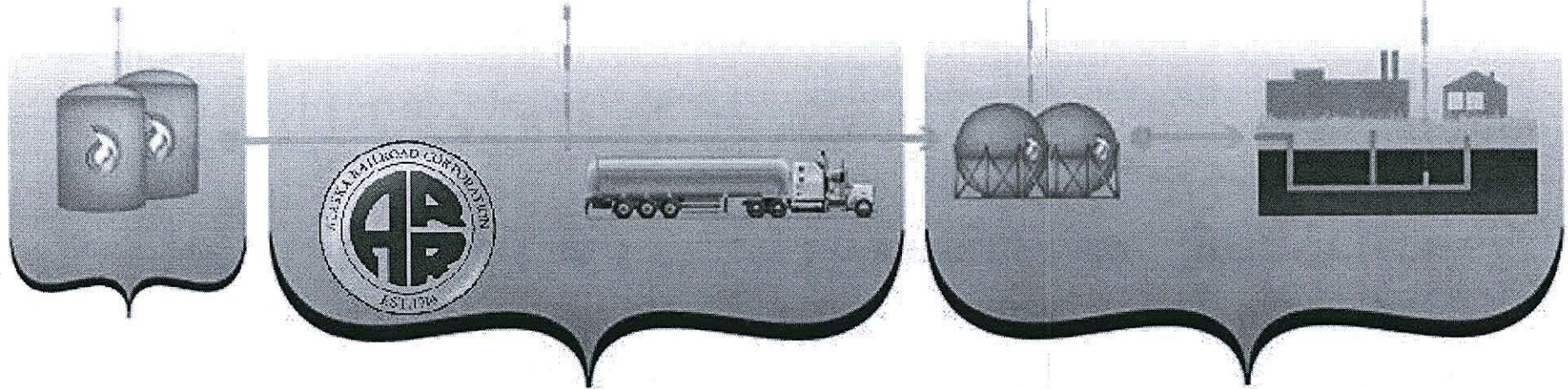


Natural Gas Supply and Liquefaction /Alternatives

Transportation: Trucking or Railroad

LNG Storage and Regasification

Natural Gas Distribution System

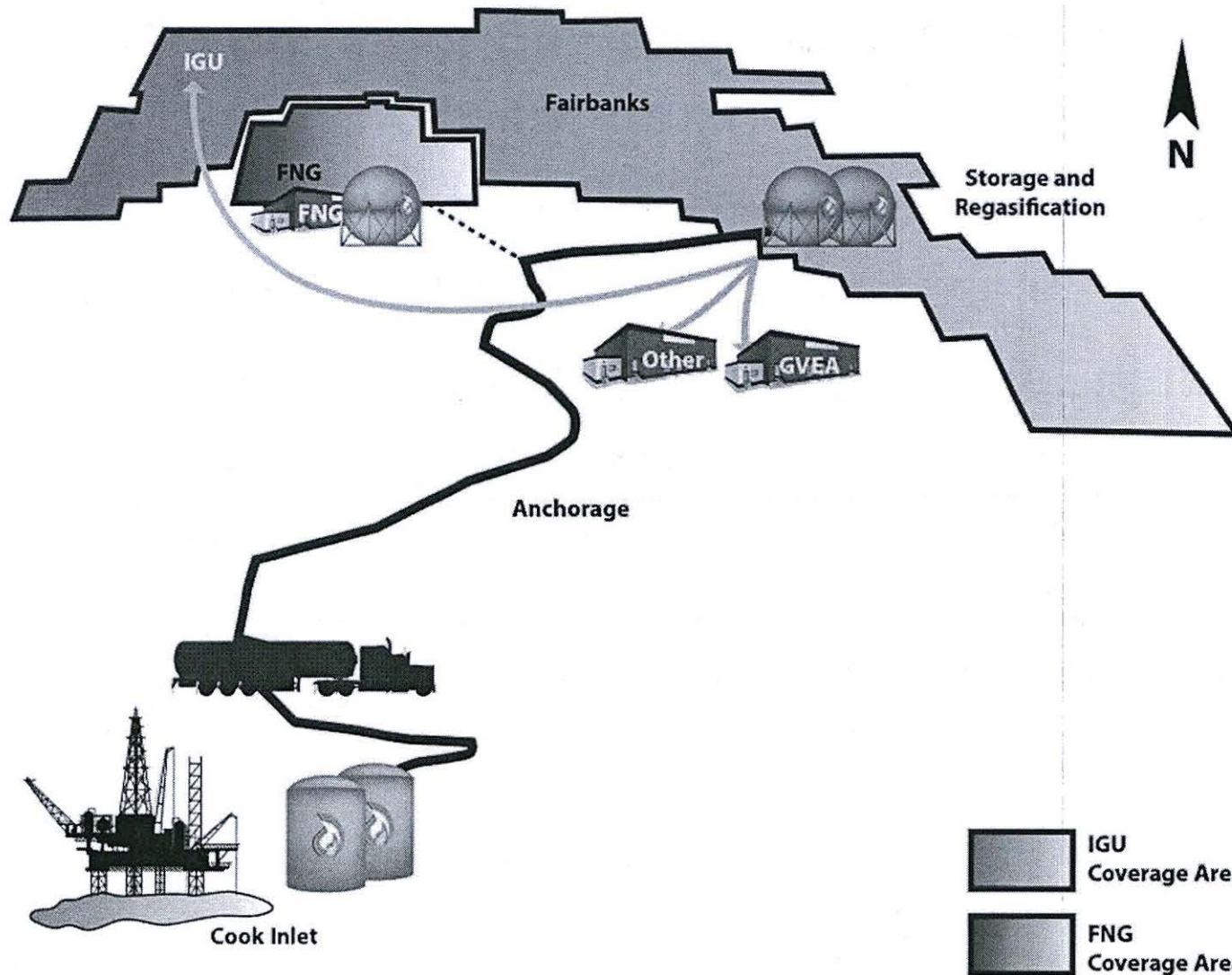


AIDEA and Private Industry

Private Trucking Contractors or Alaska Railroad

Interior Gas Utility
Fairbanks Natural Gas

COOK INLET PROJECT MAP



LNG SUPPLY PROGRESS



- **AIDEA issued an RFP for project partners**
 - Solicited for a wide range of IEP options (Cook Inlet, North Slope, pipeline, propane)
 - Salix's Cook Inlet LNG projected was identified as the potential project partner March 3, 2016

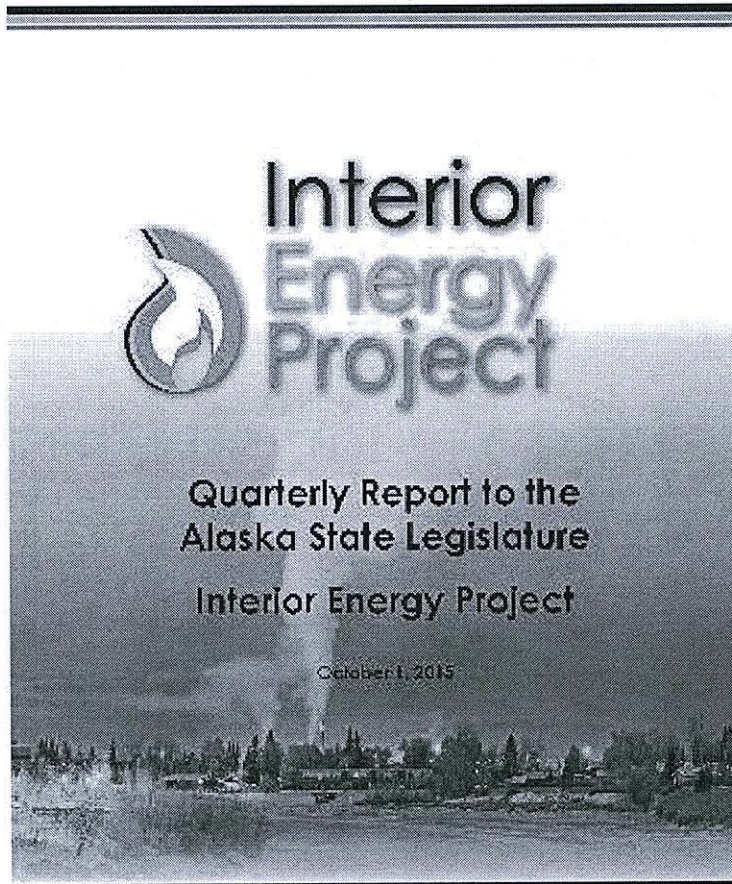
- **Current status**
 - Ongoing negotiations to finalize commercial structure with Salix
 - Cook Inlet gas supply negotiations with multiple producers

DISTRIBUTION PROGRESS



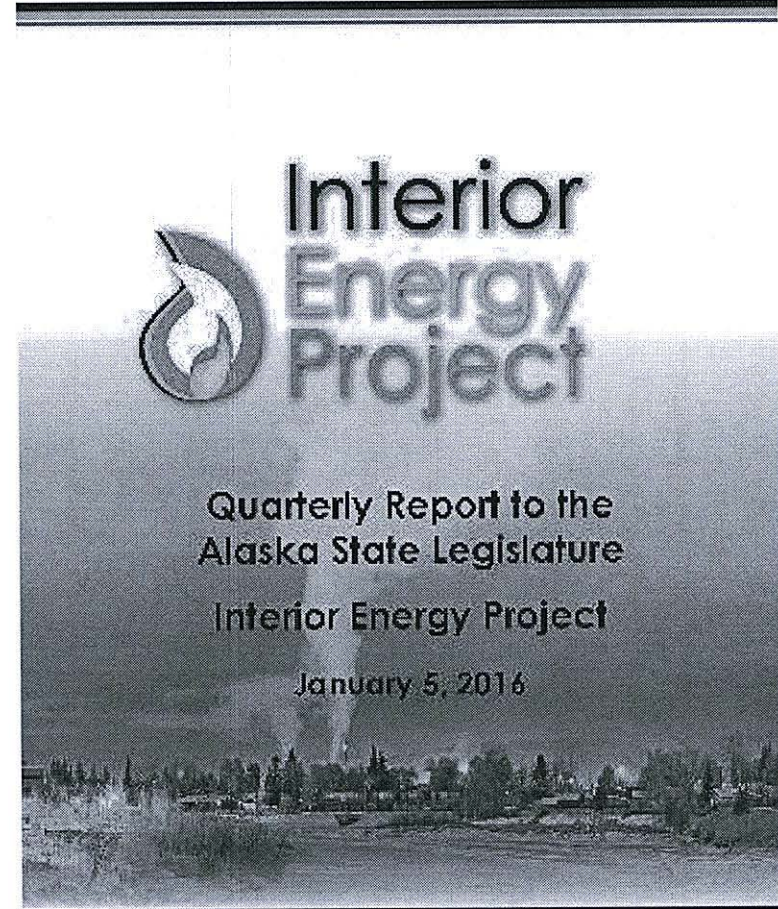
- **AIDEA Pentex acquisition**
 - Fairbanks natural gas parent company
 - AIDEA reduced rates to current FNG customers
 - Transitional ownership; planned sale to the IGU
- **Natural gas distribution system financing**
 - FNG has installed 30 miles of new pipeline in the core of Fairbanks
 - IGU has installed 73 miles of new pipeline in North Pole
 - Financed with SETS
 - Prepares community for new source of LNG

QUARTERLY REPORTS TO LEGISLATURE



 ALASKA ENERGY AUTHORITY

InteriorEnergyProject.com



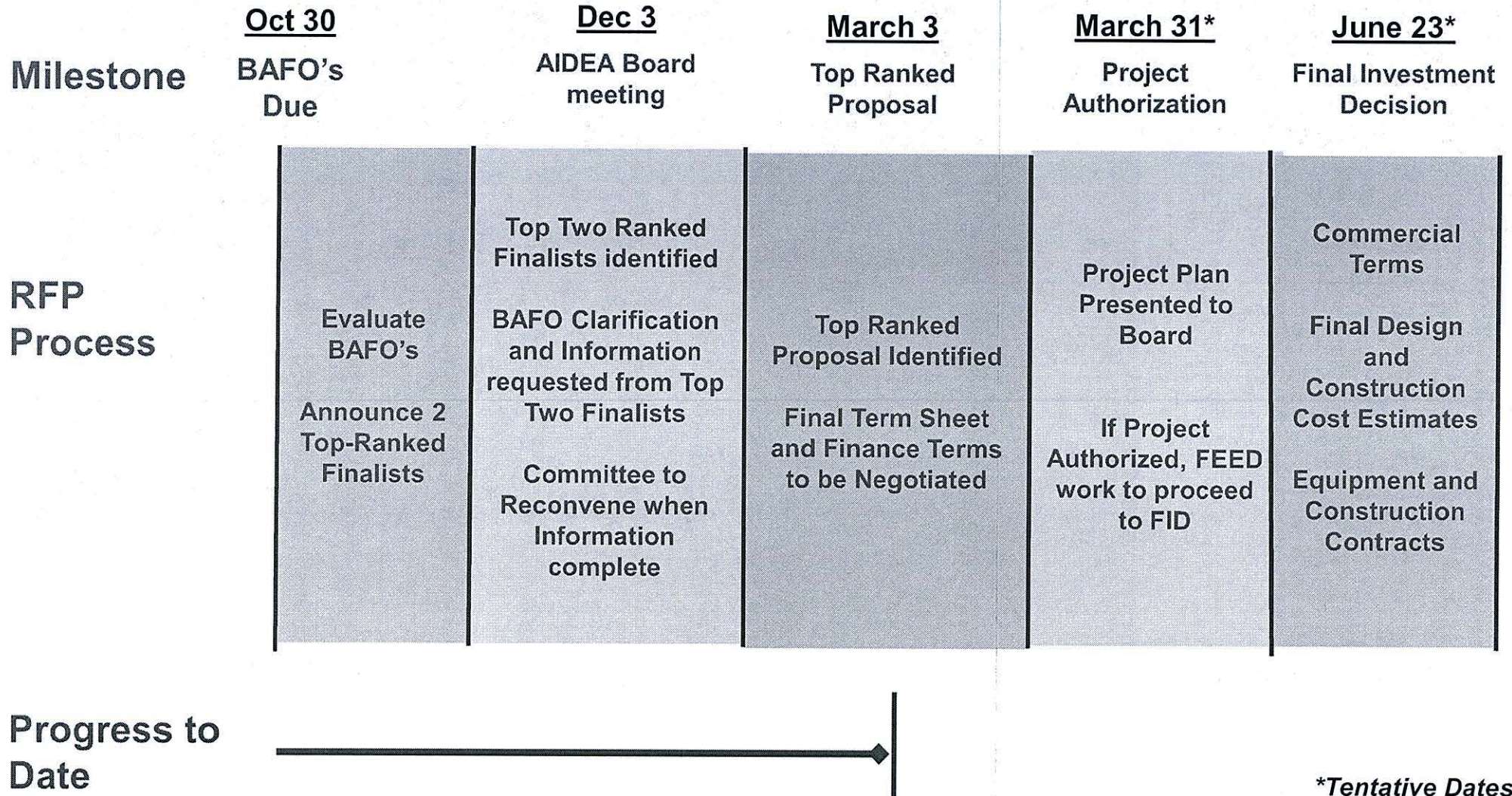
 ALASKA ENERGY AUTHORITY

InteriorEnergyProject.com



IEP PROJECT MILESTONES

REVISED MARCH 2016



**Tentative Dates*



Interior Energy Project



interiorenergyproject.com



Memorandum

To: John Springsteen, Executive Director

From: Gene Therriault, IEP Team Lead *Gene Therriault*

Date: March 3, 2016

RE: Interior Energy Project – Liquefaction RFP

This memorandum provides an update on the status of RFP 15142, Interior Energy Project.

The RFP Evaluation Committee met on February 4, 2016. At that meeting the committee reviewed the final submittals on the Best and Final Offers from the two top ranked respondents, Spectrum LLC and Salix Inc. The committee unanimously determined Salix Inc. as the top ranked project from this process. Attached is the report that details the proceedings and results from the February 4th meeting.

Also attached are redacted reports submitted by Arcadis, the engineering firm contracted to conduct the third party review of the cost components of the two offers. These reports offer concise summaries of the “Best and Final Offers” from each respondent and provide information on capital and operating costs presented in the offers.

With this action, the Evaluation Committee for RFP 15142 concluded its work. As noted in the report, several items on the term sheet remained unresolved in order for the offer to move forward to the AIDEA Board for action. Representatives from the two utilities and AIDEA are in discussions with Salix to resolve those issues to the satisfaction of the utilities and AIDEA. It is expected the issues will be resolved in time to bring a project recommendation to the AIDEA Board at its regularly scheduled meeting on March 31, 2016.

Bob Shefchik, Nick Szymoniak, Tom Erickson, and I will be available at the March 3rd Board meeting to present this information to the AIDEA Board and respond to questions.

Attachments: IEP RFP Review Committee Notes and Results 2-4-16
Arcadis Report on Spectrum LLC
Arcadis Report on Salix INC
Proposed Timeline for IEP Actions to AIDEA Board

**IEP RFP Review Committee
Notes and Results
2-4-16**

The Procurement Evaluation Committee met on Thursday, February 4th to review information collected on the top two rated finalists, Spectrum LGN, LLC and Salix, Inc.

The Committee reviewed the Best and Final Offers from Salix and Spectrum along with independent third party technical and financial analysis of the same. In addition, they received updated information regarding natural gas feedstock and LNG transportation costs as well as draft term sheets.

Documents were reviewed in hard copy and electronically on the conference room display. Spreadsheets were reviewed on the conference room display and on individual member computers. In addition to the documents listed, oral presentations were made regarding the impact low demand will have on liquefaction costs, gas supply contract status, and the large capacity trailer pilot project.

Following the document review, the Evaluation Committee had a thorough group discussion of the relative strengths and weaknesses of the two proposals. The discussion allowed committee members to express opinions, compare the two proposals on a variety of metrics and understand the perspectives of the other committee members. The major topic areas covered in the group discussion included:

- Gas Supply
- Sources and Uses
- 3rd Party Review of CAPEX and OPEX
- 3rd Party Review of Financials
- Plant
- Pricing FOB Fairbanks – at projected demand
- Pricing at Low Demand Stress Test
- CAPEX risk
- OPEX risk
- Termination
- Payments to Partner for equity and Management Fees across 20-year period.
- Ownership at end of period
- Transportation
- Risk Identification

The discussion concluded with members providing an indication of the project each considered "most likely to succeed." Then members described their conclusions about the different options and the reasons for their position.

Salix was unanimously determined to be the top ranked project from this process. Reasons offered for this determination included:

- Lower Annual Revenue Requirement of the two proposals
- Lower payments to owner/operator of the two proposals
 - Salix: \$39.73 million across 20 years in combined owner payments, net of tax payments made to utilities, in exchange for a \$10M investment and plant operation
 - Spectrum: \$54.42 million across 20 years in combined owner payments in exchange for a \$5 million investment and plant operations
- Higher risks of excessive LNG prices or cash deficiencies in low demand scenarios for North Slope option
- Transportation costs lower and less risk of cost variability than North Slope option
- Term Sheet as presented by Salix more acceptable to utilities than term sheet presented by Spectrum
- Salix was perceived as a partner more willing to adapt their project/approach to meet utility/project needs
- Lower Capital costs for Salix Proposal made more funding available for other components of the supply chain
- 3rd party financial review indicated stronger financial position of Salix parent company as project partner
- GVEA unwillingness to participate as year-round customer created significant early year demand risk for North Slope project with higher fixed costs
- Changing economic conditions with low oil prices creates risks that demand will not materialize as quickly as projected – and the Salix approach handled low demand scenarios better than the Spectrum approach
- Build-out of the distribution, storage and liquefaction components of the project will all be constrained by low oil prices – leading to a need to limit capital costs as much as possible to ensure success throughout the supply chain

- Ownership of the plant at the end of the 30-year term reverted to utilities in the Salix approach
- Ownership of the plant at the end of 30-year term would be held by Spectrum under their approach

This synopsis includes the items generally agreed upon as part of the discussion.

The committee vote was 7-0 in favor of Salix as the top rated project.

The committee adjourned with the following determination:

- The committee unanimously voted to move forward with Salix as the top ranked proposal
- The committee determined that further negotiations are required to correct deficiencies in the term sheets
- Revised terms and conditions acceptable to the utilities and AIDEA are necessary to advance a recommendation to the AIDEA Board

The following is the agenda followed at the February 4th evaluation committee meeting.

9:00	Introduction	Tom	
9:10	Review of Packet	Bob	<ul style="list-style-type: none"> • Review of each document provided committee; summarized by staff responsible for document. • Focus on understanding of information - not debate of value/impact
11:00	Break		
11:15	<ul style="list-style-type: none"> • Review of "Most Likely to Succeed" • Detailed discussion of Items of interest 	Bob	<ul style="list-style-type: none"> • Committee discussion of "Most likely to succeed" as defined to finalists • Review of major items: <ul style="list-style-type: none"> ○ Gas Supply ○ Risks ○ Low Demand ○ Commercial Terms ○ Document List
12:00	Working Lunch		
1:00	Recommendations by Individual members	Tom	<ul style="list-style-type: none"> • Collect written indications of top offer "most likely to succeed" • Display to group
1:15	Discussion of Results	Bob	<ul style="list-style-type: none"> • Have each person explain choice, rationale, and major factors underpinning choice • Interaction with other members • Review of data elements as needed
3:00	Opportunity to revise	Tom	<ul style="list-style-type: none"> • Offer opportunity to members to change "most likely to succeed" • If not consensus, offer opportunity to vote
3:30	Wrap Up	Bob	<ul style="list-style-type: none"> • Identification of Items of Agreement • Recommendations to AIDEA for selection of private partner • Collection of Notes
4:00	Final Thoughts		

ARCADIS
Report on Salix INC
2/26/16

February 26, 2016

Kirk H. Warren, P.E. PMP
Interim COO/Director, Project Implementation
AEA/AIDEA

Arcadis U.S., Inc.
880 H Street
Suite 101
Anchorage
Alaska 99501
Tel 907 276 8095
Fax 907 276 8609
www.arcadis.com

Subject: Interior Energy Project, Reasonableness Review of BAFO CAPEX & OPEX: Salix Proposal

Dear Mr. Warren:

Arcadis has reviewed the best and final proposal (BAFO) submitted by Salix in response to AIDEA's Request for Proposal 15-142, Addendum Four. Salix's submittal consisted of a non-confidential proposal and a confidential appendix. This memorandum summarizes our independent review, in terms of the overall reasonableness and completeness, of the capital expenditure (CAPEX) and operational expenditure (OPEX) budget estimates presented by Salix.

The methodology applied to this review of CAPEX and OPEX budgets proceeded through 1) an evaluation against global industry benchmarks and unit cost indexes; 2) consideration of LNG industry specific development processes and costs; and 3) an internal assessment based on Arcadis' knowledge and experiences with LNG and large-scale project development processes and costs particular to Alaska. In the course of this review, Arcadis spoke with the proponent, as well as the liquefaction equipment vendor and general contractor associated with the proponent. Discussions with the proponent and participants of their team focused on key issues of concern and particular questions identified through an initial review of the proposal materials. As appropriate to an overall assessment of reasonableness and completeness of the CAPEX and OPEX estimates provides, the issues identified and specific questions concentrated at high-level issues and items with the potential to substantially affect CAPEX and OPEX.

This memorandum summarizes our evaluation of Salix's proposal, and Attachment A (confidential) provides a summary of the cost estimate review against global and national cost indexes. The review of this proposal is arranged through a discussion of the required proposal components as identified in Addendum Four of RFP 15-142; namely, Technical Project Description; Detailed Project Costs; Commercial Terms; Project Financing; Risk Identification and

Allocation; and Detail on Ability to meet IEP Project Goals. The discussion of these required proposal components is made from the perspective of CAPEX and OPEX reasonableness, and an assessment as to the reasonableness and completeness of the proposal follows the discussion of these proposal components.

In terms of overall completeness of the proposal at a pre-FEED stage of development, the development scheme presents a well-formed and readily implementable development plan to accomplish the construction and operation of an LNG liquefaction plant in line with development costs and schedules presented.

Specific details of the CAPEX and OPEX estimates prepared by Salix are presented below in the Commercial Terms section of this memorandum, and an assessment as to the overall reasonableness and completeness of the proposal.

Salix

Salix is a subsidiary of Avista Corporation, an established regulated utility operator providing electric power and natural gas in five states, including Alaska. Salix operates as an unregulated LNG project development company, and is teamed with Braemar Engineering, HDR, and Haskell Construction in proposing an LNG liquefaction plant in the Cook Inlet region to meet the IEP goals.

Technical Project Description: Salix proposes the development of a LNG liquefaction plant producing 100,000 gallon per day at a site in the Cook Inlet region. The LNG plant would be expandable to 200,000gpd with additional CAPEX and OPEX expenditures. CAPEX for the proposed LNG plant is estimated at \$68,034,527, and OPEX is budgeted at \$7,697,000 per year—\$3.1M of which is for energy costs. These costs reflect non-binding budgetary estimates at this stage of development.

Gas Supply: Gas supply would come from tapping the Enstar Beluga NG pipeline with a 300' 6" pipeline, receiving NG at 750psig. CAPEX costs for establishing the physical connection to the Beluga pipeline are included in the CAPEX estimate: the NG received for liquefaction would be purchased by the utilities participating in the IEP.

Gas Treatment, LNG Liquefaction Plant and Storage Tanks: Salix's develop plan calls for the fabrication and installation of a C100N nitrogen cycle liquefaction unit manufactured by Chart. Gas treatment capabilities are integrated with the Chart C100N unit. LNG storage at the liquefaction plant site is accomplished with four (4)-75K gallon tanks. In addition to the on-site storage capacity, Salix assumed that a LNG storage facility of up to 5 million gallons will be developed in Fairbanks by the utilities participating in the IEP.

Salix provided a written budgetary estimate prepared by Chart for provision of the liquefaction, pretreatment, LNG storage, and trailer loading units that combine to form the liquefaction plant.

Discussions with Chart confirmed their recent fabrication of three LNG liquefaction plants that were either identical or mostly similar to the LNG plant proposed by Salix. Of these, one is complete and in commercial operation (George West), another is in the start-up process (Miami), and the third has been shipped for installation (Keota). Major components of LNG plants fabricated by Chart are manufactured

by Chart in the U.S., including the cold box, heat exchangers, and air coolers; and other components are procured in the U.S., such as the compressors and turbo expander. Fabrication of the George West LNG plant, which is essentially identical to the liquefaction plant proposed Salix, was completed on schedule over a 12-month period, and installed successfully on-site in roughly 5 months. Fabrication and shipping of the other two plants also met all production milestones and shipment dates. Chart has standardized production of the C100N LNG unit, which is sold world-wide as a standard plant with modifications as required by the specific site and the quality of natural gas received for any particular plant. As such, basic engineering of the plant has been completed and vetted, and with production experience Chart is realizing efficiencies in the overall production time of the C100N unit, reducing fabrication time from 12 to 10 months. Chart states that they have adequate domestic production capacity to readily fabricate and ship the Salix plant as presently scheduled, and noted that they have production plants in China and Czechoslovakia that also produce the C100N unit. Though not anticipated, production of the Salix plant could be moved to either of these plants if there were to be some unexpected constraint on domestic production. As planned, all major components of the Salix plant will be manufactured or procured domestically, with the primary compressor representing a long-lead item.

Power Plant: The Salix LNG unit will be powered by a 5,000 HP Gas Turbine Compressor, and a 1MW emergency generator for backup power. The generator has heat trace and insulation, and is protected by a shelter. With the gas compressor and emergency generator, the Salix plant would be self-sufficient in terms of power generation, and incidental electricity would be purchased from MEA at existing tariff rates.

Balance of Plant: The Chart scope of work for the project accounts for roughly 40% of total CAPEX, which includes site installation and shipping. The remainder is considered balance of plant. Water requirements of 500 gallons per day could be acquired with an on-site well, or possibly drawn from existing wells. Haskell's budget estimate of balance of plant works is derived from unit cost estimates based on advanced designs for a larger scale LNG unit that was considered earlier in the proposal cycle. These earlier detailed estimates were factored for the smaller scale plant now proposed. Haskell notes that their recent cost experience in the fabrication and construction of a LNG production plant in North Dakota, their detailed work on a recent estimate of a 200,000 gpd LNG plant on the North Slope, and their 50-plus years of construction experience in Alaska were used in determining costs reflected in their estimate for construction the Salix plant.

Detailed Project Costs: CAPEX for the proposed LNG plant is estimated at \$68,034,527, and OPEX is budgeted at \$7,697,000 per year, \$3.1M of which is for energy costs. The LNG package, as described above, provided by Chart represent 40% of CAPEX, and the balance of plant 60%. Pre-development costs are not included; however, Salix proposes to contribute up to \$500,000 for these costs on a shared basis. Given the standard, commercial LNG plant package being provided by Chart, typical pre-development engineering costs for FEED are substantially reduced, and Salix's CAPEX does include amounts for design integration, geotechnical investigations and permitting applications.

Construction budget estimates for on-site installation of the LNG units and balance of plant were discussed above. The potential cost items listed in section 3.1.1 of Attachment A were confirmed to be included. Haskell estimated transportation charges for each of the major components provided by Chart

on the basis of specific skid sizes and shipping weights. Delivery of the LNG tanks received particular attention, and costs associated with the shipping of each tank are included in CAPEX.

Given the cost of service purchase agreements intended for this development, Salix suggests that the addition of an EPC role in the delivery of the project to manage overall project cost and schedule would serve as a means to enhance certainty, from the clients perspective, of project implementation costs. Inclusion of an EPC role in delivery of the project would add 5-8% of total installed cost (TIC) to CAPEX.

The \$3.1 million for energy costs in OPEX cover fuel gas and incidental utility purchases for operating the plant.

Escalation of costs may occur at the rate of economic inflation; however, in light of the recessionary pressures prevailing in the oil and construction industries, it is likely that cost savings will be realized in the delivery of the project as currently scheduled.

Additional operational efficiencies in terms of overhead costs are possible with the further consideration leveraging existing utilities and logistics facilities.

Commercial Terms and Project Financing: Salix proposes that long-term cost of service purchasing agreements be structured to compensate Salix for fixed and variable costs, and a rate of return. Salix suggests that these purchase agreements, or tolling fee arrangements, may include specific terms for an early buyout by the Contracting Interior Utilities (CIUs), and that potential benefits derived through the third-party sale of excess LNG be shared in some manner. The tolling fee would be adjusted annually to cover all fixed and variable costs, including a management fee. Additional adjustments would be made to cover major repairs and maintenance, along with efficiency upgrades or plant expansions.

Capitalization of LNG liquefaction plant would comprise a \$10M equity investment by Salix, with a rate of return (RoR) of 11.78%; a \$30M equity position by AIDEA, with a 0.0% RoR; and \$28M of AIDEA SETS financing for 30 years at 1%, with a 5-year deferment of payment with no interest capitalization.

Risk Identification and Allocation: In terms of CAPEX and OPEX estimates, the 'cost of service' structuring of commercial terms works to remove revenue risk from development of the liquefaction plant and place this risk at the larger IEP program level. At the project level, all capital and operating costs would be remunerated. With the revenue risk shifted to the program level, project level risk for the scheduling of procurement and construction remain.

Salix, operating as an unregulated LNG project development subsidiary of an established producer and distributor of electric power and natural gas, brings industry experience in building and operating energy projects, and is confident that the schedule proposed is achievable.

Chart has specific and recent experience in costing, fabricating, shipping and commissioning nearly identical liquefaction units to those proposed for this project. Chart manufactures major components of its LNG units domestically, and, as a standard projection unit, the proposed C100N plant demonstrates proven engineering and operating performance. Chart's manufacturing processes also demonstrate sufficient capacity to fabricate the proposed Salix liquefaction unit as scheduled.

Haskell's estimate of construction costs is based on recent experience in the construction of LNG facilities and Alaska operations. Haskell has operated in Alaska for more than 50 years, and has performed similar project works for major energy corporations.

In addition to the CAPEX estimate, Salix suggests that the inclusion of an EPC(M) role in the implementation of the project work would provide net potential value to the client by increasing the certainty of project meeting budget and schedule. The additional cost of an EPC(M) role is identified as being from 5-8% of TIC, or roughly \$3.4M to \$5.4M against the current CAPEX estimate.

Salix proposes that project pre-development work expenses be shared with Interior utilities up to \$500,000, and that pre-development work in excess of \$500,000 be funded by the utilities.

At the overall IEP program level, Salix's intends an initial LNG production capacity of 100,000gpd, which would minimize front-end capitalization and work to lessen the IEP program risks associated with end user conversion and market demand. In reducing initial capitalization, the Salix LNG plant development plan would require additional capital investment when the distribution network in Fairbanks materializes and overall market demand reaches IEP forecast levels.

Detail on Ability to meet IEP project Goals: With the CAPEX and OPEX expenditures identified for the development of a 100,000gpd liquefaction plant, Salix identifies a \$3.24/mcf liquefaction fee. Adding feed stock gas purchase, and transportation and distribution provided by others, the delivered price of gas for the IEP is put at \$15.74/mcf. This is close to meeting the IEP goal of \$15/mcf. Cook Inlet feed stock gas supply is priced at \$6.00/mcf as part of the delivered price total; however, current market conditions for Cook Inlet gas supply suggest that there is downward potential for the pricing of this feed stock gas. Salix also identifies that a LNG storage tank of up to 5M gallons would be required in Fairbanks to meet distribution needs. Salix has discussed the possibility of ARRC hauling LNG to the Fairbanks region, which could potentially result in transportation cost savings at some point in the future.

At an average daily production capacity of 100,000 gallons, the state's capital participation in the project equates with \$580.00 per gallon of developed production capacity (\$58M/100,000).

Overall Reasonableness and Completeness of Development Plan

Salix's budgetary estimates of CAPEX and OPEX are reasonable within a range of +/-30% given the level of project development demonstrated. This range is consistent with the AACE expected range of accuracy for projects at comparable levels of development. As a LNG developer formed by an established energy producer and distributor, Avista, Salix brings decades of energy project development and operations experience to this project. Chart has priced, fabricated, shipped and commissioned LNG liquefaction plants essentially identical to the liquefaction units that would be part of the Salix development plan, and the contractor, Haskell Construction, has also fabricated and installed LNG and other energy projects of a similar nature and scale to the Salix plant.

In terms of a CAPEX to LNG production ratio, Salix's development plan demonstrates a ratio of \$1,242/tonne. At this, Salix's capital/production ration equates with 105% of the world-wide ratio of \$1,185/tonne (IGU World LNG Report 2015). Daily rates represented in Salix's CAPEX and OPEX for

labor, materials and equipment are within the range of rates expected, and are generally applicable to the rates experienced in Alaska.

Overall the Salix development plan demonstrates relative completeness at this stage of development and presents reasonable CAPEX and OPEX estimates within the range noted above.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Griffin". The signature is stylized with a large, looping "G" at the end.

Mark Griffin, AICP
Senior Project Manager
Arcadis U.S., Inc.

Attachments

1 Attachment A

ARCADIS
Report on Spectrum LLC
2/26/16

February 26, 2016

Kirk H. Warren, P.E. PMP
Interim COO/Director, Project Implementation
AEA/AIDEA

Arcadis U.S., Inc.
880 H Street
Suite 101
Anchorage
Alaska 99501
Tel 907 276 8095
Fax 907 276 8609
www.arcadis.com

Subject: Interior Energy Project, Reasonableness Review of BAFO CAPEX &
OPEX: Spectrum Proposal

Dear Mr. Warren:

Arcadis has reviewed the best and final proposal (BAFO) submitted by Spectrum LNG in response to AIDEA's Request for Proposal 15-142, Addendum Four. Spectrum's consisted of a non-confidential proposal and a confidential appendix. This memorandum summarizes our independent review, in terms of the overall reasonableness and completeness, of the capital expenditure (CAPEX) and operational expenditure (OPEX) budget estimates presented by Spectrum.

The methodology applied to this review of CAPEX and OPEX budgets proceeded through 1) an evaluation against global industry benchmarks and unit cost indexes; 2) consideration of LNG industry specific development processes and costs; and 3) an internal assessment based on Arcadis' knowledge and experiences with LNG and large-scale project development processes and costs particular to Alaska. In the course of this review, Arcadis spoke with the proponent, as well as the liquefaction equipment vendor and general contractor associated with the proponent. Discussions with the proponent and participants of their team focused on key issues of concern and particular questions identified through an initial review of the proposal materials. As appropriate to an overall assessment of reasonableness and completeness of the CAPEX and OPEX estimates provides, the issues identified and specific questions concentrated at high-level issues and items with the potential to substantially affect CAPEX and OPEX.

This memorandum summarizes our evaluation of Spectrum's proposal, and Attachment A (confidential) provides a summary of the cost estimate review against global and national cost indexes. The review of this proposal is arranged through a discussion of the required proposal components as identified in

Addendum Four of RFP 15-142; namely, Technical Project Description; Detailed Project Costs; Commercial Terms; Project Financing; Risk Identification and Allocation; and Detail on Ability to meet IEP Project Goals. The discussion of these required proposal components is made from the perspective of CAPEX and OPEX reasonableness, and an assessment as to the reasonableness and completeness of the proposal follows the discussion of these proposal components.

In terms of overall completeness of the proposal at a pre-FEED stage of development, the development scheme presents a well-formed and readily implementable development plan to accomplish the construction and operation of an LNG liquefaction plant in line with development costs and schedules presented.

Specific details of the CAPEX and OPEX estimates prepared by Spectrum are presented below in the Commercial Terms section of this memorandum, and an assessment as to the overall reasonableness and completeness of the proposal.

Spectrum

Spectrum's proposal identifies SST as the LNG liquefaction plant vendor, with Conam as the general contractor. Spectrum provided contacts for each these team members and Arcadis spoke Spectrum as well as each of these team members in the preparation of this memorandum.

Technical Project Description: Spectrum, an established LNG project developer and producer, proposes that a liquefaction plant with an average daily production capacity of 260,000 gallons be developed on a gravel pad owned by AIDEA on the North Slope. This LNG plant would incorporate a modularized LNG liquefaction process of two trains and be fabricated by SST JV, a joint-venture of Specialized Mechanical Equipment Co. (SME) and Sancus, LLC.). Major aspects and components of the proposed LNG plant include its location in the Prudhoe Bay area; gas supply off of the Prudhoe Bay Unit gas pipeline (Spectrum has specific experience in tapping this gas pipeline); gas treatment, liquefaction, storage and distribution equipment and facilities; power generators; and balance of plant elements such as the MCC, shop, and camp. Power will be supplied from generators as detailed below, and water is to be purchased initially from NSB. As operations mature, water may be subsequently sourced from a nearby lake if this proves to be more economical. Sewer disposal will be collected by services available in the NSB and processed at an off-site sewer plant. On-site water handling will include an installed grey water disposal system along with water saving devices, as a means to minimize disposal charges.

Gas Supply: Spectrum intends to execute a long-term gas supply agreement with a North Slope producer at or below the \$2.10/mmbtu price established by the Royalty Settlement Agreement (RSA). Spectrum identifies multiple alternative providers of gas as backup options to the purchase agreement, and is confident that a gas supply price for less than the RSA price is achievable. At the RSA price, Spectrum's proposal meets the IEP target requirements.

Gas Treatment, LNG Liquefaction Plant and Storage Tanks: The SST LNG plant will be fabricated and shipped to the site and incorporates a two-train, mixed refrigerant (MR) process capable of producing 104,000 gallons per day in the summer, 150,000 in the winter, per train, for a combined total average daily production of 260,000 gallons. SST's written quotation for providing the gas treatment and liquefaction units reflects a favorable production timing, and Spectrum believes market circumstances are such that upward movement of this pricing is unlikely. Moreover, Spectrum secured a backup LNG plant quotation from Furuise which is 12% less than the SST price: this will serve as an additional hedge against LNG plant price escalation through the development process. Four (4) Cryogenic Storage tanks of 100K gallons are manufactured by Furuise in China and imported through KCenergi to provide on-site storage for LNG. Speaking with Spectrum, Arcadis discussed the following potential upside cost exposures identified in the Spectrum proposal in terms of CAPEX and OPEX:

- Spectrum affirmed the SST pricing was stable and pointed out that current and foreseeable market conditions in the LNG plant fabrication market favor buyers.
- Spectrum's LNG plant would have an average daily production capacity of 260,000 gpd, which surpasses the stated IEP goal of targeted 200,000 gpd by 30%. Spectrum highlighted several potential benefits that could be derived from this level of production; specifically, that while Fairbanks represents a large potential LNG market, Fairbanks is not the only LNG market in Alaska that can be served by the plant. LNG use in transportation to displace both surface and maritime diesel engines is forecast to increase, and, as discussed below in Commercial Terms, any third party sales of LNG produced by the plant would work to lower eventual unit price of LNG charged to the IEP end users.
- It was confirmed that sales taxes would not apply to the development and operation of the LNG plant, and Spectrum provided a U.S. Harmonized Tariff Schedule demonstrating that customs duties would not apply to the LNG tanks imported from China.
- As presently scheduled, Spectrum's development plan affords ample time for the fabrication and shipping of the LNG storage tanks and liquefaction plant components. Spectrum further noted that several design changes that have occurred during the proposal process offer the potential for a net reduction in CAPEX and OPEX.
- Discussions with SST confirmed their recent fabrication, shipping and commissioning of a LNG plant in North Dakota with a production capacity nameplate rating of 66Kgpd, and that subsequently performance tested at 96Kgpd. This plant was contracted for a site in North Dakota in February 2014, and the plant commenced commercial operations in February 2015. Similar to the plant proposed by Spectrum, this plant is a MR process plant with integrated gas treatment equipment, and is nearly identical in terms of the cold box, compressors and other fixtures. With this recent and similar plant fabrication experience, SST

is confident in the fabrication costs and schedule they provided to Spectrum. In addition, design of the Spectrum plant will incorporate some design modifications to enhance constructability. Considering the two-train design of the proposed Spectrum LNG plant, SST believes the 260,000 gpd average production rate, as presented by Spectrum, is readily achievable. SST provides an Orlof Gold Standard performance guarantee for their LNG plants. For the Spectrum LNG plant, SST would use a cold box and compressor procured from Zhongtai in China. SST notes that Zhongtai is recognized as a world-class manufacturer of cold box equipment, and provides cold boxes to Air Products as well as other large scale LNG plant fabricators. This cold box would be the long lead item in the LNG plant fabrication schedule, requiring 36 weeks for delivery. With that, SST is comfortable with a total fabrication schedule for the Spectrum plant of 46 weeks. The SST fabrication facilities are currently operating with a level rate of production, running a single shift at a 75-80% production load. The plant has an established record in fabricating cold train and other LNG components for GE as part of their larger LNG plant production work for Shell Oil, and production capacity could be increased with the addition of a second shift, if necessary.

Power Plant: Spectrum identifies that three (3) CAT 3520H gensets will power the LNG liquefaction plant and two (2) 170kw gensets will maintain house operations when the plant is down (tanks are full). With this power generation capacity capitalized in the project, OPEX costs for power are covered by Plant Maintenance. Fuel gas to power the generators, however, is to be purchased by the utilities receiving the LNG produced. The basic configuration calls for one CAT 3520H generator to drive each LNG liquefaction train, with the third generator on standby. However, Spectrum has modelled operating the three generators simultaneously, and this demonstrated LNG production efficiencies.

Balance of Plant: Spectrum's CAPEX estimate identifies and includes major components required for the full functioning of the liquefaction plant, including the MCC, Camp, Shop, other buildings, utilities and offsites, and other miscellaneous components. Spectrum relied on their recent relevant project development experience in building cost estimates for these components on the basis of dollars per sq. ft., beds per camp, weight of piping, and etc. Conam is recognized as an experienced pipe welding and fitting contractor and heavy equipment operator with an extensive record of work on North Slope projects. In particular for the camp component, the opportunity to solicit competitive bids offers the potential for a pricing reduction from the current estimate. In addition, the prevailing recessionary pressures in the equipment vendor and general contractor markets suggest a general downward movement in pricing for the procurement of these project components.

Detailed Project Costs: Spectrum's CAPEX budget totals \$72,094,002. Eighty two percent (82%) of this CAPEX is supported by written quotations with a 10% contingency factor added, and the balance of CAPEX, or 18%, is based on estimates with a contingency of 25%. SST's quote for the LNG liquefaction unit and gas treatment (amine plant) amounts to \$32,900,000, or roughly 46% of CAPEX. Annual operating costs (OPEX) are at \$8,653,490, and do not include a contingency amount, aside from the

Owners Risk as a part of Management Fee. Spectrum's management fee is \$1,445,000 per year, and is deferred for the first four (4) years of plant operation as a means to lower initial overall cost to market.

Spectrum will be delivering and operating the plant as an owner; accordingly, no markups are added to the vendor and contractor quotes supporting their CAPEX. Spectrum eventually envisions operating the plant with four shifts—two day and night shifts alternating on/off every two weeks. Spectrum believes that there will be opportunities to minimize operational expenses through the initial years of operation as the market demand for LNG continues to grow.

The enumerated line items shown in section 3.2.1 of Attachment A were reviewed in discussions with Spectrum and confirmed to be included in the CAPEX cost or not applicable to the project.

As noted above, SST's quote for the LNG process units reflects recent production cost experience and incorporates lessons learned in the fabrication, installation and commissioning of similar LNG plants. In terms of the construction cost estimates, Conam Construction confirmed their recent and continuing works of a similar nature on the North Slope for ConocoPhillips and BP, as well as others. These works have included a modularized plant with components of a similar scale and weight to the Spectrum LNG plant which Conam off-loaded, set foundations, and fabricated and made piping connections in the field. Other works involved the exchanging of plant compressors and installation of modular units and piping components at active drill sites. As such, Conam is confident that their construction estimates accurately reflect construction costs on the North Slope for the Spectrum LNG plant. In addition, and based on these recent and relevant project experiences, Conam has conducted a constructability review of the Spectrum development plan. This review confirmed that the construction of the proposed LNG plant would be relatively straight forward in terms of construction methods and resources, and could be readily constructed in the time frame spanning two construction seasons. Conam maintains a continuous level of construction work activity on the North Slope, so providing resources for the Spectrum LNG plant is not seen as a particular challenge. Moreover, Conam worked with Spectrum senior management previously on the Port Mackenzie LNG plant, demonstrating an experienced developer/contractor team with a record of working together on opportunities to optimize constructability and schedule of the planned Spectrum LNG plant. Specifically for this LNG plant, these constructability reviews eventuated in modifications to the delivery plan, with some fabrication of piping works being moved off-site, thereby reducing the amount of costly on-site works and providing scheduling advantages. These modifications are yet to be reflected in the CAPEX estimates of the plant and, as such, offer the potential for lower construction costs.

As noted previously, Spectrum's CAPEX budget is supported in large part with written quotations. A number of these have or will expire; however, Spectrum, as well as their contractor and LNG vendor, noted that given the prevailing recessionary pressures in the market place for these products and services, any escalation of pricing, other than at the overall economic rate of inflation, would be a remote possibility. In light of the near-term market conditions, as the project progresses towards implementation, there will likely be opportunities to optimize CAPEX expenditures.

Spectrum's CAPEX includes amounts for detailed design and permitting of the project. Spectrum previously developed the intended site and understands that all necessary permits, aside from an air emissions permit from ADEC, are in place. ADEC has been consulted on the project, and, given the air quality benefits that the IEP would generate through a reduction of higher emitting fuel sources in Fairbanks, the project is expected to demonstrate positive environmental and public health benefits.

Commercial Terms and Project Financing: Spectrum has proposed the formation of an ownership company (Newco) capitalized with \$5,000,000 in preferred equity held by Spectrum; \$30,000,000 in common equity held by AIDEA; and a \$50,000,000 AIDEA SETS loan at 1% for a 30-year term. The target rate of return on preferred equity would be 12.5%, and 0.0% for common equity. Total capitalization would fund CAPEX of roughly \$75,000,000, including contingencies as a construction reserve. The balance of \$10,000,000 would be used to offset negative cash flows anticipated through the first four (4) years of operations. Newco governance would be determined through an operating agreement between AIDEA and Spectrum, and Spectrum would execute a 30-year, fixed fee operating and maintenance agreement with Newco. In addition, AIDEA would provide Newco with a 30-year, no charge lease of the plant site, with options for three (3) 5-year extensions. Any other financing costs that arise would be additive to the basic commercial terms.

Purchases of LNG would be made by GVEA and local distribution companies (LDCs), paying for LNG on a Revenue Requirements basis. GVEA would be asked to commit to an annual offtake volume of up to 0.58 Bcfy. Spectrum suggests that Revenue Requirements pricing be established through forward rolling 3-year adjustment to account for variance in pricing for any particular subject year relative to the AIDEA demand forecast.

The initial four (4) years of Management Fees would be deferred and recouped in pricing adjustments through subsequent years at a to be determined schedule. Spectrum's revenue forecast presently identifies these deferred Management Fees being recouped by year 15, accounting for a price reduction at that point.

Purchase agreements for LNG would also include an "all requirements" provision for LNG purchases up to a certain level, with certain exceptions for pre-existing LNG purchases of Port Mackenzie LNG. These provisions would work to secure forward revenue streams essential to the sustained financial performance of the IEP.

Risk Identification and Allocation: In terms of CAPEX, Spectrum's estimate is supported by a substantial number of quotations, which serve to enhance the overall reasonableness and substantiate the completeness of their budget estimates. In the initial years of startup and building of the distribution network(s) in Fairbanks, revenue shortfalls are capitalized. This arrangement helps to ameliorate the overall market demand risk exposure inherent in the IEP initiative as distribution capacities in Fairbanks are established. With the revenue risk mitigated through long-term purchase agreements, CAPEX and OPEX risk exposure remains primarily with the project scheduling risk for procurement and construction.

For fabrication and delivery of the LNG liquefaction plant, SST has demonstrated its pricing and performance capabilities in the recent fabrication and delivery of a similar project, and their production capacities are capable of accommodating the intended schedule for fabricating the Spectrum LNG plant. As presented by Conam, construction of the Spectrum LNG plant would be relatively routine and readily accomplished as scheduled. Procurement of the storage tanks would be made from a recognized provider in China, and the fabrication and delivery times fit comfortably in the overall project schedule. Spectrum has proposed a sharing of CAPEX savings realized through development of the plan in proportion with equity shares. Through final design and implementation of the development plan, given the anticipated competitive nature of the market segments involved in the project, it is likely that savings in CAPEX for the project can be realized.

In terms of the overall development plan, capitalizing a production plant with a capacity of 260,000 gpd presents a front-end pricing risk given the revenue requirements pricing scheme, as the greater amount of capitalization would be reflected eventually in purchase agreement prices. The potential upside to greater production, however, would be in potential third party sales that would work to lower the IEP distributed LNG price. Additionally, capitalizing sufficient capacity initially would eliminate the need for expanding capacity in the future when the market demand matures and state resources may not be as readily available.

Detail on Ability to Meet IEP Project Goals: For the CAPEX and OPEX estimates presented, Spectrum shows a price of \$10/mcf price for LNG delivered to the City Gate. Distribution and storage from that point has been identified in the range of \$4-5/mcf. Accordingly, Spetrum's proposed development meets the end user pricing target of \$15/mcf.

At an average daily production capacity of 260,000 gallons, the state's capital participation in the project equates with \$307.69 per gallon of developed production capacity (\$80M/260,000).

Overall Reasonableness and Completeness of CAPEX and OPEX

In terms of overall reasonableness and completeness, the CAPEX and OPEX estimates presented in Spectrum's BAFO are reasonable within a range of +/-30% for the level of development demonstrated. This range is consistent with the AACE expected range of accuracy for projects at comparable levels of development. Spectrum is an established developer and distributor of LNG liquefaction operations. SST, as the preferred vendor of the LNG liquefaction plant, has successfully quoted, fabricated, shipped and commissioned LNG plants of similar scale in northern climates, and demonstrates sufficient manufacturing capabilities to undertake fabrication of the Spectrum plant as scheduled. Conam has constructed projects of this scale and complexity on the North Slope, and has experience working with Spectrum.

In terms of a CAPEX to LNG production ratio, Spectrum's development plan demonstrates a ratio of \$563.94/tonne. At this, Spectrum's capital/production ratio equates with 48% of the world-wide ratio of \$1,185/tonne (IGU World LNG Report 2015). Daily rates represented in Spectrum's CAPEX and OPEX for labor, materials and equipment are within the range of rates expected, and are generally applicable to the rates experienced in Alaska. For OPEX, in terms of OPEX/gallon of LNG produced annually, Spectrum's ratio of \$0.09/gallon is relatively low compared to a similar ratio for other LNG liquefaction plants at a similar stage of development in Alaska, that ratio being \$0.48/gallon.

Taken together, these factors support an overall assessment that the development plan as presented by Spectrum is reasonable and essentially complete for this stage of development.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark Griffin', written in a cursive style.

Mark Griffin, AICP
Senior Project Manager
Arcadis U.S., Inc.

Attachments

1 Attachment A

RFP Timeline
10/15 through 6/16

IEP PROJECT MILESTONES

REVISED MARCH 2016



Milestone	<u>Oct 30</u> BAFO's Due	<u>Dec 3</u> AIDEA Board meeting	<u>March 3</u> Top Ranked Proposal	<u>March 31*</u> Project Authorization	<u>June 23*</u> Final Investment Decision
RFP Process	Evaluate BAFO's Announce 2 Top-Ranked Finalists	Top Two Ranked Finalists Identified BAFO Clarification and Information requested from Top Two Finalists Committee to Reconvene when Information complete	Top Ranked Proposal Identified Final Term Sheet and Finance Terms to be Negotiated	Project Plan Presented to Board If Project Authorized, FEED work to proceed to FID	Commercial Terms Final Design and Construction Cost Estimates Equipment and Construction Contracts

Progress to Date



**Tentative Dates*

3/3/16

