Alaska LNG Overview

Frank Richards, President Presented to Arctic Encounter Symposium April 8, 2022



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Alaska LNG System

North Slope Gas Supply

- 40 Trillion cubic feet (tcf) of discovered, conventional, and developed North Slope associated gas from Prudhoe Bay and Point Thomson
- This gas is stranded and can be produced at a low incremental cost

Gas Treatment Plant

- Located in Prudhoe Bay adjacent to existing gas plants
- Removes and uses/sequesters carbon dioxide (CO_2) and hydrogen sulfide (H₂S) from raw gas stream

Natural Gas Pipeline

- 807-mile pipeline from Prudhoe Bay to Nikiski, following TAPS and highway system
- Provides gas to Alaskans and LNG facility

Alaska LNG Facility

- 20 Million tonnes per annum (Mtpa) LNG facility located in Nikiski, near existing infrastructure and legacy Kenai LNG plant
- Converts natural gas to LNG for export to Asia





Alaska LNG Project Status

Strong Economics

- Alaska LNG has lower costs than its key competitors
- Cost of supply independently verified

Fully Permitted

- Federal government has approved construction of Alaska LNG
- Acquiring permits took significant effort and they are valuable

Environmental Benefits

- Alaska LNG will reduce global greenhouse gas emissions
- LNG will continue to be an important energy source



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Strong LNG Market

LNG Market is Still Growing

- Demand growth will outpace current and planned LNG capacity
- LNG growth expected as part of energy transition as natural gas emits half the greenhouse gasses as coal

Investors and Buyers want LNG

- New LNG projects expected to be sanctioned in 2022
- Most new projects have some degree of energy transition planning

"...raising capital for these very capital-intensive [LNG] projects has not really been that much of a challenge to the industry. I think that sends a strong signal of confidence that this [LNG] is going to be around for a while."

-Dan Brouillette, President of Sempra Infrastructure on NPR's Marketplace (Jan 3, 2022)



Global LNG Supply/Demand Balance Forecast,

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Source: Gas Strategies

Greenhouse Gas Emissions



A life cycle analysis of Alaska LNG shows it reduces greenhouse gas emissions for electric power generation by more than 77 million metric tons of CO₂e per year in comparison to Asian coal derived power



Life Cycle GHG Emissions for Natural Gas vs. Coal Power



Source: Greenhouse Gas Lifecycle Assessment: Alaska LNG Project

Greenhouse Gas Intensity



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Future Energy Security





- As a result of the war in Ukraine, the US LNG destined for Asia has been diverted to Europe.
- Europe is rapidly building new LNG import capacity to reduce its dependence on Russian gas, new LNG from the Gulf Coast will meet this future demand
- This dynamic increases the need for US supply from Alaska to meet the long-term energy security needs of Asia

Focus on US LNG for Energy Security ALASKA GASLINE * DEUELOPMENT CORP

US LNG Can Replace All Russia Gas to Europe

• 15 Billion cubic feet/day (Bcfd) of gas delivered from Russia to Europe

But It Will Take Time

- 3.7 Bcfd of LNG is under construction in the Gulf Coast
- Another 24.9 Bcfd is permitted for construction in the Gulf Coast
- Alaska, at 2.63 Bcfd is the only Pacific Basin project permitted for construction

North American LNG Export Terminals Approved, Not Yet Built



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Market Impact on Alaska LNG

Record high LNG prices

- Upward pressure on long-term contract price
- Highlights the need for new LNG capacity
- Buyers again seeking long-term contracts

Role of LNG in National Security

- Europe is still buying Russian gas as there is not enough US LNG
- Highlights LNG's stabilizing role in the Pacific

Natural Gas as Bridge Fuel

- Europe has recognized natural gas as transition fuel and 'green' energy
- Europe is switching back to coal due to lack of gas investment
- Buyers more willing to make longterm gas commitments

Impact on Alaska LNG

• LNG investors and developers have increased interest

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- Increased strategic importance for the US and our Asian allies
- Overall increased interest and urgency to move project forward

Wood Mackenzie Cost of Supply

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Wood Mackenzie Updated their 2016 Alaska LNG Competitiveness Analysis

- Wood Mac independently calculated Alaska LNG cost of supply
- AGDC implemented recommendations from the 2016 Report to reduce the Cost of Supply

Wood Mackenzie Report verifies that Alaska LNG Cost of Supply is now Competitive

- Transition from 100% equity funding to nonrecourse project finance with a tolling model largest driver of cost reduction
- Since 2016 report, this sort of commercial model has been used to finance the growth of the US LNG industry

*Non-recourse funding is a type of commercial lending that entitle the lender to repayment only from the profits of the project and not from assets of the borrower.

2016 Report



2022 Update



Wood Mackenzie Cost of Supply



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Wood Mackenzie Cost of Supply



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Alaska LNG vs Competitors



Cost of Supply: \$6.70

- Alaska LNG's delivered cost of supply is lower than most global competitors and contract pricing
- The cost of supply is stable and increases at about 1% per year, providing buyers a predictable cost energy source.





Comparative Cost of Supply to Asia Source: Gas Strategies

Gas For Alaskans



Low-Cost Gas for Alaskans

- The Alaska LNG in-state price is estimated to be between \$4 \$5 per MMBtu
- Significant reduction from current prices, saving Alaskans hundreds of dollars per year

Enough Gas for Alaskans

- The pipeline is designed to supply more natural gas than the LNG plant needs
- Enough capacity for in-state demand to more than double



Source: EIA

Federal Loan Guarantee

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The full faith and credit of the United States will be pledged to pay the principal and interest on \$26.3 billion of Alaska LNG debt in the event of a default.

The Infrastructure Bill includes a loan guarantee for Alaska LNG

- Principle amount of debt guaranteed up to \$26.3 billion (adjusted for inflation)
- Up to 80% of the capital cost
- Term of up to 30 years
- Loan guarantee will be subject to credit terms and requirements of the loan program

Benefits of the loan guarantee

- Reduced cost of supply
- Completion risk mitigation
- Federal government support and "skin in the game"

Reduced Cost of Supply

- Interest rate reduction of between 1 and 2.5%
- Potential for longer term debt
- Potential for higher debt/equity ratio



AGDC Analysis

Fully Permitted Project

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Completed

- Federal Energy Regulatory Commission (FERC) Authorization to Construct
- <u>All</u> 36 Major Federal permits & authorizations
- Federal ROWs: Bureau of Land Management, National Park Service
- Alaska State Land Leases and Gas Treatment Plant Air Permit

Supplemental EIS

- Upstream analysis of potential environmental impacts associated with natural gas production on the North Slope
- Lifecycle analysis calculating greenhouse gas emissions from the Alaska LNG Project

Permitting Timeline



Timeline

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The next steps for Alaska LNG are focused on securing an LNG Lead Party and moving into a privately funded FEED. The next steps are organized in the following order with construction following.





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WARTH STAF

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TOTE Maritime Alaska

March 2022



TOTE's ORCA Class Vessels



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FTOTE

LNG Conversion History

- December 2017 TOTE Maritime Alaska began the process of converting the Orca vessels to LNG
- **Q1 2018** 1st phase of MV North Star completed
- **Q1 2020** 1st phase of MV Midnight Sun completed
- Q1 2022 2nd phase of MV Midnight Sun planned completion and vessel will begin using LNG
- Q1 2023 2nd phase of MV North Star planned completion and vessel will begin using LNG



LNG Conversion







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LNG Facility



Alaska Hydrogen Opportunity





50 years ago, the modern LNG industry was created in Alaska. For many of the same reasons, the clean hydrogen industry can also be created here in Alaska.

Carbon Storage and Sequestration at the Project Site at Tidewater

Short Distance to Expanding Clean Hydrogen Markets in Asia

Low GHG Natural Gas from Conventional Supply Existing Ammonia Plant well Positioned to be First Mover in Market

Clean Hydrogen Overview

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Natural Gas



Methane hydrocarbon releases CO₂ when burned, somewhat difficult to store and transport

Hydrogen



Fuel releases no CO₂ when burned, very difficult to store and transport

Ammonia



Fuel releases no CO₂ when burned, somewhat easy to store and transport

Conversion of Natural Gas

- Natural gas can be converted into hydrogen and then into ammonia
- The existing Nutrien ammonia plant in Nikiski uses this process

CO₂ Sequestration

- The process to convert natural gas into hydrogen and ammonia produces CO₂
- If this CO₂ is captured and sequestered, the resulting "Blue Ammonia" is a clean fuel

Hydrogen vs Ammonia

- Both hydrogen and ammonia are "clean fuels" and do not emit CO₂ when burned
- Hydrogen is converted into ammonia to make storage and transportation easier
- Ammonia can be exported to Asia to meet their future clean energy demands

Alaska LNG and Blue Ammonia



ALASKA LNG



The size of the current LNG market can support construction of a 20 Mtpa Alaska LNG facility. This LNG facility is large enough to support construction of the Alaska Natural Gas Pipeline. Cook Inlet Blue Ammonia demonstrates the opportunity for expanded clean energy supply from Alaska. This future proofs Alaska LNG investment and provides a path to net-zero carbon energy from Alaska.

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ALASKA LNG

Current Status

- ✓ Strong Economics
- ✓ Fully Permitted
- Environmental Benefits

Alaska Benefits

- Energy for Alaskans
- ✓ Jobs
- ✓ New Revenue

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