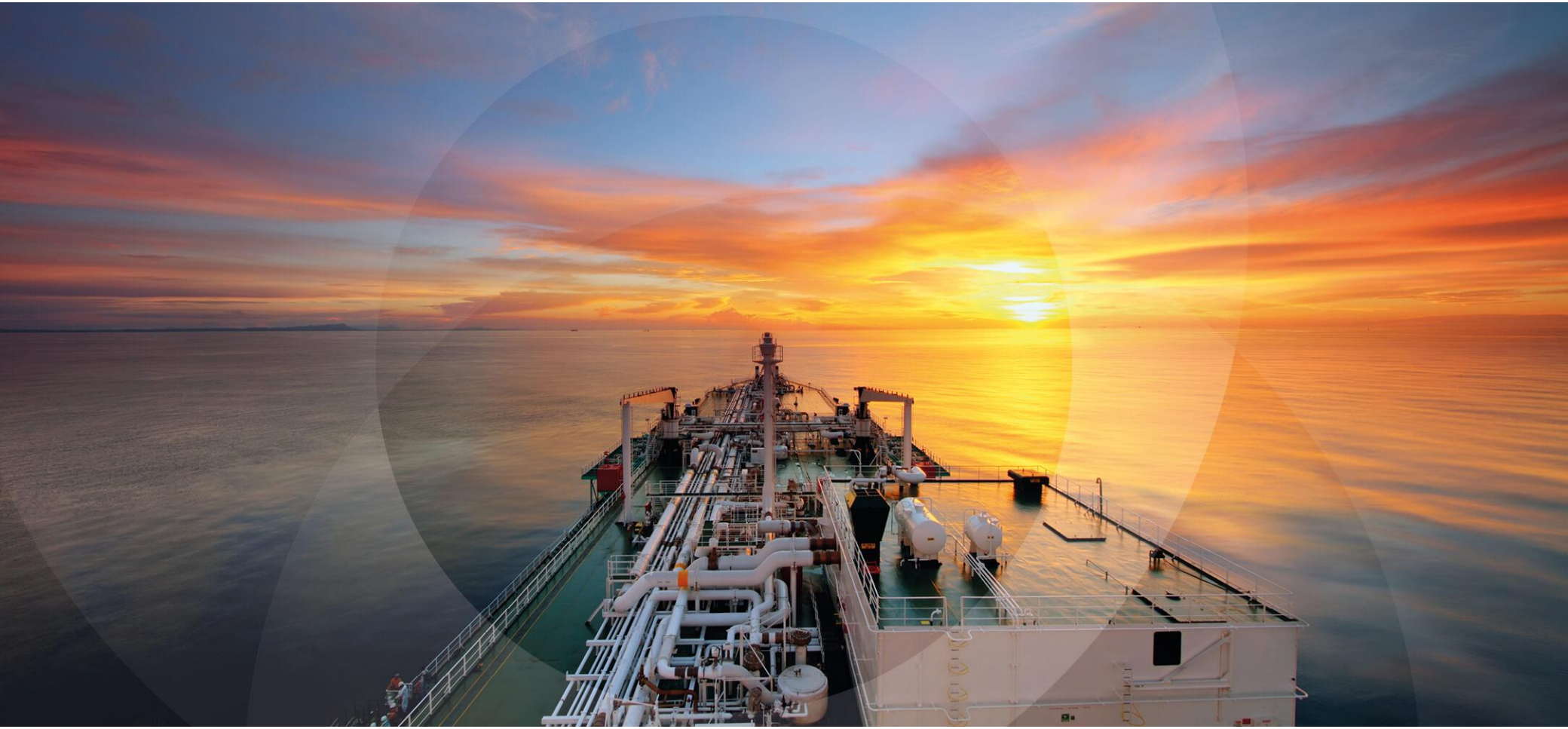
Alaska LNG Competitiveness Analysis

Alaska State Legislature Lunch and Learn Presentation

5 April 2022



Project Background

Scope of Work

- In 2016, Wood Mackenzie provided AGDC together with BP and ExxonMobil an independent analysis, which:

  - » Established the base cost of supply for Alaska LNG and defined the target range for a competitive cost of supply (CoS) for Alaska LNG;

  - » Identified viable options in addition to base capex and opex reductions to reduce the project's CoS, covering project structure and fiscal terms adjustments; and

  - » Considered the way forward for a globally competitive LNG project in Alaska

The Study is divided into three primary areas

- **1 Cost of Supply**
  - » Calculate the current Cost of Supply (“CoS”) of Alaska LNG
  - » Compare it with the previous commercial structure and project costs
  - » Understand how the CoS has evolved

- **2 Cost Optimization Options**
  - » Review options to reduce cost or otherwise improve the economic returns for Alaska LNG
  - » Quantify their impact

- **3 LNG Market Fundamentals & Competitiveness**
  - » Incorporate the results from steps 1 and 2 evaluate the competitiveness of Alaska LNG

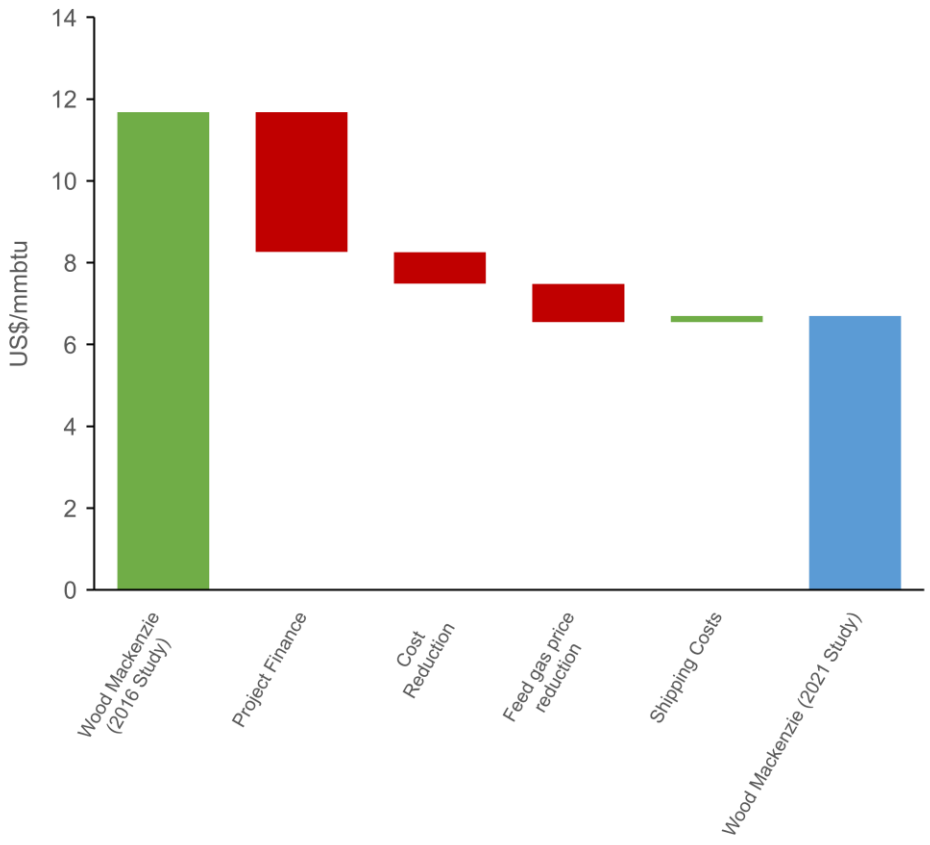
Cost of Supply

CoS is now 43% lower vs. 2016 due to lower CAPEX and feedgas price, and the use of a non-recourse debt funded 3rd party tolling structure

Understanding the difference

- **Project Finance** - introduction of a non-recourse 70% debt-funded third-party tolling structure for the GTP, LNG Facility and Pipeline
- Total **Capital costs** have been reduced from US$45 billion to US$38.7 billion
  - GTP/Pipeline reduced from US$25 billion to US$21.8 billion
  - LNG Facility reduced from US$20 billion to US$16.8 billion
- **Feed gas prices** reduced from US$2.09/mmbtu to US$1.15/mmbtu
- **Shipping Costs** increased from US$0.60/mmbtu to US$0.76/mmbtu

Breakeven cost of supply comparison

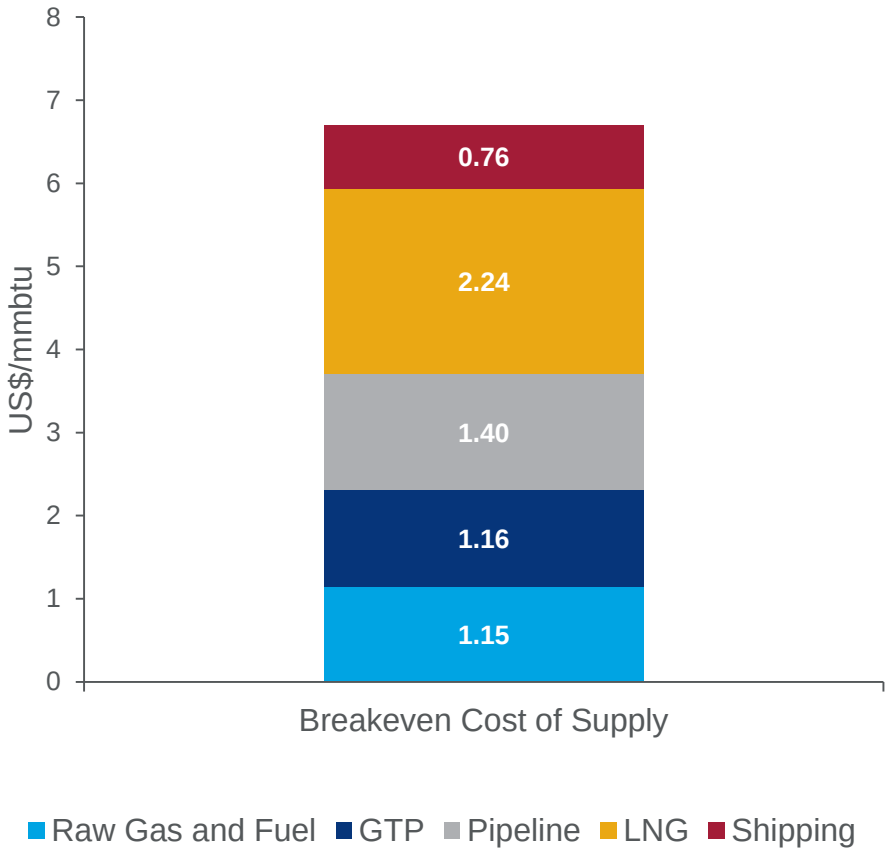


The new optimized CoS is estimated to be ~US$6.70/mmbtu

Assumptions

- Capital costs provided by AGDC
  - LNG Facility – US$16.8 billion
  - Pipeline – US$12.7 billion
  - GTP – US$9.2 billion
- The capex financed with a 70:30 debt to equity ratio.
  - Debt has an 18-year term at a 5% interest
- Raw gas purchased from Prudhoe Bay and Point Thomson for US$1.0/mmbtu
  - No commodity price link
  - Including fuel usage US$1.15/mmbtu
- Shipping Costs from Alaska to East Asia assumed at US$0.76/mmbtu
  - average of potential destinations in Japan, China, and Thailand
- Volumes of 3 bcf/d with ~13% used as fuel
- Domestic Market allocation: 300 mmcf/day

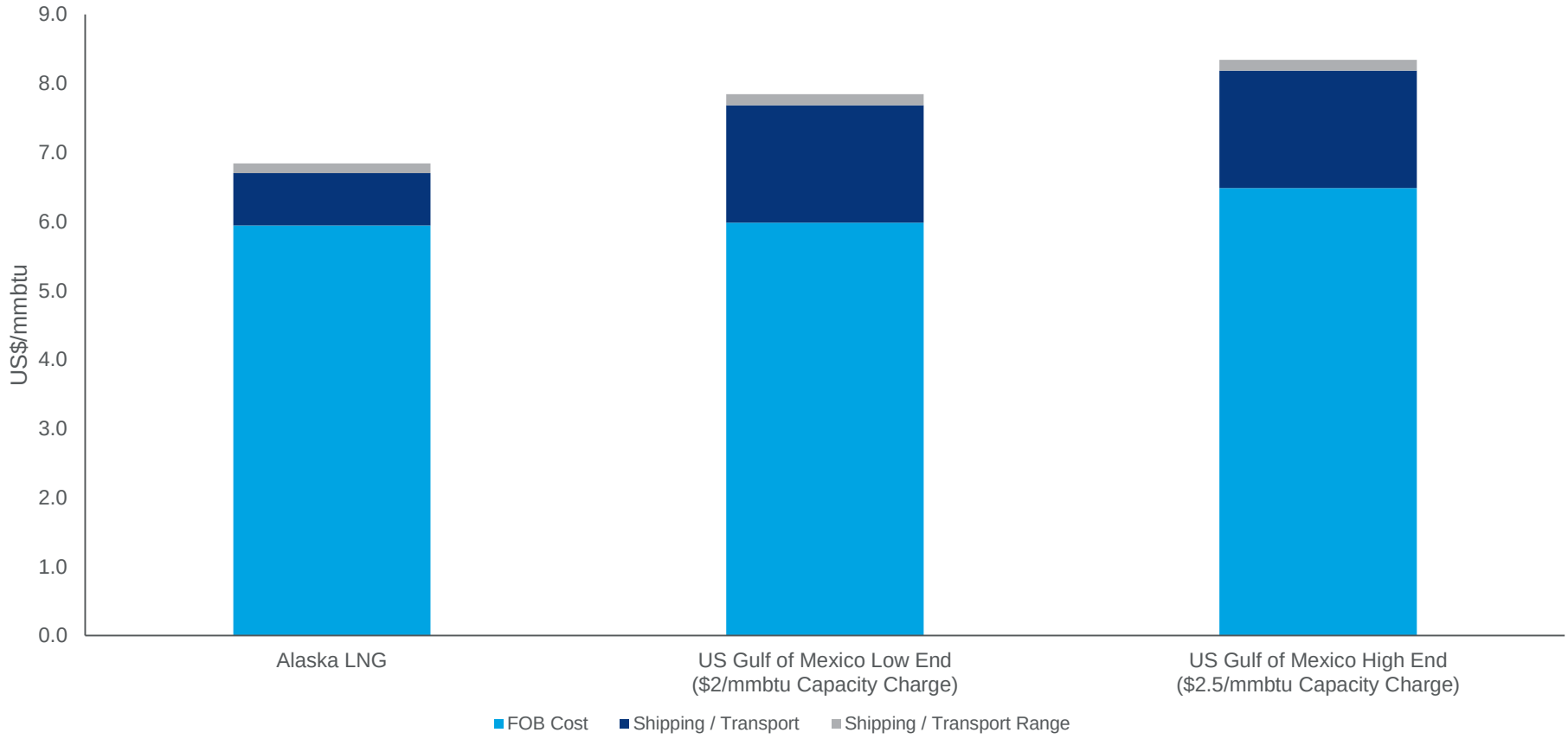
Breakeven cost of supply



Note: Capital costs are in 2019 real terms; Refer to Appendix for shipping costs; *Raw gas prices provided by AGDC and are subject to negotiation

With the cost optimization and new debt structure, Alaska LNG is competitive against US Gulf Coast LNG Projects

Comparison of Breakeven cost of supply for delivery into North Asia



Source: Wood Mackenzie

Cost Optimization Options

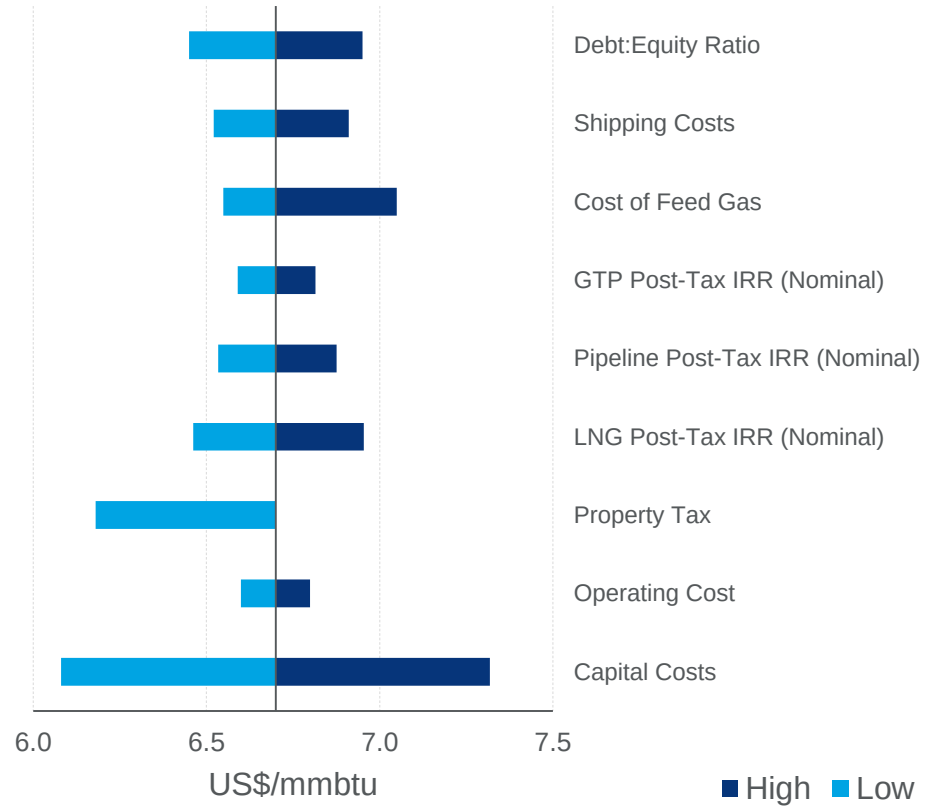
Cost of supply is most sensitive to capital costs and property tax

Cost of Supply - Sensitivities

Assumptions

	Low	Base	High
Leverage – Debt : Equity Ratio	75:25	70:30	65:35
Shipping Costs (US$/mmbtu)	0.58	0.76	0.97
Cost of Feed Gas (US$/mmbtu)	1.00	1.15	1.50
GTP Post-Tax IRR (Nominal)	10%	12%	14%
Pipeline Post-Tax IRR (Nominal)	10%	12%	14%
LNG Post-Tax IRR (Nominal)	10%	12%	14%
Property Tax	0.2%	2%	2%
Operating Cost (US$ billion, 2019 real) (+/- 15%)	14.7	17.3	19.9
Capital Costs (US$ billion, 2019 real) (+/- 15%)	32.9	38.7	44.5

Sensitivities



Source: Wood Mackenzie

The Federal Loan Guarantee has the potential to be another option for cost optimization

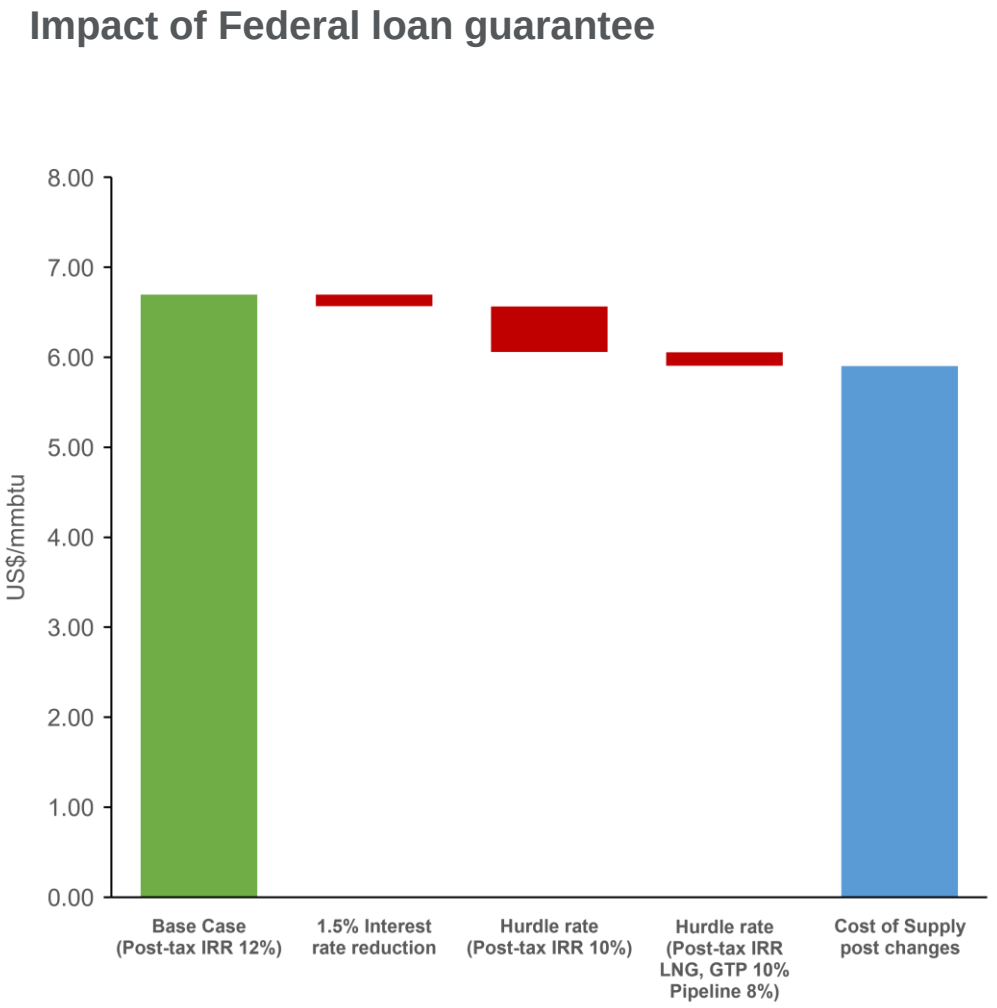
Federal Loan Guarantee

- The $1.2 trillion Infrastructure Bill signed into law in November 2021 will enable Federal Loan Guarantees for the Alaska LNG project
- H.R. 3684 amends the Alaska Natural Pipeline Act to strike the requirements surrounding gas transportation to the “West Coast” and “to continental United States”. Based on H.R. 3684 and the Infrastructure Bill:
  - The Loan Guarantee is limited to 80% of total capital cost including interest during construction
  - The principal inflated amount as of July 2021 is $25.7 billion
  - The loan term has a 30-year limit
- A federal loan guarantee provides additional assurances and may be expected to de-risk the project for both lenders and participants

*Source: https://www.energy.gov/lpo/what-loan-guarantee

The federal loan guarantee would help to de-risk the project and therefore further lower the cost of supply

- A federal loan guarantee should help to de-risk the project
  - The US Government effectively stands behind the debt, supporting up to 80% of the debt
  - Thus, lenders would be expected to be more willing to accept a lower interest rate for loans
  - Owners of facilities may therefore reduce their breakeven hurdle rates as a result of this lower interest rate
- We therefore assume that the loan guarantee helps reduce the interest rate and the hurdle rate
- We have considered the impact of the following on the breakeven cost of supply
  - Reduction of borrowing interest rate by 1.5%
  - Reduction in post-tax hurdle rate for GTP, LNG facility and Pipeline from 12% to 10%
  - Reduction in post-tax hurdle rate for GTP and LNG facility to 10% and for Pipeline to 8%
- The above examples are included to illustrate the effect of changes rather than being predictive

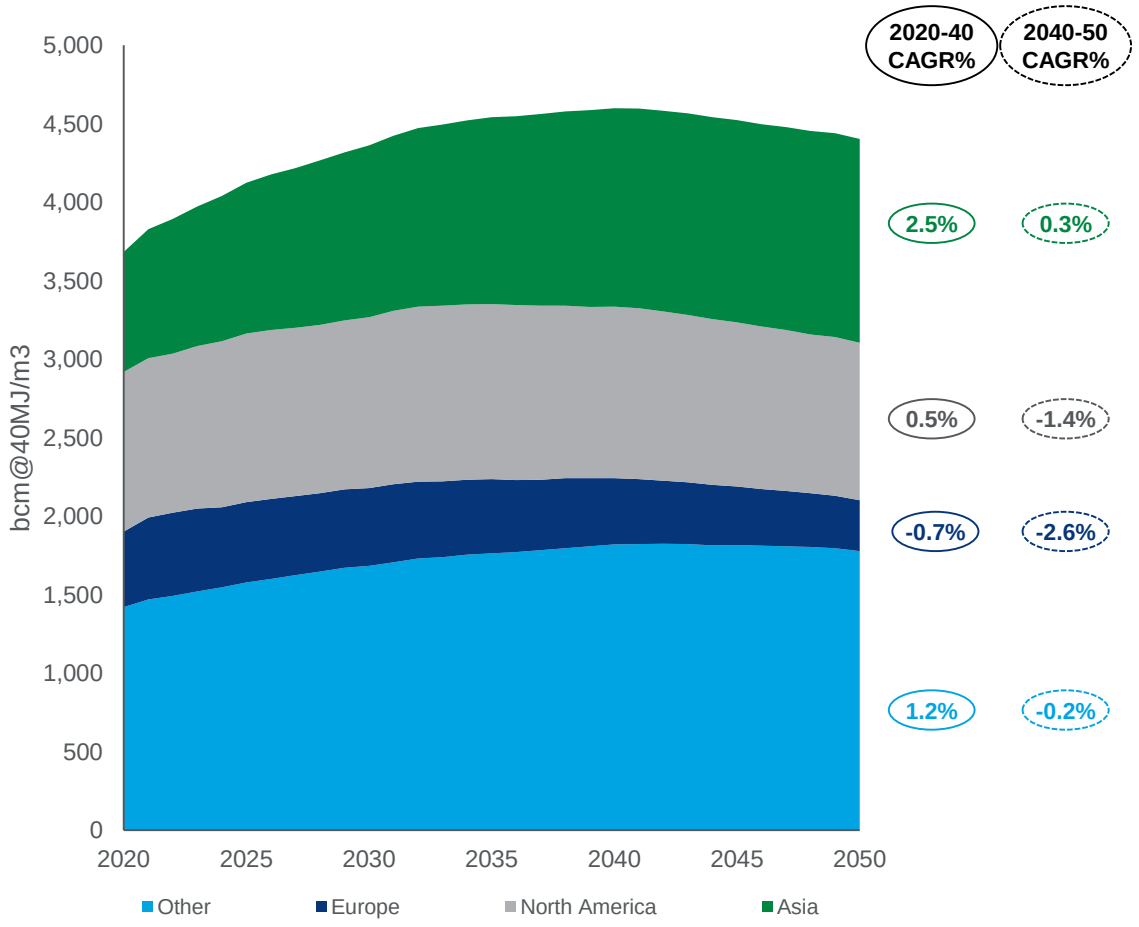


LNG Market Fundamentals and Competitiveness

Under Wood Mackenzie's base case, gas demand peaks in 2040 as the energy transition accelerates

Only Asian gas demand continues to grow to 2050 driven by Southeast Asia

Global gas demand by region



Asia

- Japan, Korea and Taiwan (JKT) demand declines
- Chinese demand growth plateaus
- SE Asian demand grows driven by energy and feedstock needs

North America

- Decline in demand, driven by high renewable penetration
- Low-carbon hydrogen displacement.
- Blue hydrogen production represents a growth opportunity for gas demand

Europe

- Decarbonising of commercial and industrial sectors gathers pace in 2030s
- Gas still supported by power in 2020s

Others

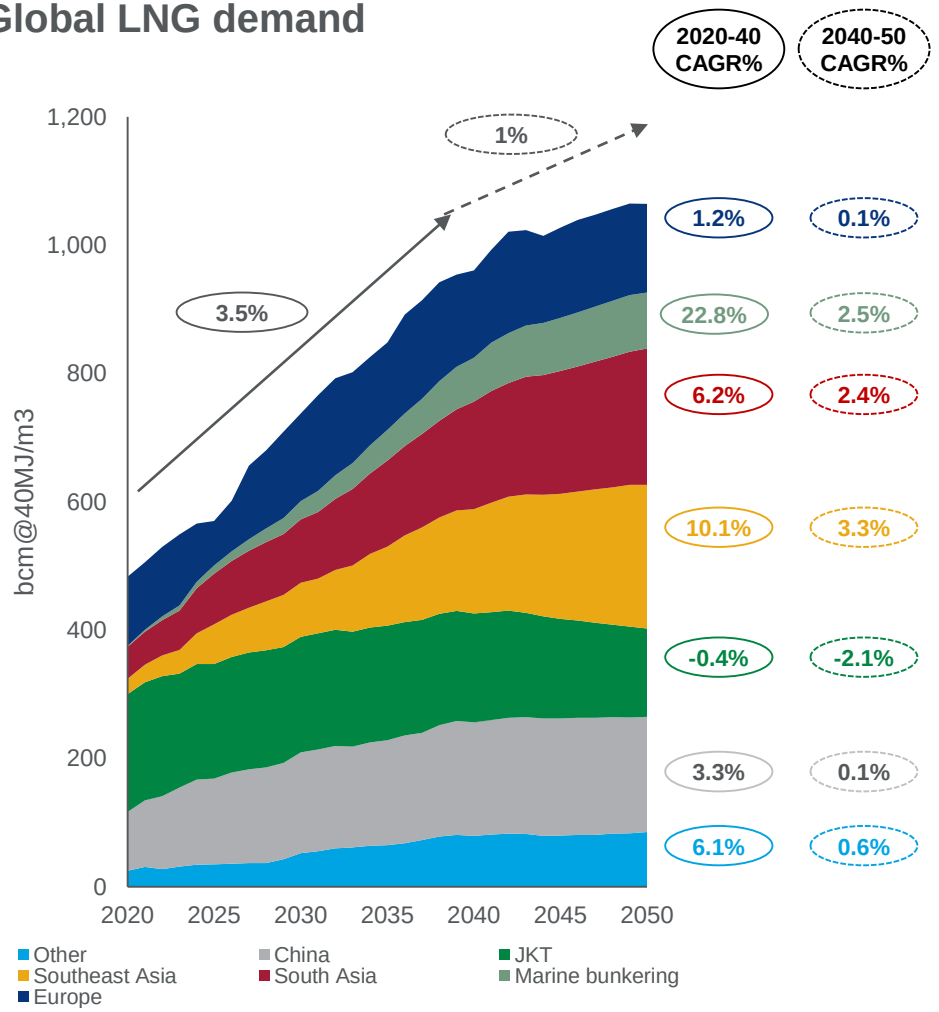
- Gas demand remains resilient in rest of the world consuming markets including Russia, Middle East and N. Africa.
- Blue hydrogen trade presents a growth opportunity

Note: Other includes other major gas consumers including Middle East, Russia, Latin America and North Africa
Source: Wood Mackenzie

Despite gas demand peaking in 2040, LNG demand continues to grow past 2050

Declining indigenous production drives the need for LNG from more distant locations

Global LNG demand



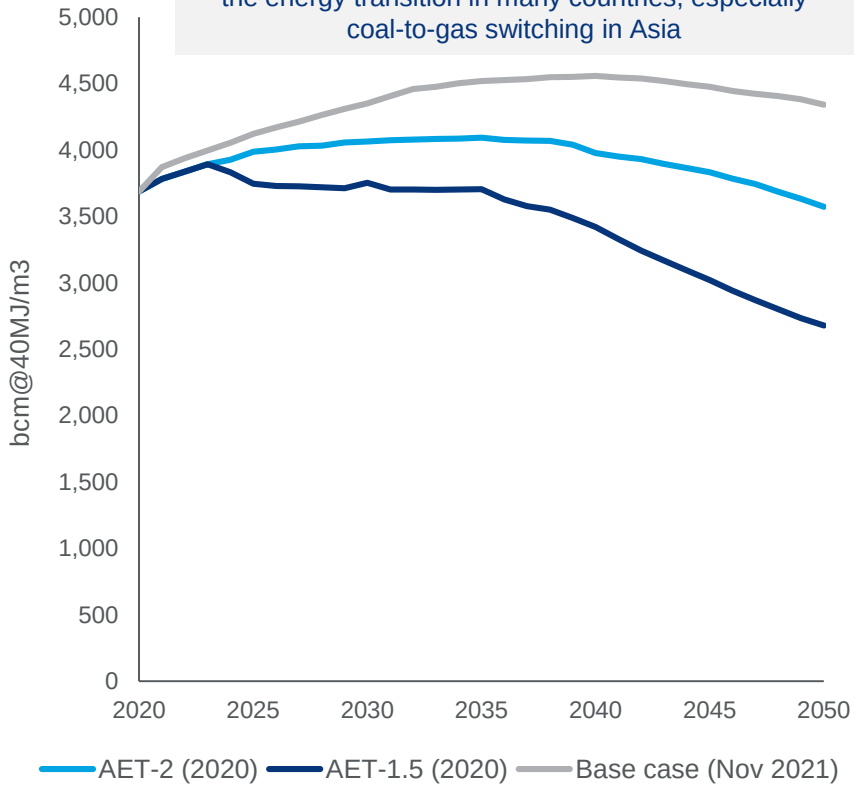
- Growth in LNG demand will be driven by markets such as SE Asia, South Asia and China
- Europe's demand for LNG will continue to grow slowly supported by coal retirals and indigenous gas supply declines
- While small at present, the demand for LNG in marine bunkering is expected to grow rapidly over the next 20 years
- The traditional markets of Japan, Korea and Taiwan are forecasted to contract as LNG is replaced by lower carbon options

Source: Wood Mackenzie

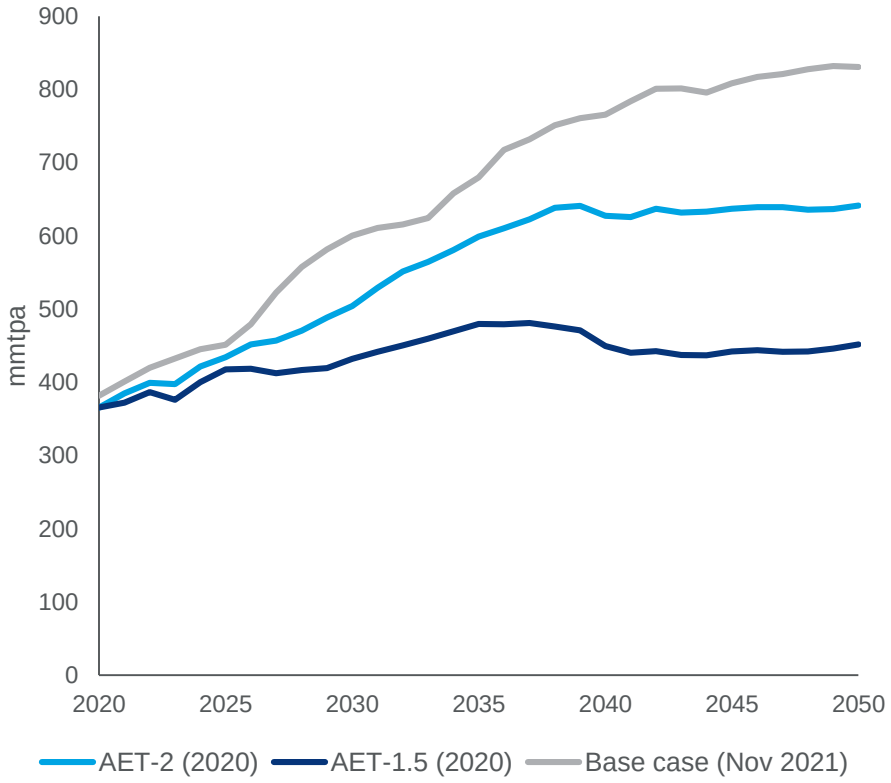
Even under low carbon scenarios (2°C and 1.5°C), LNG demand remains resilient to 2050

Global gas demand under carbon constrained scenarios

Gas demand remains resilient under alternative energy transition scenarios to 2035. As gas supports the energy transition in many countries, especially coal-to-gas switching in Asia



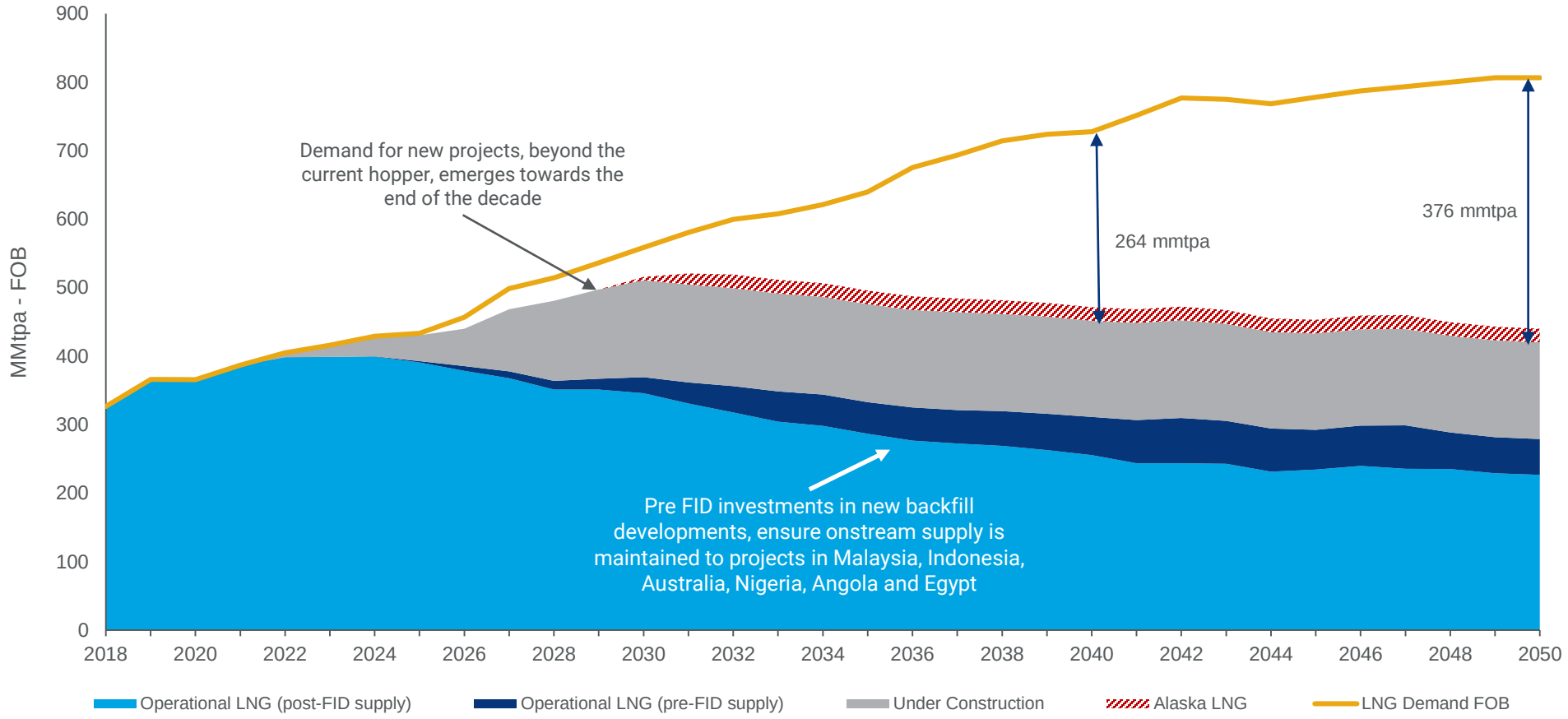
Global LNG demand under alternative scenarios



Note: AET-2 and AET-1.5 refer to Wood Mackenzie's Accelerated Energy Transition 2-degree and 1.5-degree scenarios respectively
Source: Wood Mackenzie

After a recent run of FIDs a potential window for Alaska LNG production begins to open in 2028 as the supply gap widens

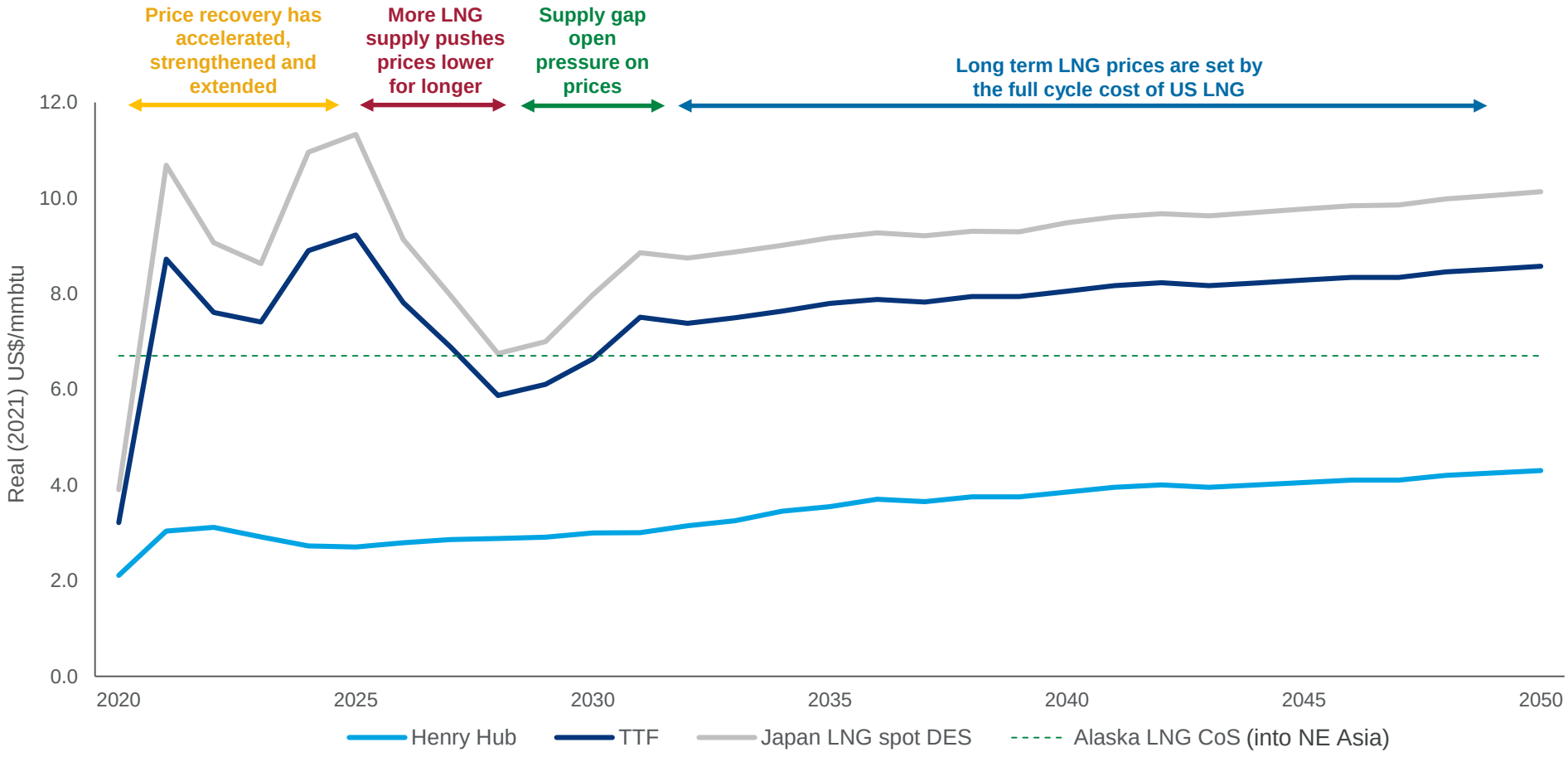
LNG supply and demand by project development status



Source: Wood Mackenzie. Note: 1 million tonnes (mmt) LNG is equivalent to approximately 1.36 billion cubic metres (bcm) of gas

With the cost optimization and debt financing Alaska LNG is price competitive starting in 2028

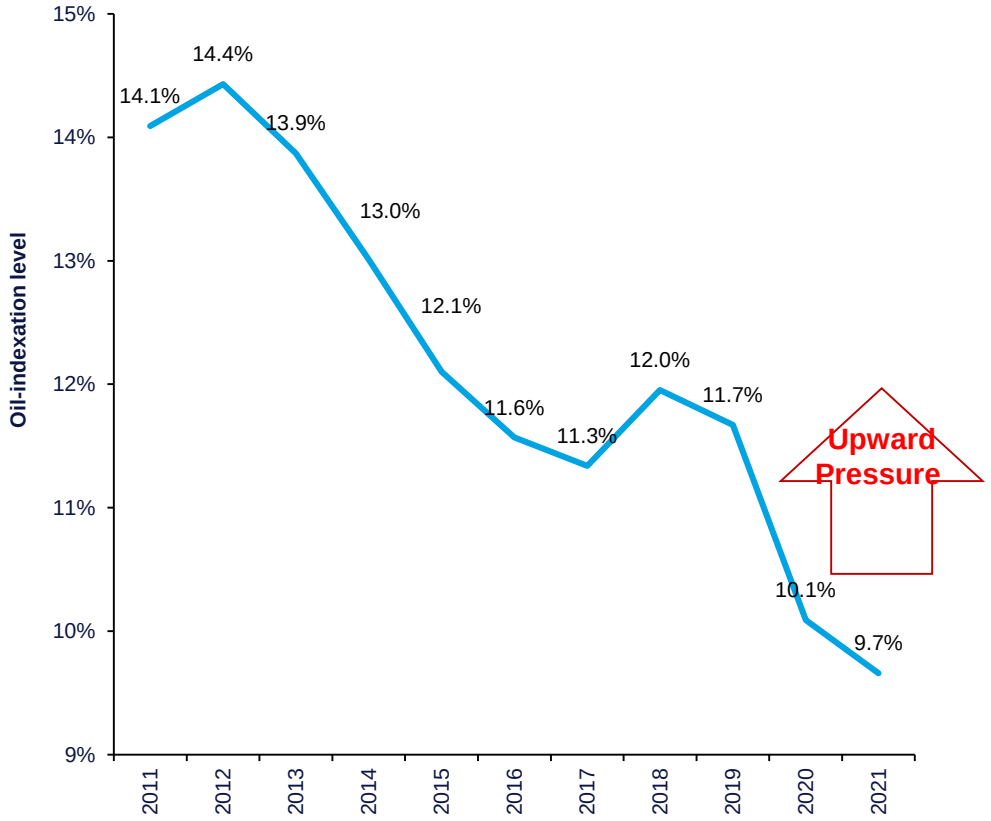
Global gas and LNG prices forecast



Source: Wood Mackenzie

Oil-indexed contract prices have trended down over the last decade, however they are expected to rise again to ~11-12% slopes

Average oil indexations in new contracts into Asia + US$0.50/mmbtu constant DES



- The continue fall in oil-linked prices has been driven by:
  - » Qatar opting for a market share strategy;
  - » other sellers holding long uncontracted positions; and
  - » Japanese legacy buyers being out of the market for long-term volumes.
- However, higher spot prices are already exerting upward pricing pressure.
- We anticipate new long-term contracts being signed with 11-12% slopes.
- Although uncertain, this provides some upside for future long-term pricing in Asia

Buyers, lenders and regulators are increasingly focused on the carbon footprint of energy supplies

Favored LNG projects are using emissions as a differentiator for the marketing of LNG

- Emissions along the LNG value chain are coming under significant scrutiny by the industry and governments
- As well as demonstrating transparency of value chain emissions, there is a strong desire to see evidence of emissions mitigation and reduction
  - » The capture and sequestration of CO2 from the feedstock gas on the North Slope will position Alaska LNG well with buyers/regulators
- Demonstrating “top quartile” performance with regards emissions intensity (per tonne of LNG) from well to tank will be a differentiator from competitor projects
  - » Particularly against L48 competitors where emissions are generally higher
- Comparisons with alternative fuels in the power sector, demonstrates that gas has significantly lower carbon emissions than coal and in many energy transition scenarios gas plays an important role in satisfying energy demand well into the future

Conclusions

Conclusions

Since Wood Mackenzie's 2016 study, AGDC has acted on the identified recommendations reducing the cost of supply (CoS)

- Optimised CoS delivered to East Asia reduced by 43% from US$11.7/mmbtu (fully equity funded) to US$6.7/mmbtu
  - » Using 70% debt financing for Alaska LNG reduces the CoS by ~29%
  - » Alaska LNG is now competitive against the US Gulf Coast LNG projects
- LNG demand remains robust under all scenarios to 2050, despite gas demand peaking in 2040, due to declining indigenous production in key demand regions
- The strong LNG demand is expected to create a gap in supply starting in 2028
- Alaska LNG is competing to fill the supply gap
  - » with the upward pressure expected on prices Japan LNG Spot prices rising to ~US$8/mmbtu (DES) in 2030 – higher than the Alaska LNG CoS

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Appendix

Cost of Supply

Approach to Analysis

- The basis of our analysis is to determine the breakeven delivered cost of supply for the Alaska LNG project

- The analysis provides the price that would be required for a project to break even
  - » the price required for the project to generate a deemed rate of return
  - » for the purposes of this analysis a post-tax return of 12% is used in the base case

Cost optimization options

Approach to Analysis

- We have considered what other options may allow a reduction in the project breakeven

- As a part of this, we have analyzed how changes in the following would impact the breakeven cost of supply
  - » Capex and Opex
  - » Property Tax
  - » Post-tax IRR
  - » Cost of FEED gas
  - » Shipping Costs
  - » Leverage (Debt:Equity Ratio)

- In addition, we have also looked at other factors which may reduce the cost of supply, specifically:
  - » The Federal Loan Guarantee

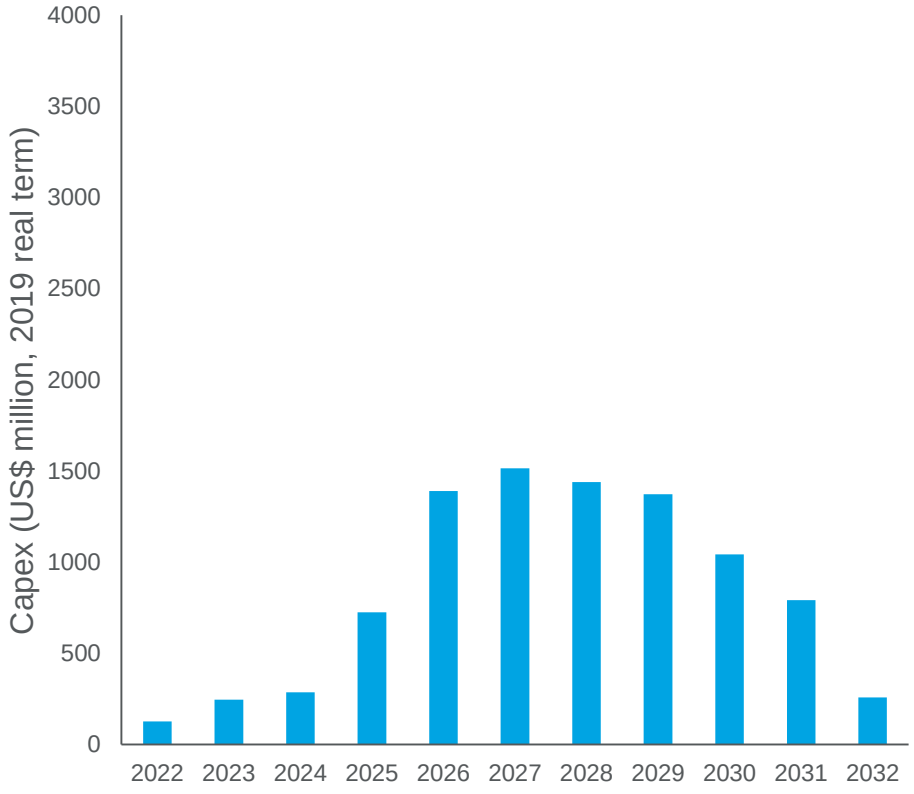
Glossary

	Definitions
Capex	Capital costs - Expenditure by companies on capital equipment.
Opex	Operating costs - The day-to-day costs incurred in producing oil and gas.
GTP	Gas Treatment Plant
Feed gas price	The price of the natural gas that is delivered to a liquefaction facility via pipeline to be converted into LNG.
Mmbtu	Metric Million British Thermal Unit
Bcf/d	Billion Cubic Feet per day
Mmcf/day	Million cubic feet per day
Post-tax IRR	The after-tax real rate of return is defined as the actual profit or loss of an investment after accounting for inflation and taxes.
CAGR%	Compound annual growth rate
TTF	Title Transfer Facility, more commonly known as TTF, is a virtual trading point for natural gas in the Netherlands

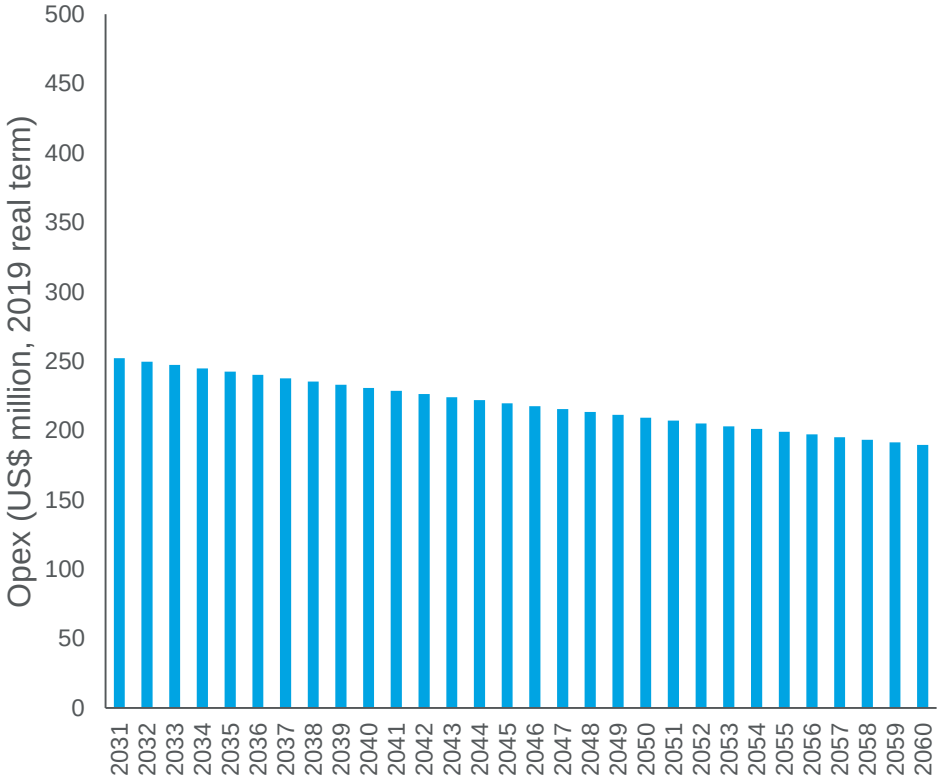
Gas Treatment Plant

Cost Profiles

Capex Profile (2019, real terms)



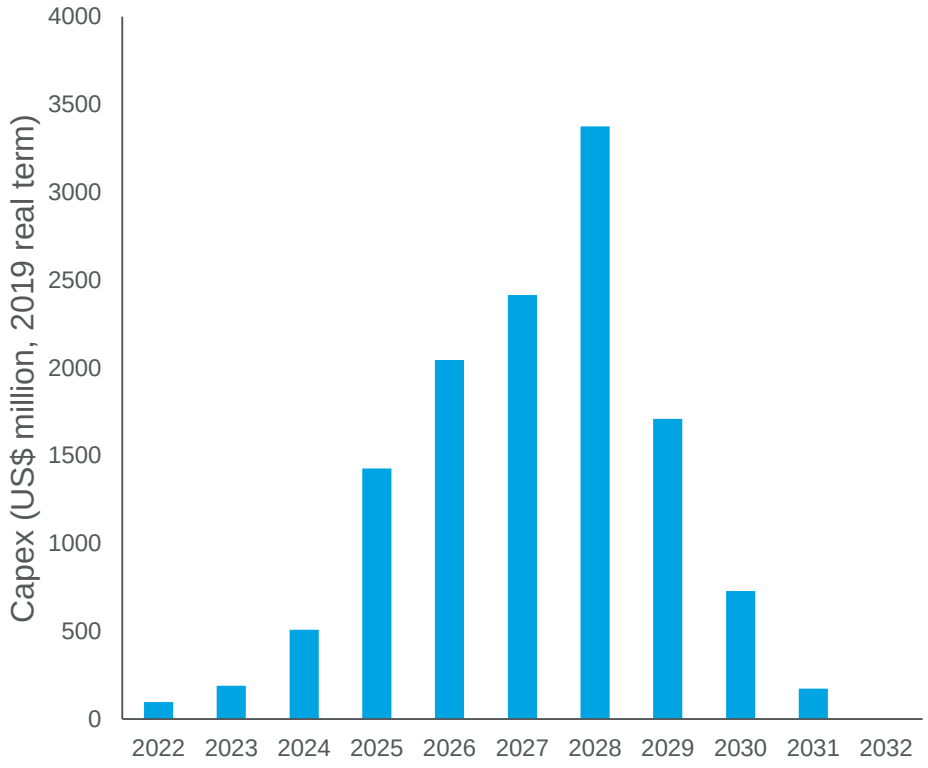
Opex Profile (2019, real terms)



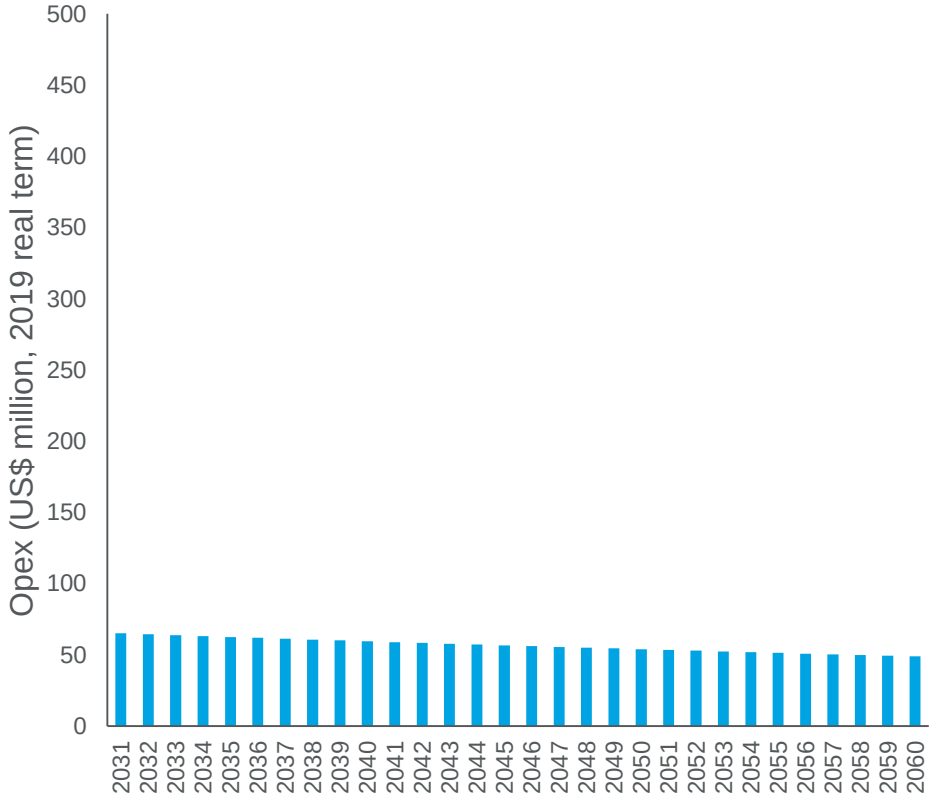
Pipeline

Cost Profiles

Capex Profile (2019, real terms)



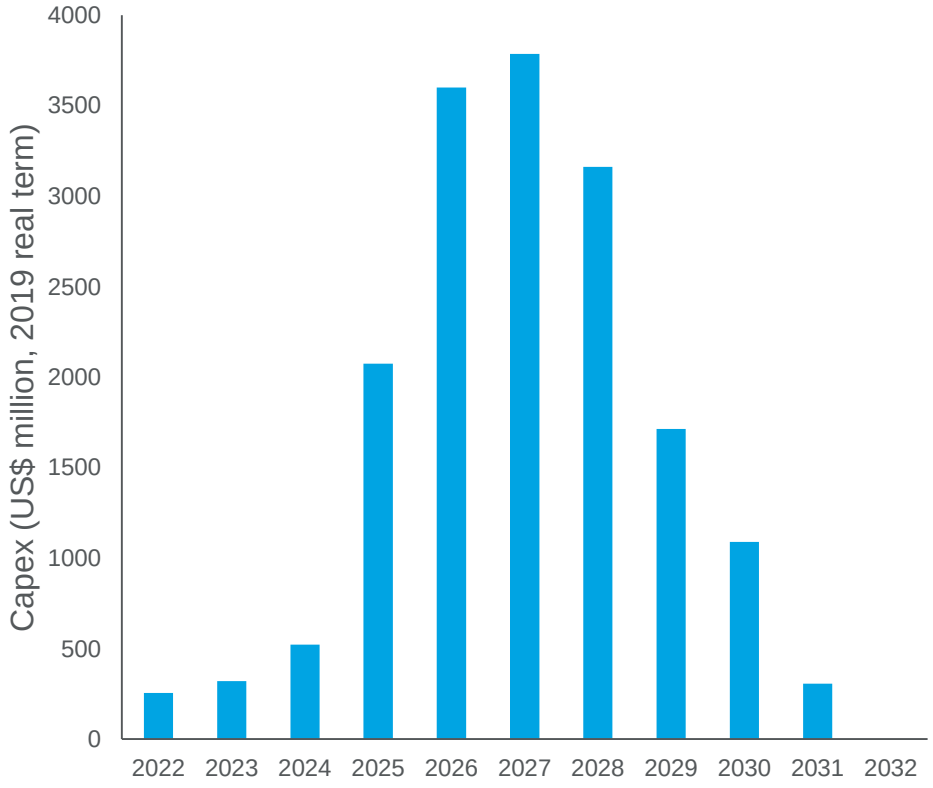
Opex Profile (2019, real terms)



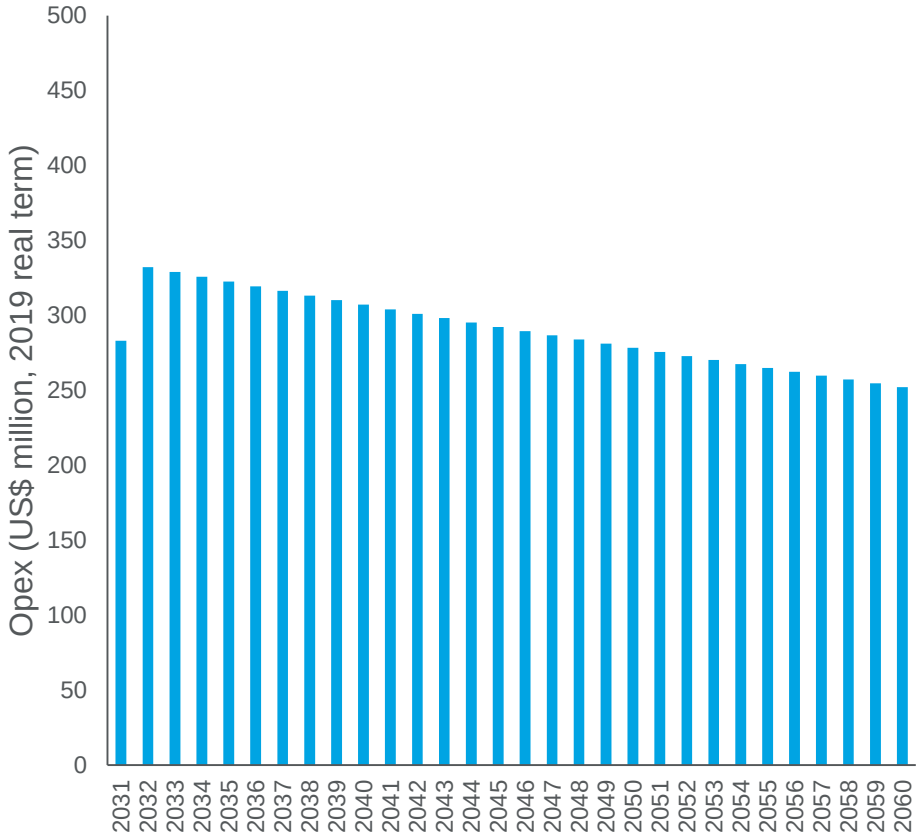
LNG Plant

Cost Profiles

Capex Profile (2019, real terms)



Opex Profile (2019, real terms)



Shipping Costs

Average shipping costs estimates from Alaska LNG to Asia is ~ US$0.76/mmbtu

Terminal	Country	Vessel	Shipping Cost (US$/mmbtu)
Guangxi LNG	China	174,000m³ Mem (SSGI)	0.83
Shandong LNG	China	174,000m³ Mem (SSGI)	0.69
Tianjin LNG (Sinopec)	China	174,000m³ Mem (SSGI)	0.72
Higashi-Ohgishima	Japan	174,000m³ Mem (SSGI)	0.58
EGAT FSRU	Thailand	174,000m³ Mem (SSGI)	0.97

Source: Wood Mackenzie LNG Tool

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