Gas Strategies

New Zealand LNG Import Feasibility Assessment

Public Release Summary

First Gas Ltd

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Context

The New Zealand LNG Import Feasibility Assessment report was prepared solely for First Gas Limited, Contact Energy Limited, Genesis Energy Limited, Mercury NZ Limited and Meridian Energy Limited (the "LNG Import Feasibility Assessment Report Parties") for internal use only. This Public Release Summary has been prepared and published by First Gas Limited with Gas Strategies' agreement. Gas Strategies' responsibilities in respect of the New Zealand LNG Import Feasibility Assessment report and this Public Release Summary are solely to the LNG Import Feasibility Assessment Report Parties.

As further described in this Public Release Summary, the New Zealand LNG Import Feasibility Assessment Report was the result of an Assessment led by UK-based energy consulting firm, Gas Strategies Group Limited, with support from New Zealand-based consultancy, Wood Beca Ltd, over a c.10-week period beginning mid-September 2024. The report was concluded on 20 December 2024. The scope of the assessment was determined by a set of LNG demand scenarios and guiding principles provided by the New Zealand's Gas Industry Company and LNG Import Feasibility Assessment Report Parties respectively.

Disclaimer

The New Zealand LNG Import Feasibility Assessment report has been prepared by Gas Strategies with the degree of reasonable skill and care to be expected of consultants specialising in the area of energy consultancy. Such advice and information is provided in good faith and may include advice and information obtained from third party sources. The advice given is based upon the information available to Gas Strategies (such as the state of the market) and the methods applied by Gas Strategies at the time the advice is given or the report prepared. All advice and information is open to interpretation and typographical error. This Public Release Summary has been approved by Gas Strategies as being representative of the findings and conclusions of the New Zealand LNG Import Feasibility Assessment report and no action has been taken to update those findings and conclusions to this Public Release Summary date.

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1 Key Conclusions of this Assessment

- Six preferred locations for liquified natural gas ("LNG") imports have been identified across the North Island. No single location in New Zealand has the existing combination of sufficient water depth, benign metocean condition and existing gas pipeline capacity to meet demand scenarios. Therefore, all locations will require financial investment to address one or more of these issues
- LNG imports are unlikely to be achieved in less than four years[1] unless the existing permitting and consenting process is fast-tracked and / or some financial risk is taken to commit to long-lead items in advance of taking a final investment decision ("FID") on the project. These measures could reduce the timeline by up to one year. Government support, including permitting and consents, will be a key enabler in achieving LNG imports in a reduced time frame.
- LNG represents an insurance policy for New Zealand to ensure the availability of gas resources into the future. Over a 15-year duration, the annualised cost of the infrastructure to provide this certainty is in the region of NZ$170–210 million, this excludes the cost of the LNG. However LNG demand is uncertain and it is recognised that in some years demand could be zero. In this case, fixed infrastructure costs will still need to be recovered.
- The cost of the LNG, based on an average price over last 12 months, would be NZ$83 million (US$51 million) per LNG cargo[2] however as shown in Figure 1, LNG prices have been particularly volatile in recent years. The number of cargoes required each year could vary between zero and three up to 2030, and perhaps up to seven cargoes per year post 2030.

Commercial aspects of an LNG import project need to be progressed, including clarity on the entity/entities to be involved in the development of the necessary infrastructure and purchasing of LNG molecules, how the necessary investment will be funded and the commercial model to be employed, and how the infrastructure will be paid for over time by energy consumers. Recognising the importance of these commercial aspects, and alignment with national energy policy, the Government has the opportunity to take early decisions to enable project development if LNG imports are considered a desirable insurance policy for New Zealand.

[1] Four years from establishing an entity with a mandate to progress the project, supported by appropriate governance structure.
[2] The average monthly average JKM price between December 2023 and November 2024 was US$11.85/MMBtu; LNG cargo of 170,000 m^3 assumed (4,286,170 MMBtu); NZ$/US$ = 1.64

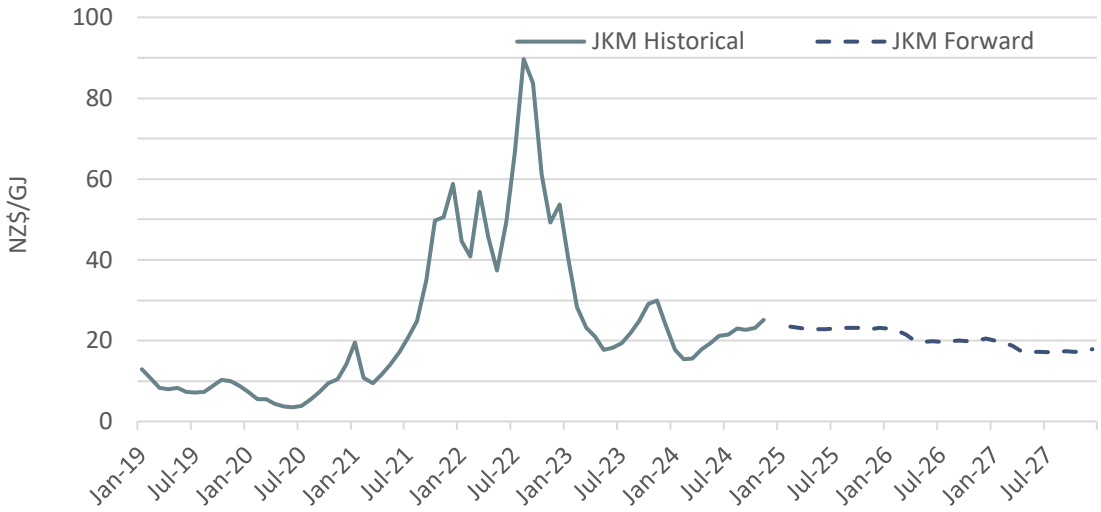

Figure 1: JKM Historic and Forward Prices 2020–2027

Forward curves in US$/MMBtu at close of trading 17 December 2024 converted to NZ$/GJ based on a forward exchange rate of 1.67 NZ$ per US$. Source: Gas Strategies, LSEG Workspace

2 Introduction

New Zealand's security of energy supply is increasingly exposed to a combination of uncertain weather patterns that impact the deliverability of renewable generation and a decline in indigenous gas supply. In 2024, reduced gas deliverability coincided with a fall in hydroelectric generation due to a dry winter and as a result, wholesale gas and electricity spot prices reached unprecedented levels as demand significantly exceeded supply.

Over 85% of New Zealand's electricity demand is met from renewable energy sources, and over 60% of the total is met through hydro-generation. The seasonal nature of hydro-generation, fluctuations of hydro-generation on an inter-year basis depending on rainfall, and an increase in intermittent solar and wind generation all require New Zealand to have alternative power generation sources. At present New Zealand relies on coal and gas fired thermal power generation to meet the gap between power demand and renewable generation. When combined with the decline in indigenous gas production New Zealand is considering the importation of natural gas in the form of liquified natural gas ("LNG") to meet ongoing gas demand from the power sector.

To support the consideration of LNG imports, this Assessment has been commissioned to provide a robust and independent view of the feasibility of LNG imports into New Zealand. The work has been based on a set of clearly defined LNG demand scenarios and has identified a number of Preferred Concepts, each consisting of a specific representative LNG import technology solution at a defined location. Class V cost estimates (+50% to -30%) and indicative implementation schedules have been developed for each.

The prime focus of the work to date has been on the technical and operational aspects of LNG import. Commercial considerations have been mainly limited to the evaluation of LNG supply to

New Zealand, and as such the work cannot be considered a full techno-commercial viability assessment. Meaningful commercial maturation requires greater clarity on the entity/entities to be involved in the project development and LNG import, how the necessary investment will be funded and the commercial model to be employed, including how the infrastructure will be paid for over time by energy consumers, and for how LNG will be purchased and LNG/gas will be sold.

This Assessment has been coordinated by First Gas Ltd ("Firstgas"). It has been funded by Firstgas together with Contact Energy Limited, Genesis Energy Limited, Mercury NZ Limited and Meridian Energy Limited, together the "Support Partners".

Development of the Assessment has been led by UK-based energy consulting firm, Gas Strategies Group Limited, with support from New Zealand-based consultancy, Wood Beca Ltd, over a c.10-week period beginning mid-September 2024.

Oversight of this Assessment has been provided by the Support Partners together with New Zealand's Gas Industry Company ("GIC"). The GIC also provided scenarios of LNG demand over two consecutive time periods to be used as a foundation for the Assessment, as set out in the table below. These were agreed with the Support Partners.

Table1: Scenarios Provided by New Zealand's Gas Industry Company

Scenario name	Indicative time period	LNG demand summary
Dry Year	up to ~2030	71 TJ/d for ~90-day shortfall period around June to August; 3.6 PJ supplied to domestic natural gas storage over ~260-day period; Net shortfall of ~10 PJ
Structural Demand	~2031+	161 TJ/d for ~90-day shortfall period around June to August; around 50 TJ/d outside of this period. Peak extraction rate conservatively excludes contribution of Ahuroa Gas Storage ("AGS"); Net shortfall of ~28 PJ

The Dry Year scenario represents a total of approximately three LNG cargoes per year, while the Structural Demand scenario is approximately seven cargoes (assumed LNG delivery of 170,000 m^3 per shipment with an energy content of 4.5 PJ).

Whilst these scenarios have been used as the definitive requirement of LNG demand in the development of this Assessment, it is recognised that demand requirements will fluctuate on an annual basis depending on the availability of renewable generation. As such, and particularly in earlier years when greater quantities of indigenous gas are still being produced, the requirement for LNG imports may be significantly reduced even to nothing. This highlights the "insurance" nature of LNG imports in the early years, which will impact the commercial model adopted.

3 Methodology

The Assessment methodology comprised a two-stage screening exercise, that combined identification of potential sites for LNG imports ("Sites") with proven LNG import technologies

("Technologies") and assessed how well each combination of a Site and Technology (a "Concept") met a set of pre-defined criteria across multiple categories.

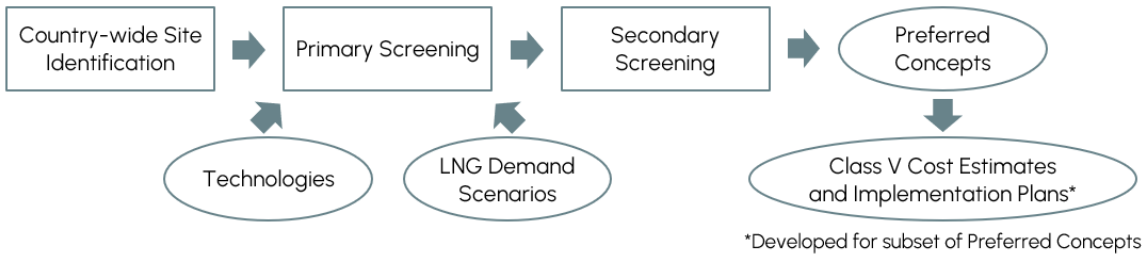

Figure 2: Assessment Methodology

The process started with a wide range of more than 30 potential locations and more than 10 different proven technologies before funnelling down to a set of Preferred Concepts. The screening criteria used in the process are summarised below:

- **Metocean:** Annual Mooring Downtime; Annual LNG carrier ("LNGC") Berthing Downtime
- **Location:** Additional Dredging Requirement; Additional Development Required; Land Availability
- **Social-Cultural:** Hazard Management; Public Safety; Environmental; Community; Cultural
- **Technological:** Track Record; Ability to Meet Demand Scenarios; Speed of Implementation; Storage and Security of Supply; Market Attractiveness; Comparative Cost
- **Pipeline:** Onshore Pipeline Route Distance; Onshore Pipeline Construction Complexity; Offshore Pipeline Construction Complexity

3.1 Guiding Principles

Ahead of the screening process a number of guiding principles were identified. These included:

- Industry proven, reliable technology would be strongly preferred. With this project being a one-off and a first for New Zealand, and the requirement being for a robust and reliable independent alternative energy source, there must be a high level of confidence in the regasified LNG being available when required.
- Concepts which reduce up-front CAPEX and lead-time are favoured over those which optimise variable costs, noting that the frequency of use, project lifetime and volume of LNG to be imported is low and uncertain.
- The solution needs to be flexible to cater for a range of different demand scenarios, including the potential to sit idle for significant periods.

- The scale of LNG storage for any conventional sized Floating Storage Unit ("FSU") or Floating Storage and Regasification Unit ("FSRU") solution needs to be at least 140,000 m^3 so as to broadly align with the capacity of the majority of the LNGC delivery fleet to not restrict opportunities to purchase spot-LNG and to allow efficient unloading of LNG cargoes therefore avoiding significant demurrage charges.
- The Assessment assumed that domestic gas storage, for example the Ahuroa Gas Storage facility will remain available to provide additional deliverability at times of high demand.

4 Key Findings of the Process

The key findings from the assessment are:

- LNG import is technically feasible. There are locations, suppliers and technologies which can enable LNG import to supplement domestic gas production. The primary technical challenges are designing, consenting and constructing new infrastructure and associated upgrades and sourcing specialist LNG import equipment in an acceptable timeframe.
- The volume and quality of LNG required by New Zealand should be readily obtainable in the global market.
- A major strategic decision is the import location, and once this is confirmed the technology can be optimised for a given location depending on the market. Whilst this Assessment has retained six Concepts for consideration, strategic choices by decision makers to focus on two or three preferred locations will enable the clearest path to finalising the selection.
- No single location has a good combination of sufficient water depth, favourable metocean (wind and wave) conditions and existing gas pipeline capacity. All locations will need some form of development and investment in both new and existing facilities. Given this requirement, and the limited availability of existing FSRUs, it is not possible for New Zealand to implement an LNG solution in the rapid timelines achieved in other countries.
- The requirement to meet variable gas send out rates ranging from zero, through the demand scenario of the Dry Year and to the Structural Demand scenario, as well as the management of Boil Off Gas ("BOG")[3], creates technical challenges. These challenges mean that a bespoke new build / conversion solution of an FSU with separate regasification could be preferable over modifying an existing FSRU that cannot currently meet the variability in demand requirements.
- Given the within year variation in the demand profile, particularly in the Dry Year scenario, it is highly likely that the floating storage solution will 'warm up' outside of demand periods. Whilst this is technically possible, it does result in some additional commercial complexities that will need to be managed.
- Small-scale solutions (generally defined as deliveries <30,000 m^3) do not meet the needs of the identified demand scenarios. Whilst the Dry Year demand scenario could probably

[3] methane that has returned to a gaseous form from the LNG within the storage facility

be met by a small-scale solution, the availability of small-scale carriers (c.10,000 m^3) is limited. The Structural Demand scenario is too large for small-scale LNG. Additionally, in the locations initially considered favourable for onshore regasification fed by small-scale LNGCs, there are constraints relating to disruption of existing port operations related to the frequency of deliveries.

- The scale of demand is of a volume where a small increase would not create the opportunity to use a different solution that has a material benefit to cost or schedule.
- The time required to obtain permits and consents drive the pre-FID schedule for all the Preferred Concepts. There is the potential opportunity to accelerate this critical path item through Government intervention and support (see below). The specifics and impact of this intervention need to be explored and agreed with the Government.
- Securing an existing FSRU may not speed up the time to first LNG imports given that the requirement to address dredging, breakwater development and / or pipeline network reinforcement are on the critical path. As such, there is the opportunity to convert an LNGC to an FSU and construct separate regasification without extending the overall timeline. This would enable implementation of a tailored solution to meet the specific needs of New Zealand.
- Fabrication of regasification equipment, conversion/construction of an FSU/FSRU and/or construction of onshore pipelines are likely to control the post-FID schedule (Concept dependent). There is a potential opportunity to expedite by ordering long-lead items ("LLIs"), however there is a risk associated with this approach depending on how early LLIs are committed to.
- Capital cost estimates range widely from approximately NZ$189 million through to over NZ$1 billion. These are driven by the required port modifications at a given location, pipeline upgrade requirements and whether onshore regasification technology is recommended. Onshore regasification generally drives for a higher capital outlay, but a reduced vessel lease (FSU c.f. FSRU).

5 Preferred Concepts

Based on the methodology and principles described above, a short list of six Preferred Concerts was identified. Of these, four have the ability to meet both demand scenarios, and for these Concepts Class V cost estimates and more detailed schedules have been developed. Figure 3 below compares the annualised costs of each Concept assuming a cost of capital of 8.4%.[4]

[4] PWC, 2022, Average Cost of Capital in Ports Sector

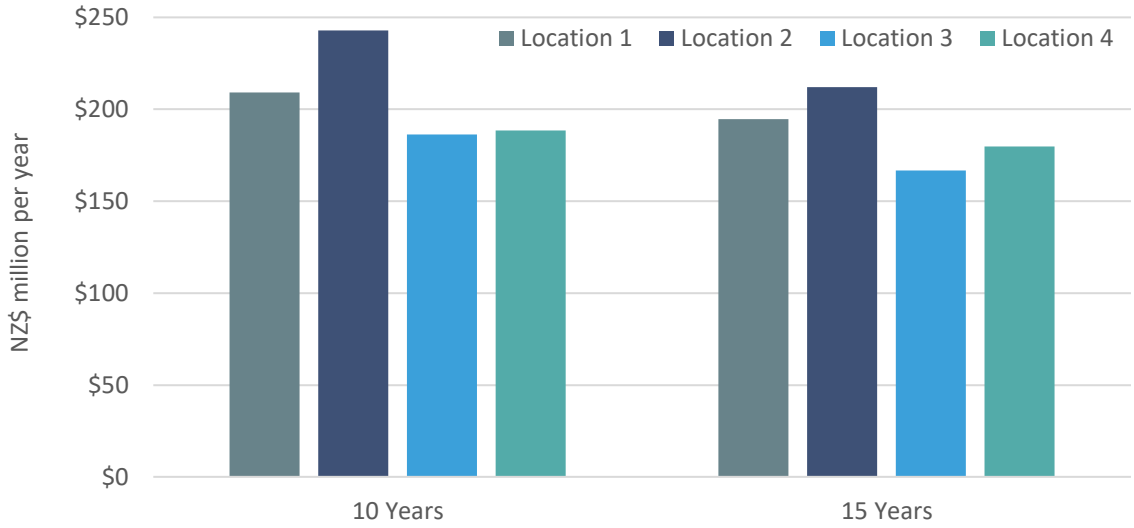

Figure 3: Annualised Costs for Preferred Concepts

Of the Preferred Concepts, an FSU with onshore regasification at Location 3 represents the fastest approach to LNG imports, with first LNG potentially in four years. This is based on an aggressive two-year execution duration. On the same scheduling basis, the other Preferred Concepts are around five years or slightly longer. However, there are opportunities to accelerate the schedules, although these generally require a combination of increasing costs, taking some development risk and/or fast-tracking processes. Specific examples are described below:

- In August 2024, the Government of New Zealand agreed in principle[5] to legislate consents for a new LNG import facility. This could have a significant impact on the timing of a development, potentially reducing pre-FID schedules by six to nine months to between 12 and 18 months. This intervention is in the control of the Government and given the desire to import LNG as soon as possible it represents a significant opportunity to bring forward FID and therefore commitment to the Project.
- Commitment to long-lead items ahead of FID being reached will also accelerate the timeline, however it is recognised that this approach obviously involves taking a degree of risk that the Project will commence and that the technical specification is not modified. It is unclear at this time which entity/ies will be responsible for the development of the Project and ownership of the assets, and therefore it is not possible to understand the appetite for early commitment.
- In order to encourage early commitment, and as seen in other jurisdictions such as Germany following the disruption to Russian gas supply, the Government can take a role in underwriting early commitment in order to accelerate schedules. This need not mean taking responsibility for the full costs of early infrastructure commitments but could mean agreeing to underwrite early termination costs in the event an order is cancelled / keeping an entity whole if redundant infrastructure is resold in the market at below cost.

[5] https://newsroom.co.nz/2024/08/26/govt-set-to-announce-natural-gas-import-decision/

- Onshore pipeline construction can be accelerated using an increased number of workfronts. However, a constraint is the number of resources available to start in parallel. This approach can lead to higher costs with multiple mobilisation processes.
- Contracting an existing FSU / FSRU vessel could be an opportunity to accelerate the schedule. However, opportunities to secure an existing vessel are limited and, should one become available, to what extent the schedule will reduce will depend on when the vessel comes off its existing charter. Additionally, any existing vessel would need to be modified to accommodate New Zealand's relatively low demand scenarios. Alternatively, whilst an FSU / FSRU is being built / converted for New Zealand it could be possible to use an existing LNG vessel as a temporary FSU as an interim solution. Additionally, the construction of regasification modules, port modifications and other infrastructure may take a similar duration as the FSU/FSRU, so the gains may be limited.
- Timing of construction works – marine works such as dredging, breakwater development and berth construction may need to take place in certain weather windows. Whilst it may be possible to advance activities to meet a favourable weather window, there is also the risk of missing a window and having to wait for an extended period of time until the next window.

Implementing both the fast-tracking permitting /consenting process and early commitment to long-lead items, could reduce the time to first gas by approximately one year, possibly more. This could result in first LNG in three years in Location 3, or four years elsewhere.

Across the Concepts, there is an inverse relationship between CAPEX and OPEX. At this stage of assessment, the offshore Concepts appear to have the lower capital outlay but greater ongoing operational expenses. The port-based Concepts have greater capital expense but lower ongoing operational costs, driven by the vessel-type required to support the Concept.

6 Key Commercial Considerations

Whilst the prime focus of the work to date has been on the technical and operational aspects of importing LNG to New Zealand, there are a series of equally important commercial considerations:

- In order for the Project to continue to progress forward to achieve LNG imports as soon as possible, there needs to be a focus on the development of the commercial concepts to the same level of depth as the technical concepts that have been explored to date. That was not part of the scope of this Assessment, and will need to happen before and in parallel with further technical development
- Specific examples of commercial considerations that need to be progressed include definition of the commercial model that underpins the Project and that will address: how construction will be funded; how the asset will be paid for over time; which party or parties will own, operate, and hold capacity in the resulting asset; and, which party or parties will be responsible for procuring LNG and/or selling gas to other New Zealand buyers
- From an LNG perspective, the scale and uncertainty of LNG demand in New Zealand means that it does not have a compelling proposition for the global LNG market and will

be a price taker. The expectation of this Assessment is that the landed price of LNG in New Zealand will be approximately the Japan Korea Marker ("JKM") price – the Asian spot price – or a modest premium to that price (up to US$0.25/MMBtu) depending on market conditions at the time a cargo is sourced. This gives a landed LNG price range in New Zealand of approximately US$10.12 to US$10.37/MMBtu, or approximately NZ$17.83 to NZ$18.27/GJ based on a forward exchange rate of 1.67 NZ$ per US$. This landed price is at the entry point to the import terminal, i.e. Delivered Ex Ship ("DES"). Terminal and domestic gas transportation costs and losses would be additional to the landed price

- Given the scale and uncertainty of LNG demand, the expectation of this Assessment is that LNG will be sourced under short-term or spot deals

7 Immediate Implementation Actions

While it is possible for the development of a LNG project to progress, it will start to encounter obstacles that will need to be addressed and resolved. As is common in early project phases, the technical project definition is currently more mature than the commercial elements.

Whilst the Government may not wish to be a direct participant in the Project itself, it has an important role to play at this early stage in defining the Project. Without Government engagement the schedule to first LNG imports will certainly slip; with Government intervention and pro-activity the schedule to LNG can be accelerated. Example implementation actions include:

- Many of the considerations that need to be addressed are commercially sensitive, involve decisions that will need to be made at a national level, and/or relate to how Project assets might be owned, leased or regulated – all of which will take time to resolve and many of which will be influenced by Government decisions. It is necessary for the Government to understand these issues, their implications and take decisions. Stalling will negatively impact the schedule

- Given the desire to rapidly progress LNG imports, it would be advantageous for an organisation or consortium of organisations to continue the development of the Project from a commercial as well as a technical perspective – even if this is in an interim role until subsequent decisions are made. This entity, working within an appropriate governance structure, must be empowered to make decisions. Early decisions could include which of the Preferred Concepts to continue progressing and implementing a process to align the commercial and technical workstreams

- Assessment of lower cost LNG import solutions to understand what volume of LNG can be imported within the limitations of existing port and pipeline infrastructure and without incurring significant costs to build new or expand existing infrastructure. This reframes the question to one of 'what is possible on a lower cost basis', rather than solving for the specific demand scenarios

- Permitting and consents are on the critical path to FID for all the Preferred Concepts, and with the Government having stated that it will facilitate fast-tracking of applications it needs to establish and implement the process by which this will be done

- Engagement with stakeholders and regulatory bodies will need to commence, and a consistent and compelling external communications strategy developed. In addition, there will need to be clarity on which entity leads the external engagements.
- This Assessment has identified a series of key risks, which will have to be managed and mitigated if successful development is to continue. In general, the top risks identified at this stage relate to:
    - Uncertainty in the commercial / business / ownership model(s) moving forward – managed by addressing the commercial considerations described above
    - Extensive stakeholders and stakeholder requirements – addressed by the stakeholder engagement and an effective communications strategy
    - Change in government direction – Limited potential to mitigate risk however engagement early will minimise some implications
    - Public perception of LNG – addressed by the stakeholder engagement and an effective communications strategy
    - Developing sufficient credibility to participate in the LNG sector – managed by addressing the commercial considerations described above
    - Demand case for LNG changes significantly post-FID – managed by minimal permanent infrastructure expenditure

  Addressing these risks is essential to maintain project progress, financial stability, and stakeholder trust.