PILT MODELING ANALYSIS

The following information and analysis is intended to build on the PILT discussion from the February 20, 2015 Municipal Advisory Gas Project Review Board meeting with some high level financial projections and background information around a proposed PILT methodology.

Department of Revenue

March 2, 2015

INTRODUCTION

At the Feb 13th MAGPR Board meeting, a methodology was proposed by Commissioner Hoffbeck to set out a possible PILT alternative for the AK LNG project, in place of the current AS 43.56 approach. A review of possible parameters was presented measured against the three criteria of clarity, robustness/durability, and lack of ambiguity. The following parameters were considered to meet these criteria, in the context of an LNG export project:

- Actual cost
- Design throughput
- Actual throughput
- Inflation (against an index measured in year 0 and applied in year n)
- Tax (Mill) rate

By combining these features, an output similar to what would have been derived under AS 43.56 was envisaged, without the incumbent uncertainties in interpretation, especially around Replacement Cost New (RCN), Obsolescence, and/or measuring sales or revenue.

The proposed basic construct of the formula was as follows:

Actual cost x (Actual flow/Design flow rate) x (Inflation index year n/Inflation index year 0) x Mill rate

During the presentation of the methodology, a number of other potential features which were thought to introduce additional ways to track the "Status Quo" comparison with AS 43.56 were set out, including:

- An exponent to reflect the greater capital efficiency of expansion/de-bottlenecking
- A factor to modify the inflation measure, partly to reflect depreciation of the plant

The discussion among the MAGPR Board Members focused on the following areas:

1. Actual Cost. No comments on Actual Cost, which was considered a parameter which could be set based on Front End Engineering Design (FEED), or an audited post construction figure.
2. Actual and Design Gas Flow Rate. The following comments were offered:
    a. Potential for a floor on actual gas flow rate, to protect against a period of zero flow interrupting Borough funding for essential programs
    b. An alternative of emergency funding held in Escrow, was put forward
    c. A 3-5 year rolling average for Actual Gas Flow.
    d. Query whether the Design Flow Rate should change to reflect significant future alterations to the plant, such as a major expansion (though the formula could also accommodate this)
    e. Query whether the Design Flow Rate should change during the commissioning phase, as each of the proposed trains is brought into operation.

   f. Exponent for Gas Flow Rate factor. An exponent of 0.45 has been used by the State previously in respect of a pipeline PILT, and 0.65 in respect to additional processing plant.

3. Inflation
   a. It was noted that FERC use PPI for pipeline tariff escalation
   b. Further comment from the group suggested that CPI might be a better reflection of costs borne by Boroughs
   c. A more local index, such as Anchorage CPI was also noted as a possibility
4. Depreciation. Alternatives were considered as follows:
   a. None
   b. Introducing a feature which addresses some form of depreciation, or otherwise modifies that inflation aspect of the formula. Three approaches were suggested including
      i. Included in the equation through a fixed constant reduction to the inflation factor prior to multiplying the factors
      ii. Introduction of an additional factor into the equation, with a mathematically identical impact to (i) above
      iii. A separate factor reflecting a rolling depreciation, for example, over a 30 to 50 year forward horizon, resulting in an exponentially decaying depreciation that reduces over time.
5. Mill Rate
   a. It was suggested that a 20 Mill rate across the board was the most logical application, especially with the objective of avoiding uncertain or variable tax rate setting for the LNG plant, under Kenai Peninsula Borough local ordinances.
   b. It was noted that distribution of a PILT may not be in proportion to the ratio of capital cost in each borough (partly reflecting impact on a wider set of stakeholders), but that this aspect would be discussed on a future occasion, when the formula mechanism was better defined
6. Economic test for LNG export viability
   a. It was noted that following review in the context of project economics, an adjustment (X-factor) may be required to enable the project to compete globally, but it was noted that this was not the primary focus of the group in setting methodology.

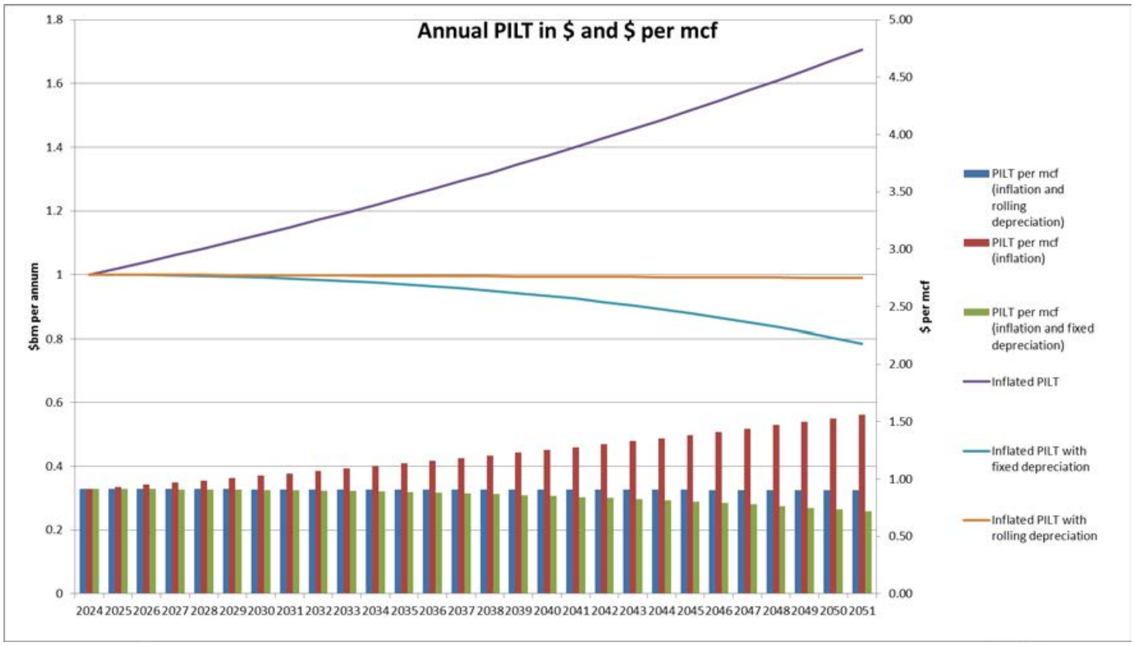
ANALYSIS OF THE FEATURES ABOVE

The illustrations below show the impact of the three approaches discussed above:

- Un-amended inflation
- Inflation combined with a fixed depreciation
- Inflation combined with rolling depreciation over a fixed horizon

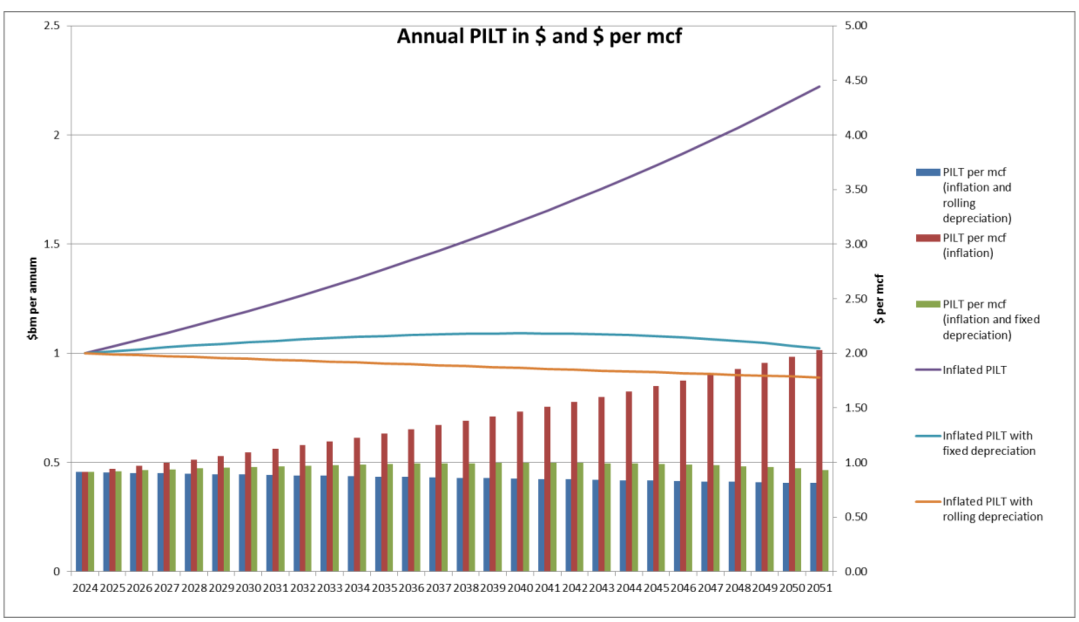
DEPRECIATION – Case 1

This case indicates the outcome with a 2% inflation rate, a fixed 2% depreciation per annum, or a 50 year rolling deprecation. As can be seen below, the rolling horizon compensates almost exactly for inflation, whereas the fixed depreciation starts to diverge downward in the later years modelled.



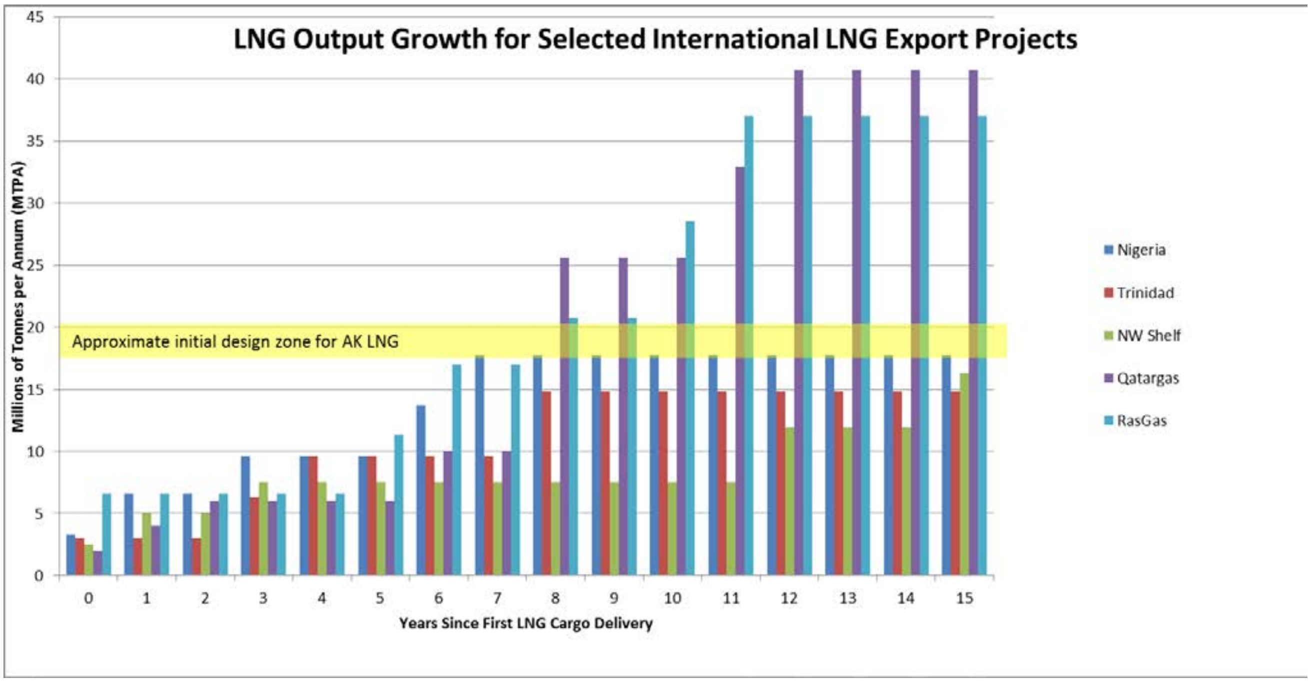
Case 2

In the event that inflation is higher (3%) and we assume a 30 year rolling depreciation, but the fixed depreciation is maintained at 2%, both approaches produced a more or less static PILT over the period modelled:



IMPACT OF GAS FLOW EXPONENT

Before considering the impact of the gas flow exponent, it is useful to look at how a typical LNG project matures over the first decade or so of its life. The chart below examines the way in which a number of LNG export projects in various locations around the world have expanded over the first 10-15 years of their existence, typically with the addition of extra LNG trains (the term for a unit of production characterized by refrigeration, heat exchangers, and sometimes storage tanks). The data below reflects historical LNG capacity growth for Nigeria LNG, Australian North West Shelf Project, Qatargas and Rasgas (both projects are in Qatar), and Trinidad.



The other way in which LNG output is typically boosted is through so-called "de-bottlenecking" which is a technique for making the liquefaction trains more efficient by amending the design of critical features in a way that optimizes the overall plant, and how its components operate together. This typically happens after an LNG train or trains have been operating for a few years, and an understanding has been gained as to which components need to be modified, redesigned, or sometimes replaced.

A particularly noteworthy de-bottlenecking was carried out on the Qatargas I, three train plant, which first delivered LNG in December 1996. The original 3 trains had a design capacity of 2 million tonnes each, but after a major debottlenecking project completed in 2005, output was raised to 10 million tonnes (combined) for the three trains.

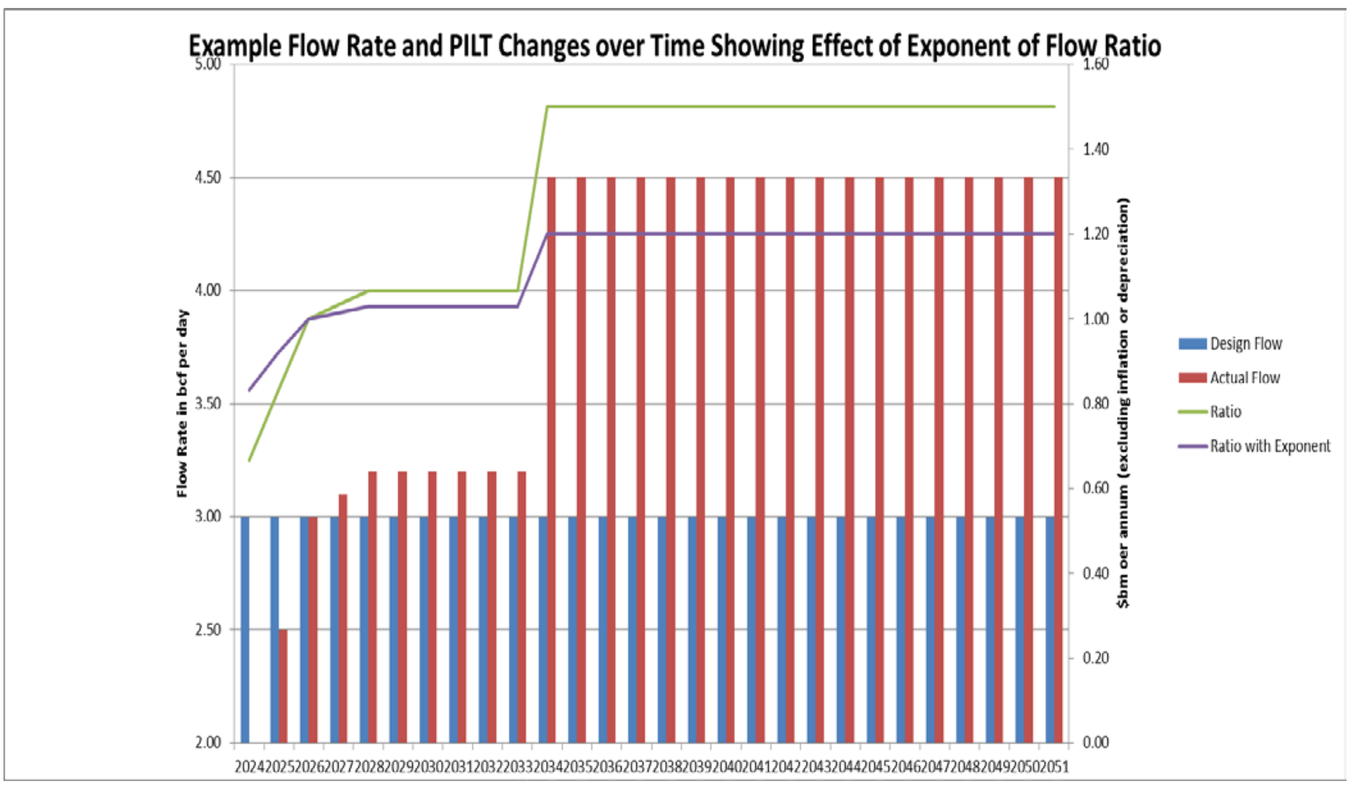
However, applying this historical data to what might be seen in Alaska has a number of major uncertainties associated with it, particularly the following:

- LNG technology has developed considerably since many of these example projects have commenced production, and train sizes are now typically two to three times bigger than those that were constructed in the projects cited above.
- The AK LNG project has a much larger initial design basis, than any of the projects noted above.
- Unlike Qatar, for example, with the very large proven reserves associated with the giant North Field (the largest conventional gas reservoir in the world), the natural gas resource in Alaska, while substantial, has not yet been proven up sufficiently to indicate whether additional gas production could be warranted.

However, with these provisos in mind, a growth trajectory has been modelled below, based on the following assumptions:

- First gas in 2024, fully commissioned in 2026 with a design flow of 3bcfd (a combination of State gas and LNG exports)
- Debottlenecking between 2026 and 2028, giving rise to a 7% increase in gas deliveries
- Addition of an additional train in 2034, with gas flow rising to 4.5 bcfd

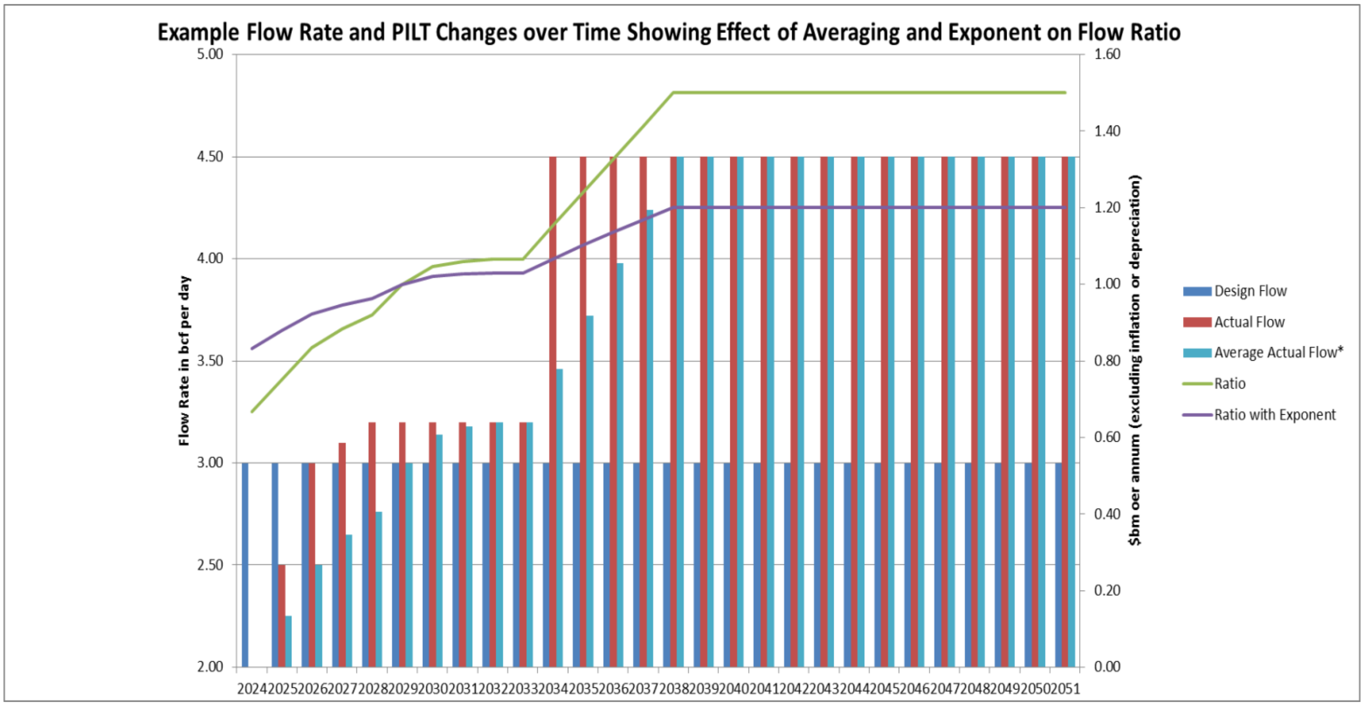
These three scenarios were looked at with no exponent and a 0.45 exponent, with the following result:



IMPACT OF EXPONENT AND FIVE YEAR MOVING AVERAGE ON FLOW INTERRUPTION

The same three scenarios were used as previously, but using a 5 year rolling average flow rate, against previous scenarios.

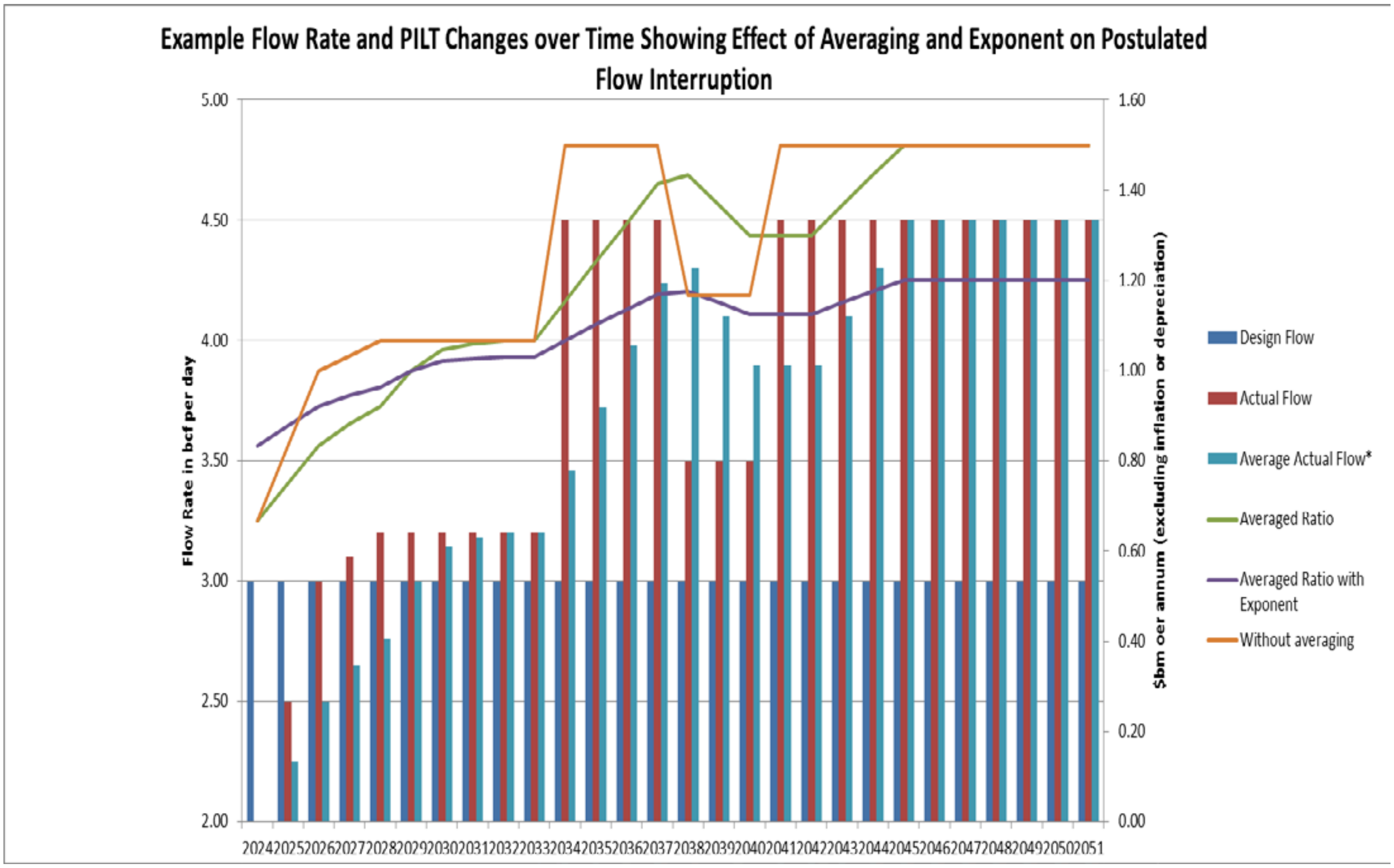
These three scenarios were also looked at with no exponent and a 0.45 exponent, with the following results:



Finally, although it should be noted that *flow interruptions for any significant time are very rare for LNG projects*, the impact of a 1bcfd reduction on flow through the gas line/LNG plant was modelled between 2038 and 2040 inclusive, showing the impact with and without flow averaging and the use of a 0.45 exponent in the formula.

Examples of LNG plant which have curtailed or suspended operations would include the following:

- Egypt, where two LNG export plants have had to curtail capacity since 2011, and the country is switching to LNG imports, similar to LNG export plants in Indonesia and Malaysia that are doing the same to address increasing domestic demand.
- Oman, where an LNG export plant has curtailed output due to shortage of feed gas amid rising energy consumption internally.
- Snohvit LNG in Norway, and Angola LNG which both suffered from commissioning and start-up reliability issues.



CONCLUSION

The analysis in this discussion paper is intended to inform the MAGPR Board members and interested members of the public, in terms of the potential impact on a PILT of some of the features that were discussed at the meeting on February 20th. This is not definitive, and further analysis and discussion will be required as the Board moves towards any recommendation following subsequent meetings and discussions, chaired by Commission Hoffbeck.