

GAS TO LIQUIDS: AN ALTERNATIVE SOLUTION FOR NATURAL GAS MONETIZATION



IGRC 2011

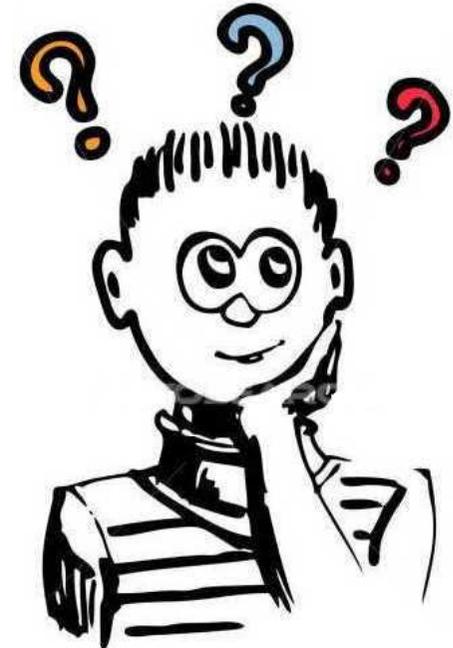
Seoul, 20 October, 2011

By Daniel Colalillo and Cesare Panzieri

Technip
take it further.

Why present GTL at an LNG Conference??

- We were requested by a client to investigate the alternatives for exploiting an onshore stranded gas reserve
- The alternatives for exploiting an onshore stranded gas reserve are several. Among them, the most viable are LNG and GTL
- We would like to share with you the road which we took in carrying out such an investigation
- We have put into play Technip's experience and expertise in both LNG and GTL to perform such an investigation



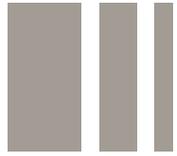


Table of Contents

- 1. Market for GTL products**
- 2. GTL Technologies**
- 3. Project Execution**
- 4. Profitability Analysis**
- 5. Summary**



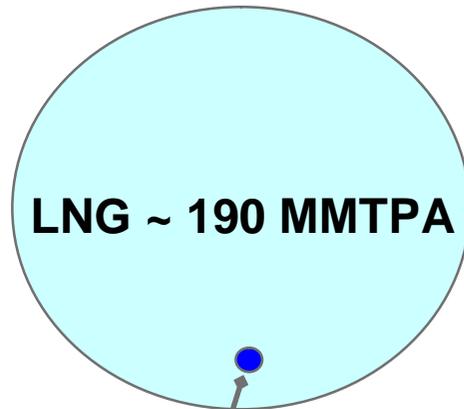
1. Market for GTL Products

- The primary market for GTL products is the ever increasing transportation fuels sector
- The current world middle distillates demand derived from crude refining is enormous at around 3,000 MMtpa and growing at approximately 4% per year
- Ultra-clean GTL diesel is a very small player in this vast diesel market and its potential market can therefore be considered to be practically unlimited

1. Market for GTL Products

LNG vs GTL Market Sizes

2011 Global LNG Market

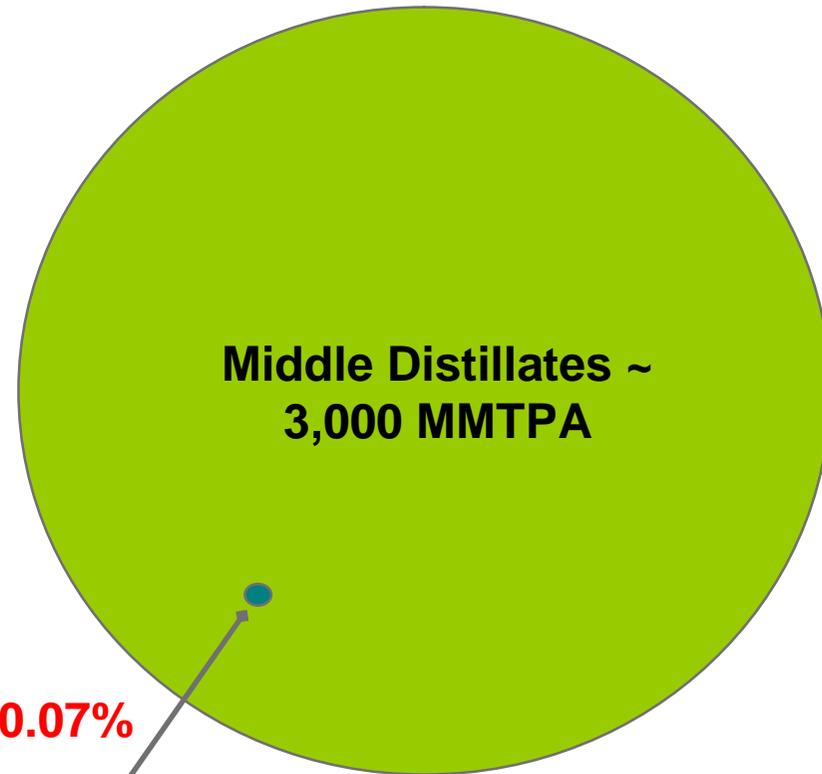


1.4%

LNG Plant Production = 2.6 MMTPA

The market for middle distillates should easily absorb the GTL products without impacting the market prices

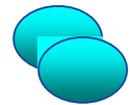
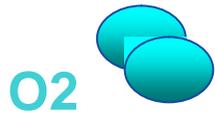
2011 Global Middle Distillates Market



0.07%

GTL Plant Production = 2.1 MMTPA (50k bpsd)

2. GTL Technologies Process Flow Concept



N₂ to
atmosphere

Natural
Gas
Reforming

Fischer-
Tropsch
Conversion

H₂O
by-product

Product
Upgrading

GTL
Diesel

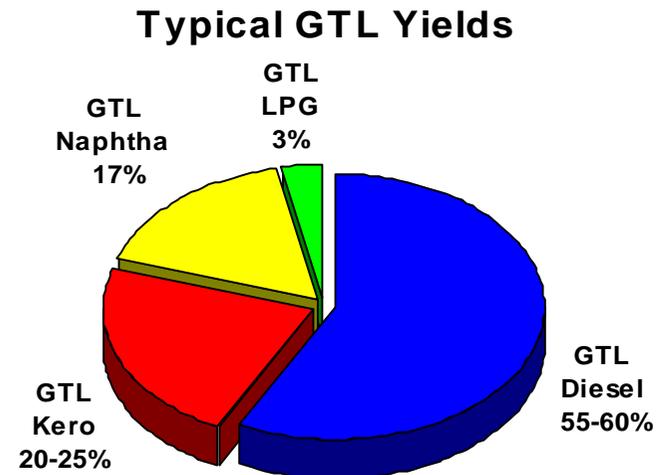
GTL
Kerosene

GTL
Naphtha

2. GTL Technologies

Products Yields and Quality

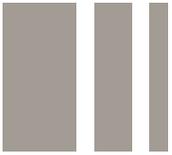
- GTL Diesel is sulphur free (<1 ppm), high cetane (>70)
- GTL Kero is sulphur free, can be used as blend component for Jet fuel production
- GTL Naphtha is sulphur free, highly paraffinic, ideal feedstock for olefins production
- LPG can be either sold as product or re-used as fuel inside GTL plant





3. Project Execution

- Logistic Study required to identify the need for on site construction of oversized equipment or potential for modularization according to specific site requirements
- Early definition of Long Lead Items (e.g. reactors, compressors) to place order at early project phase
- Construction schedule shall be carefully evaluated to optimize workforce presence at site
- Typical project duration 36 - 42 months from end of FEED phase to mechanical completion



4. Profitability Analysis

LNG and GTL

LNG Plant



GTL Plant





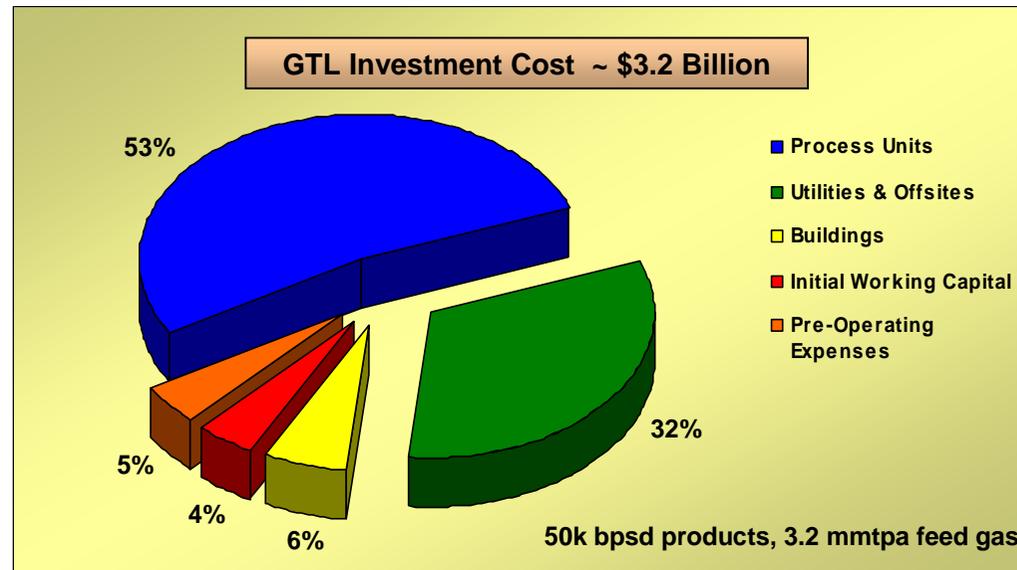
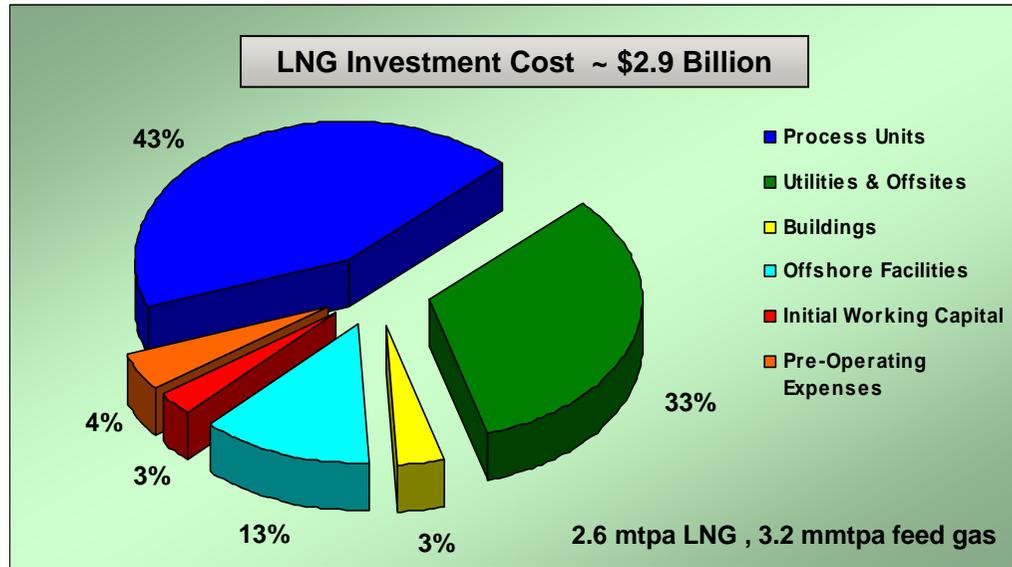
4. Profitability Analysis

LNG and GTL - Prices

- The price of the onshore stranded natural gas feedstock is considered to be 1.5 \$/mmbtu for the analysis, which is currently considered to be within the typical price range for a stranded gas reserve
- For LNG, the price is set to 8 \$/mmbtu at the port of the LNG plant location. Such price is based on a five year historical average FOB MED Basis, where 1 \$/mmbtu has been considered for the shipping cost of LNG to the receiving terminal of the destination market
- For the GTL products, the following prices were applied, based on FOB MED Basis of crude oil refined products, averaged over the last five years:
 - Diesel 705 US\$/ton (88 \$/bbl)
 - Naphtha 653 US\$/ton (71 \$/bbl)
 - Kerosene 734 US\$/ton (87 \$/bbl)
 - LPG 633 US\$/ton (55 \$/bbl)
- In order to take a conservative approach for the profitability analysis. no inflation rate was applied to the above natural gas and product prices.

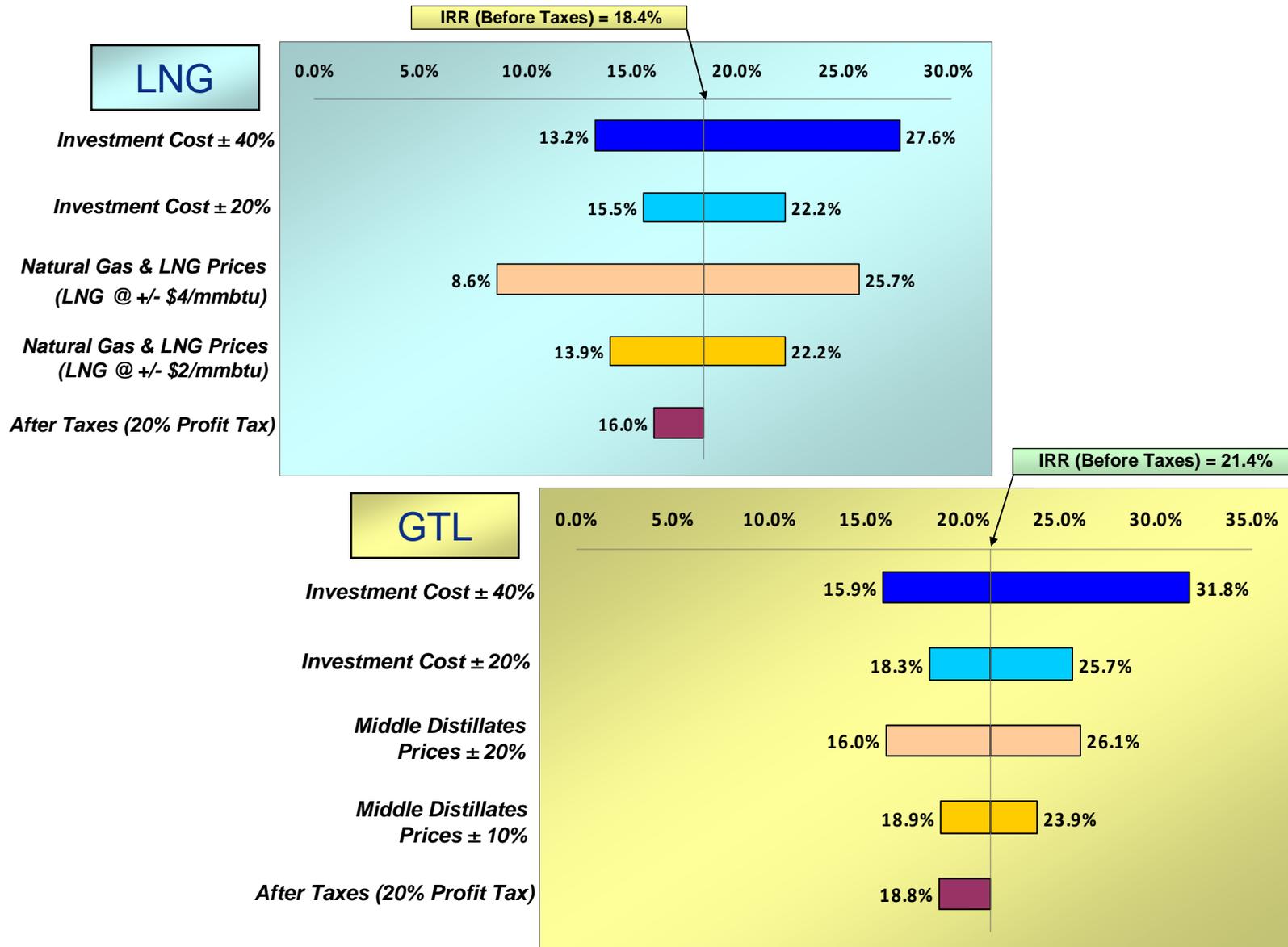
4. Profitability Analysis

LNG and GTL – Investment Cost Breakdown



4. Profitability Analysis

LNG and GTL - Sensitivity Analysis Results on IRR





5. Summary

- GTL technology over the last years has made a significant step forward moving from small pilot plants to large commercial facilities. Based on the experience gained in the most recent installations we expect to see a further improvement of the overall plant efficiency and higher capacities
- The profitability analysis has shown that today, both an onshore LNG plant and a GTL plant with the same amount of natural gas feedstock, in this case 3.2 MMTPA, give high profitability results
- Considering the current trend of the natural gas price being low and quite stable, due mainly to the exploitation of shale gas reserves, and the increasing trend of fuel product prices sustained by the increasing demand for transportation fuels over the long term, investment in GTL plants will be a highly attractive alternative for onshore stranded gas monetization in the near future

Thank you



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