CHANGING GEOGRAPHY OF GLOBAL LNG
IMPACTS ON AUSTRALIAN LNG

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DECISIONS WITH CONFIDENCE

INTRODUCTION

- Changing Global Outlook
- Demand / Supply Geography
- Supply Cost drivers
- Changes in approach
  - FLNG
  - (Re)-emergence of Mid-Scale LNG
- Comparisons of supply positions

2000-2010 SUPPLY & EXPECTATIONS

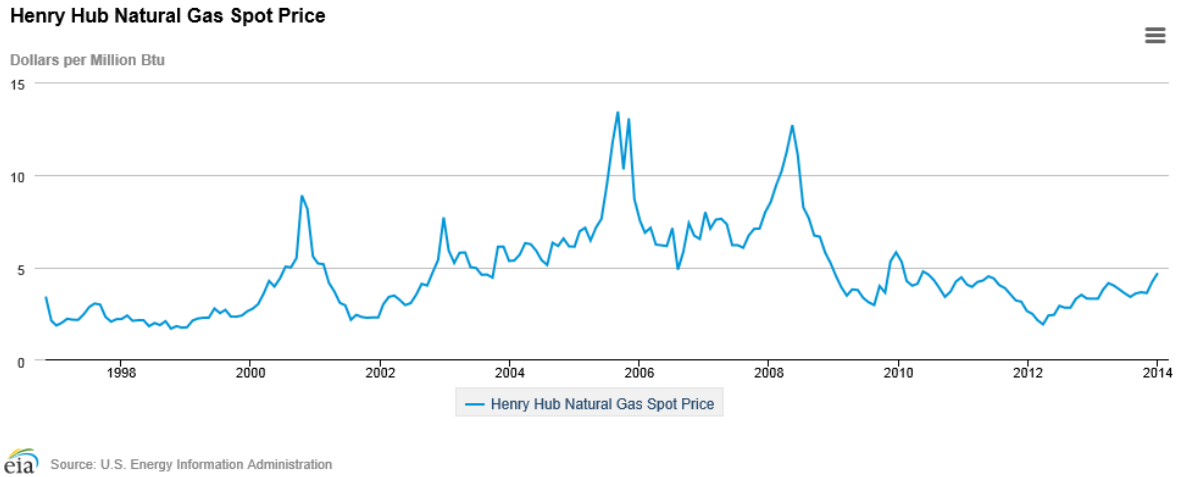
US LNG TURNAROUND

2000-2010

- US gas supply concerns, riding domestic gas price
- "Consensus" that US would become the 2nd largest importer of LNG
- Rush to build import facilities (9 in US)
- Gas price peaks above $13/mmBTU (2006-2008)
- Unconventional gas (Shale gas) takes off
- Gas price crashes to below $4/mmBTU
- Redundant import facilities

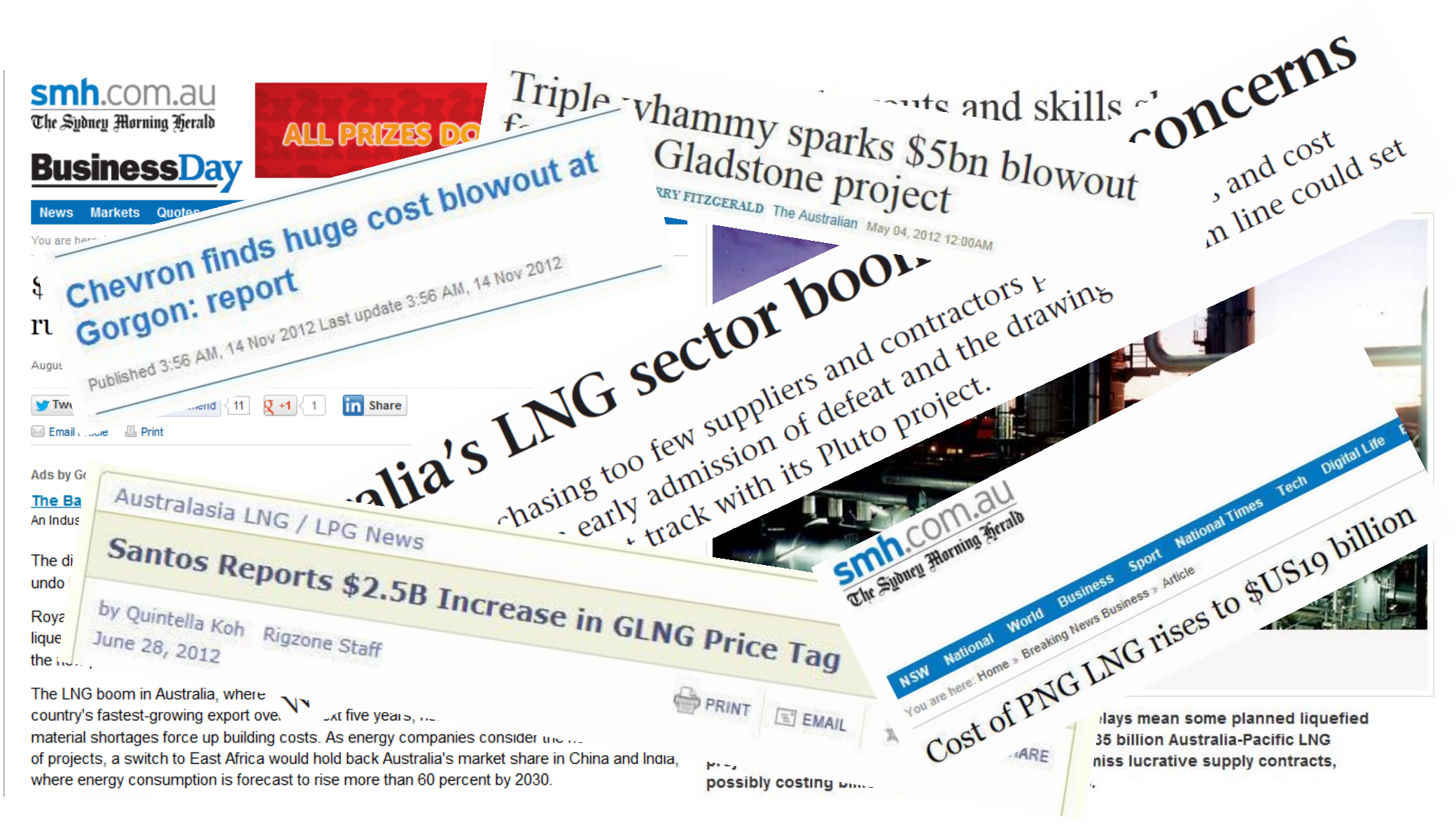
2010-on

- Domestic gas prices remain at historically low levels
- Asian prices at >$13/mmBTU
- Rush to build export facilities (20+ applications)

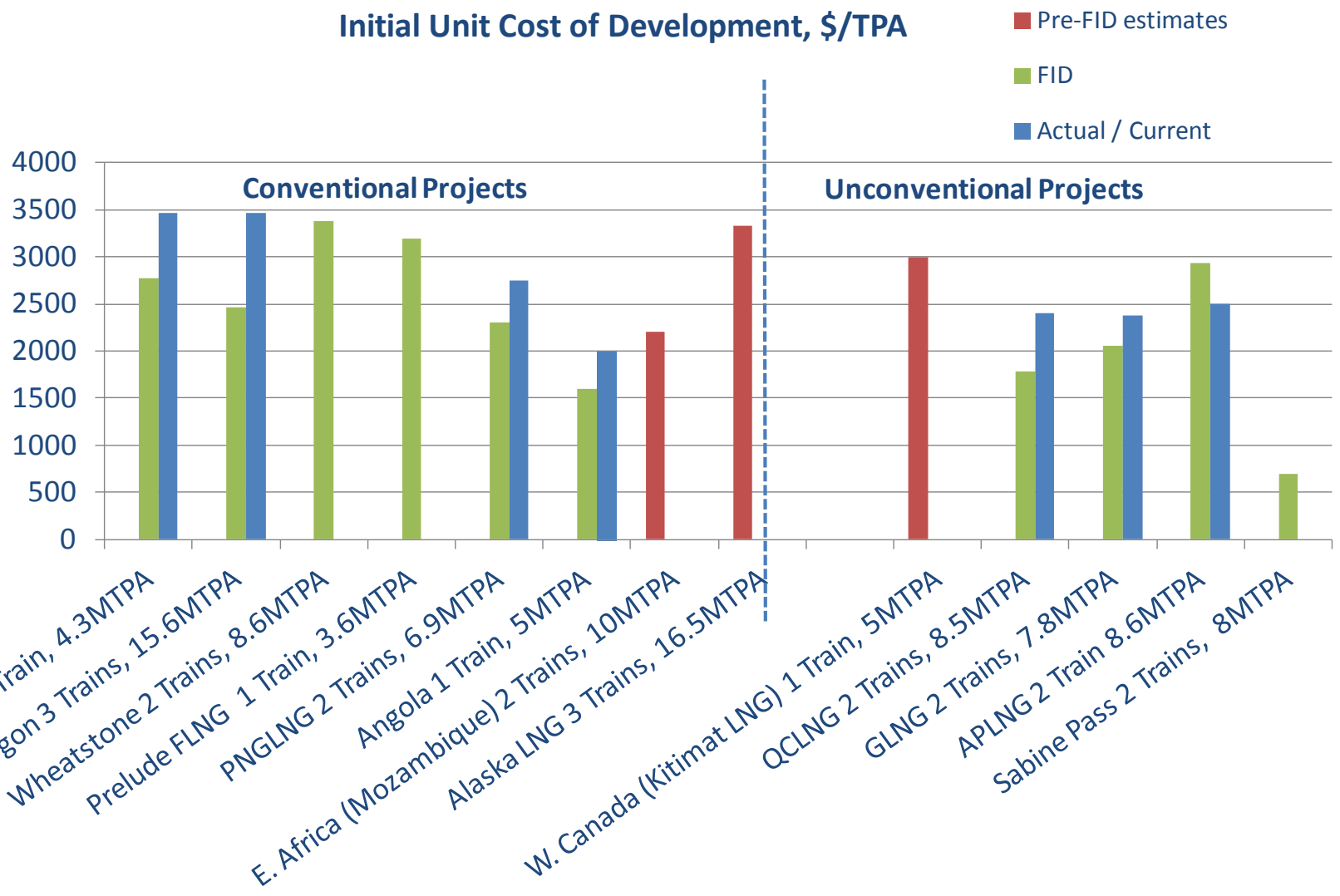


CURRENT VIEWS

WHAT THE AUSTRALIAN HEADLINES ARE SAYING



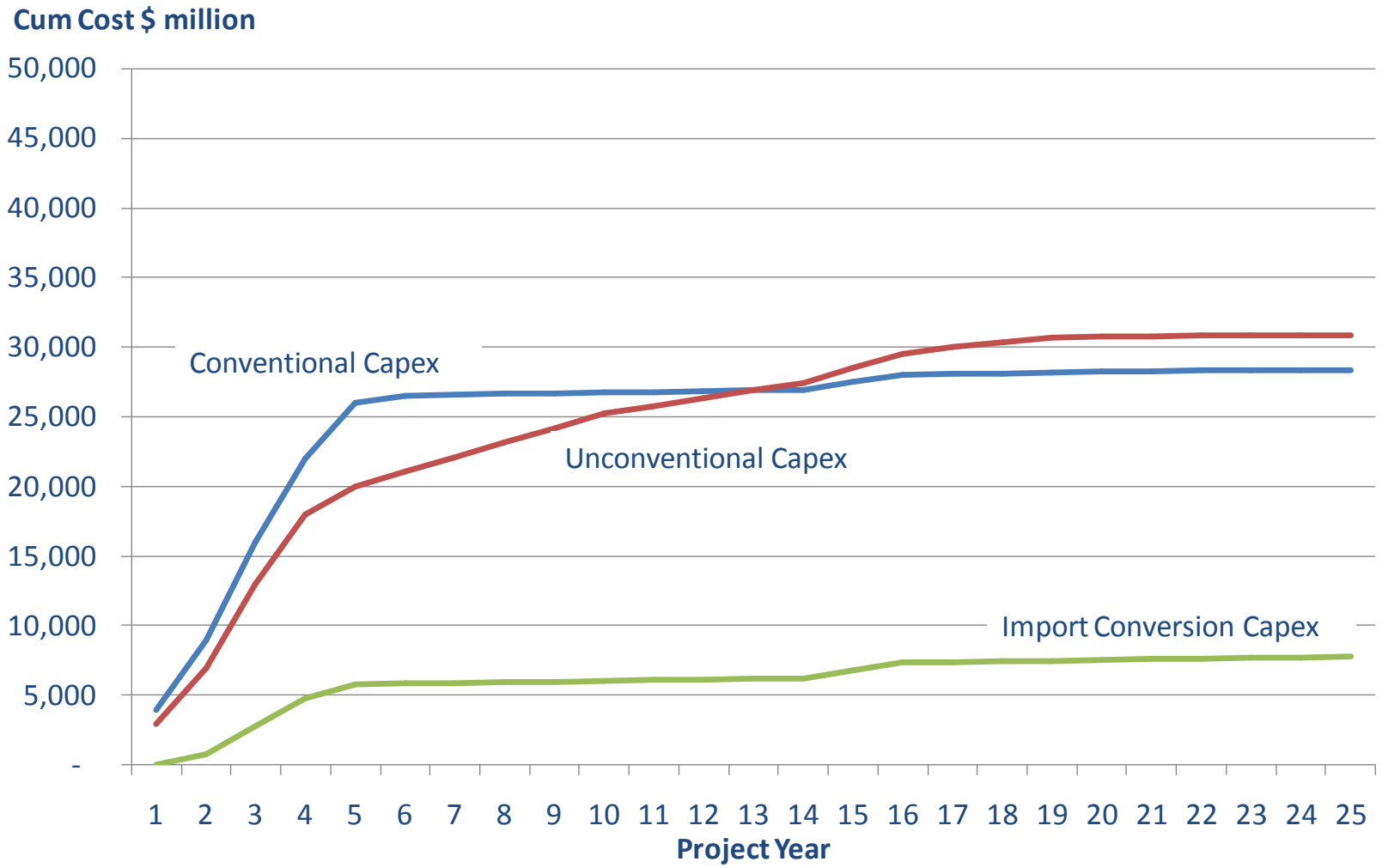
WHAT THE HEADLINE NUMBERS SAY



Source: RISC analysis

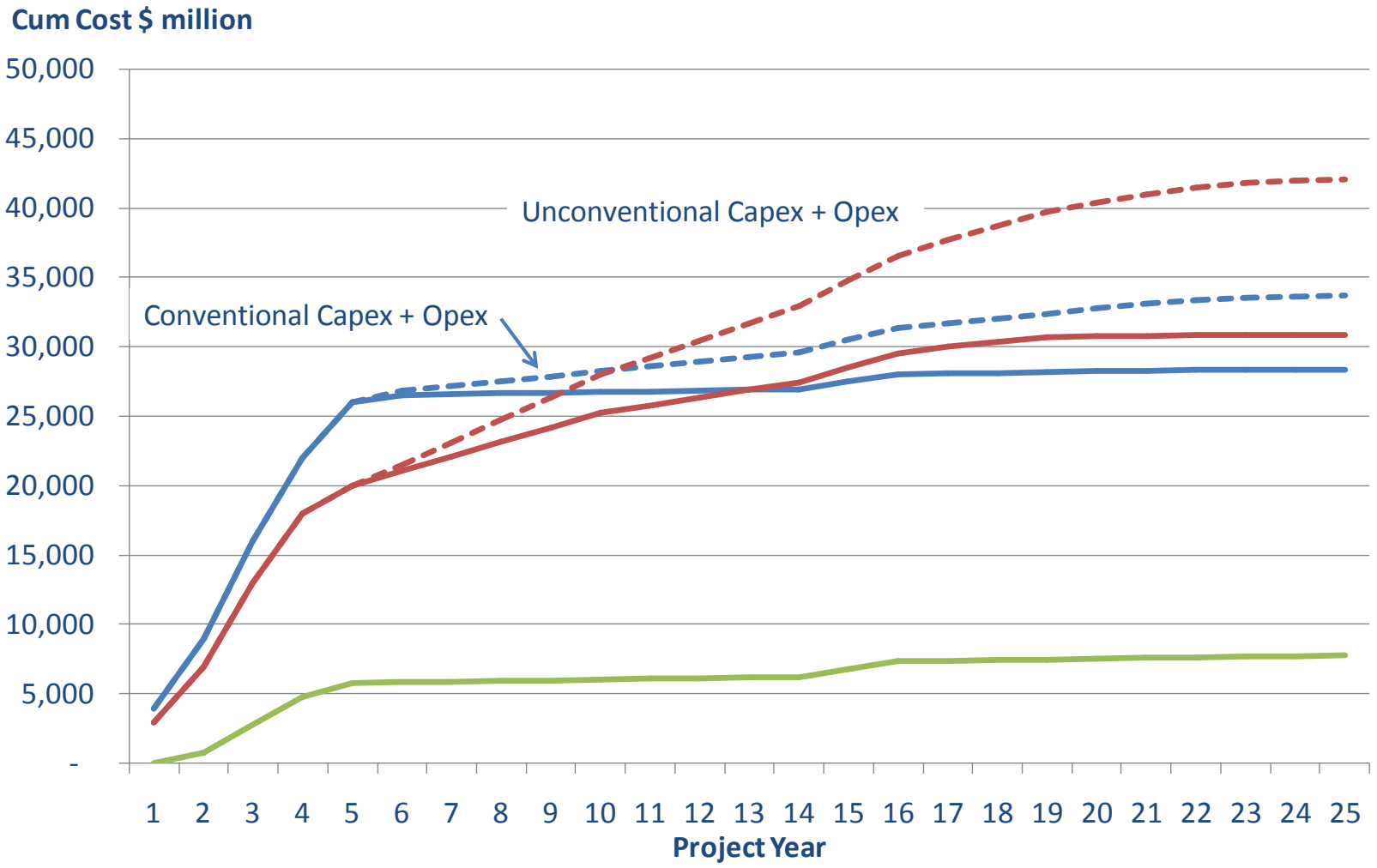
IT'S NOT ALL ABOUT CAPEX

- Projects have significantly different Business models & Cost Profiles



Source: RISC analysis

PARTICULARLY WHEN YOU COMPARE TLC



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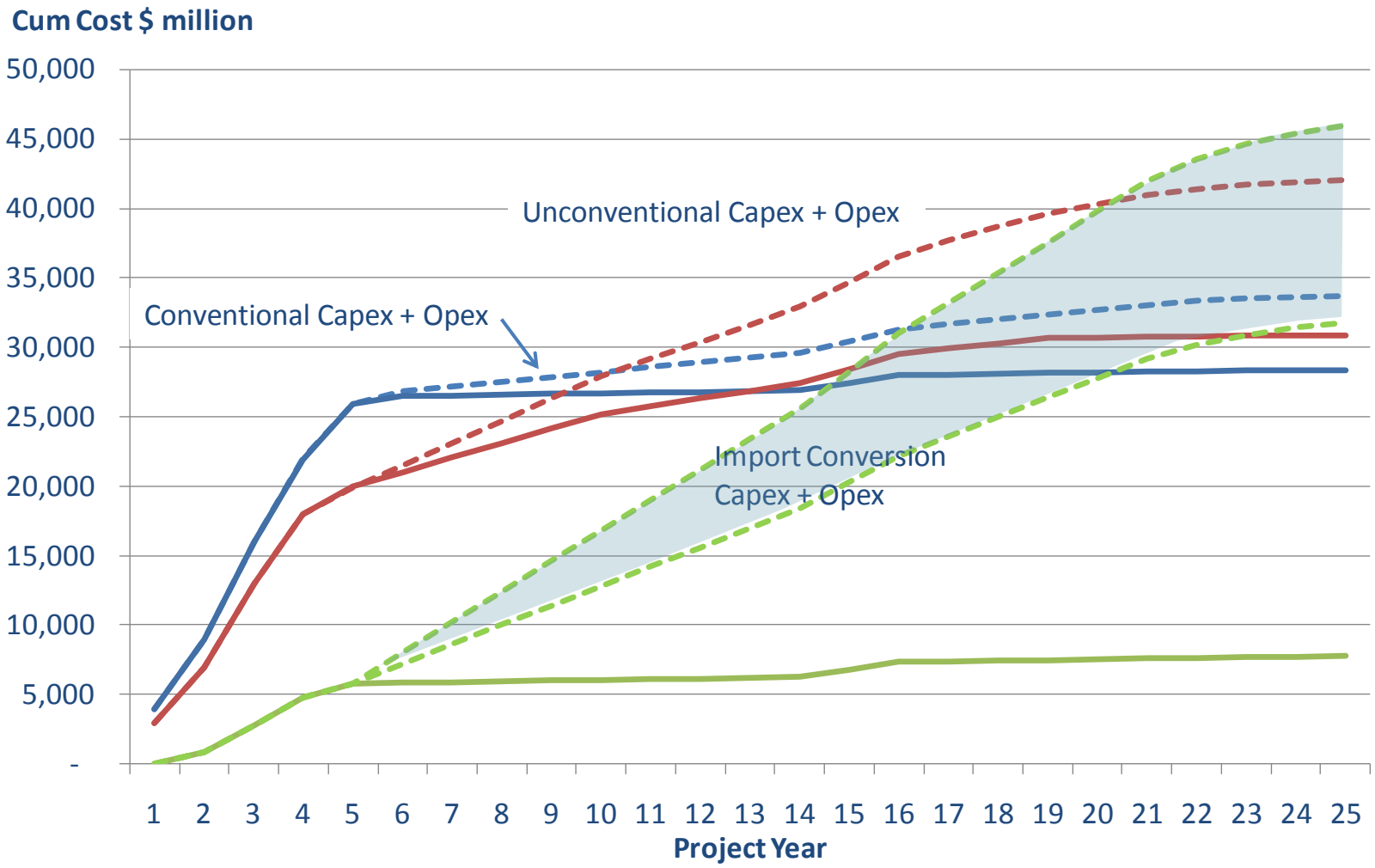
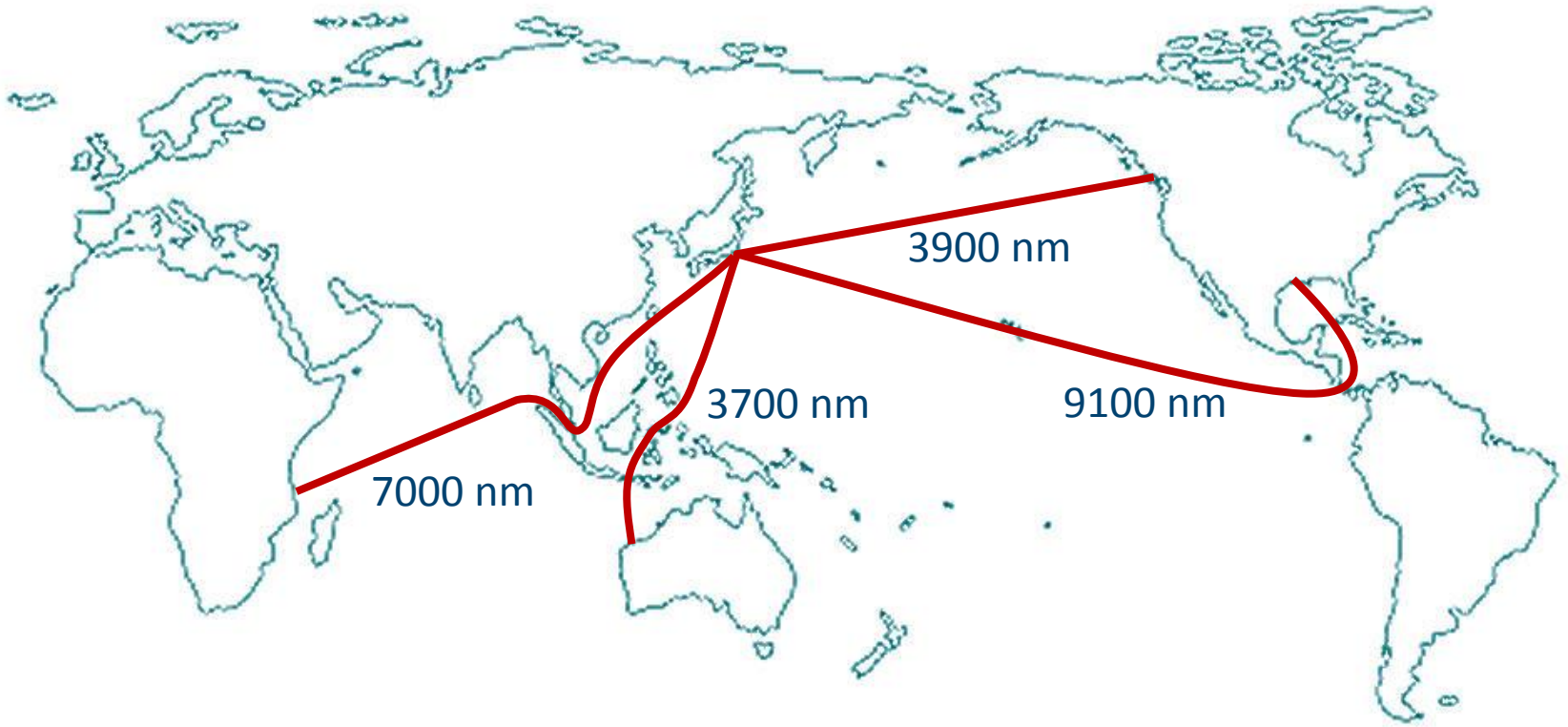
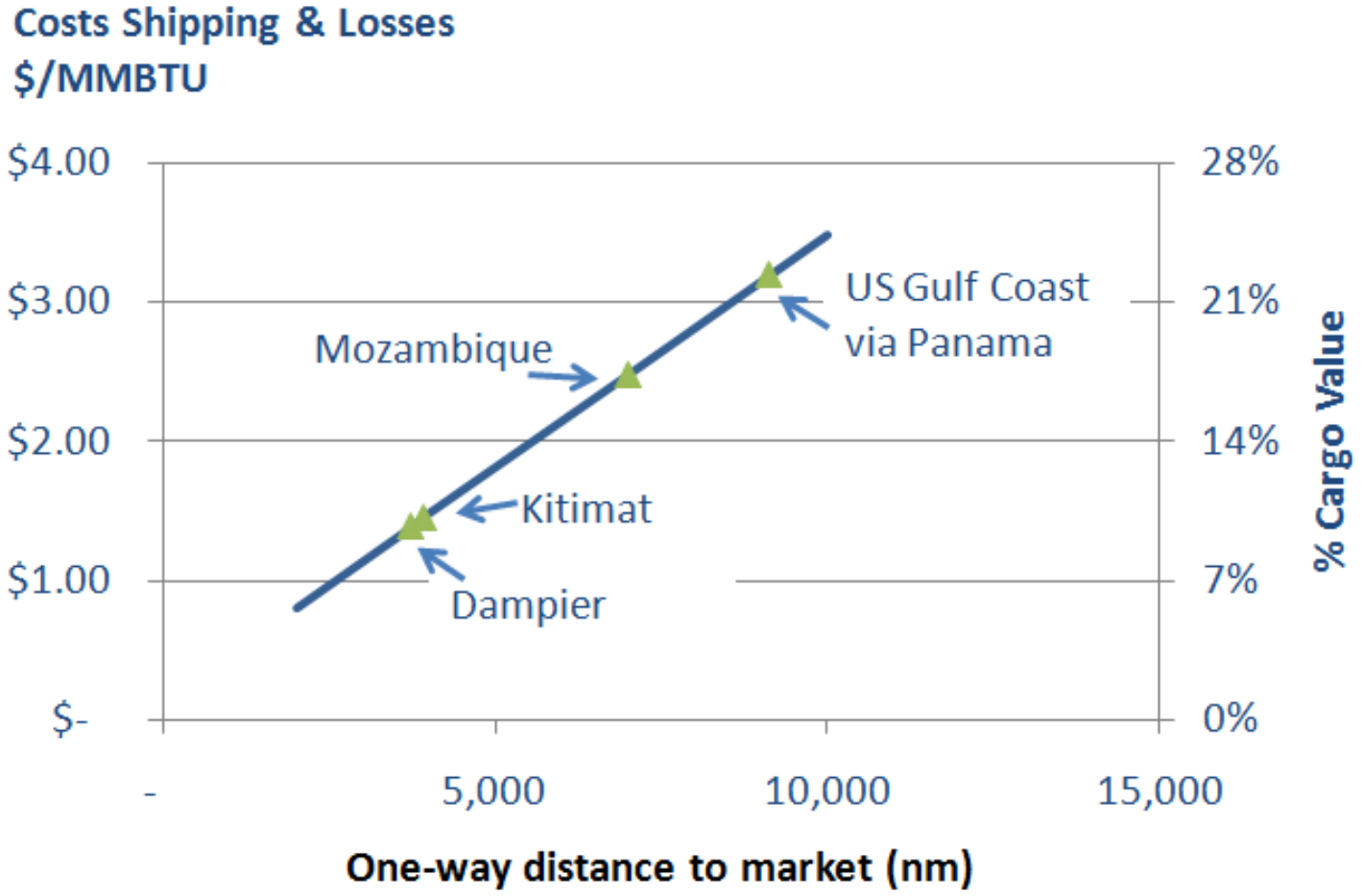


Source: RISC analysis

DISTANCE TO MARKET IS ALSO A FACTOR

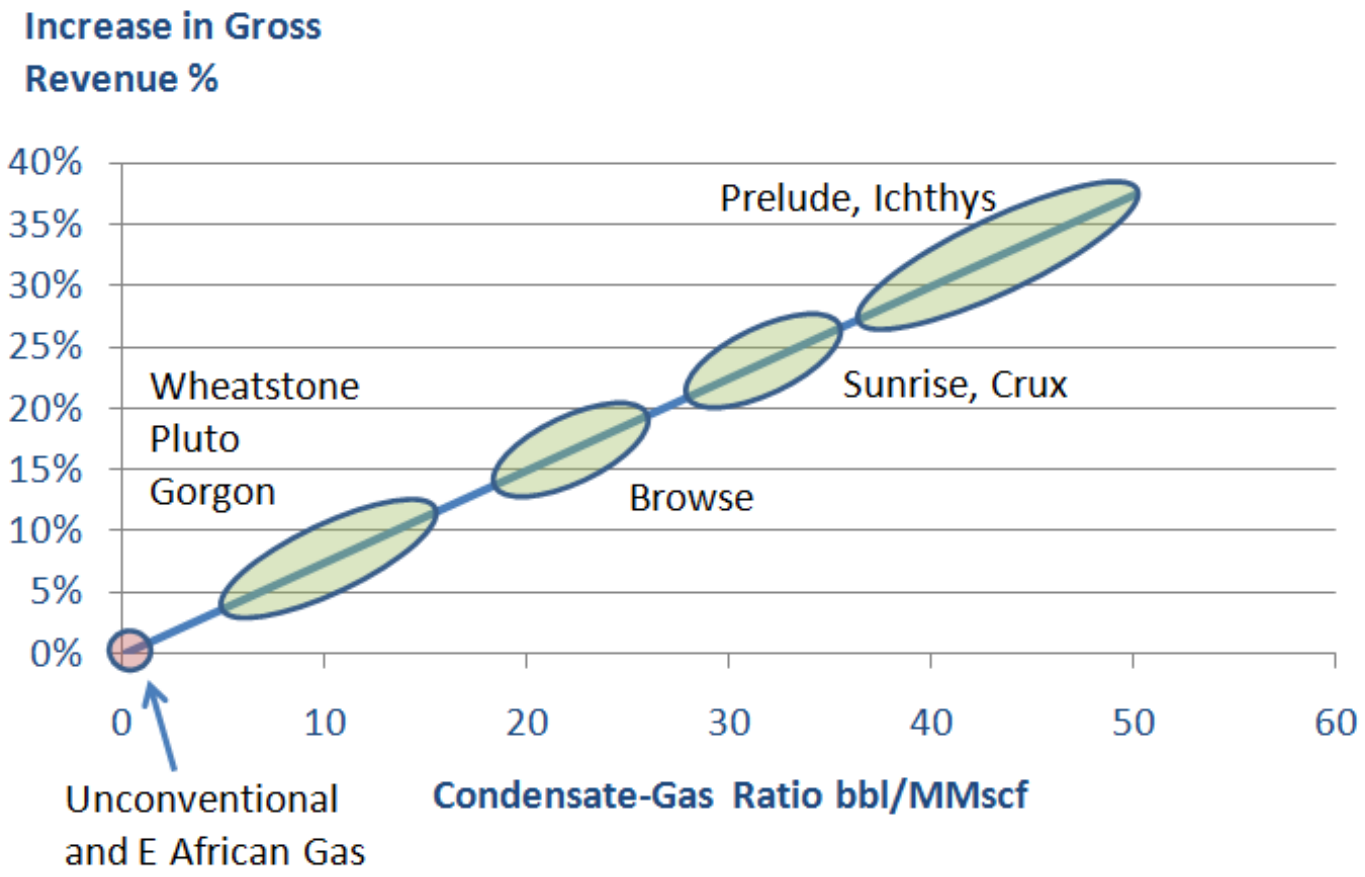


ESTIMATED TRANSPORT COSTS TO JAPAN



Source: RISC analysis

LIQUIDS CONTENT IMPACTS REVENUE STREAMS



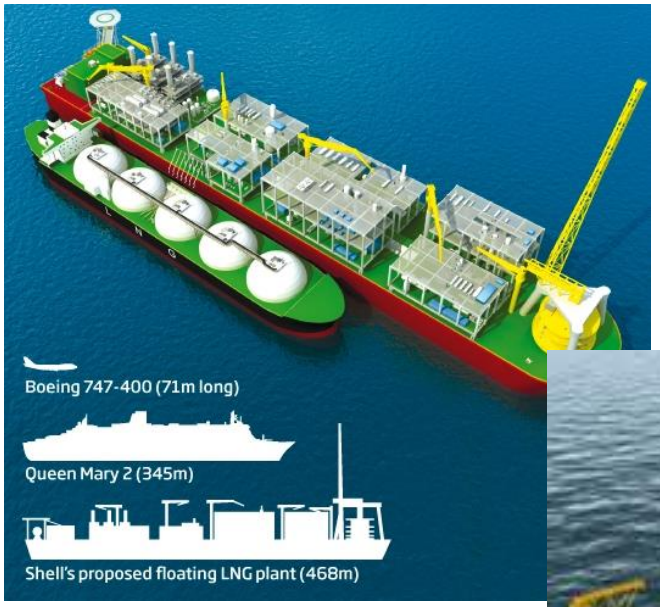
Assumes LNG sold at energy value parity to condensate

Source: RISC analysis

CHANGES IN APPROACH

FLNG

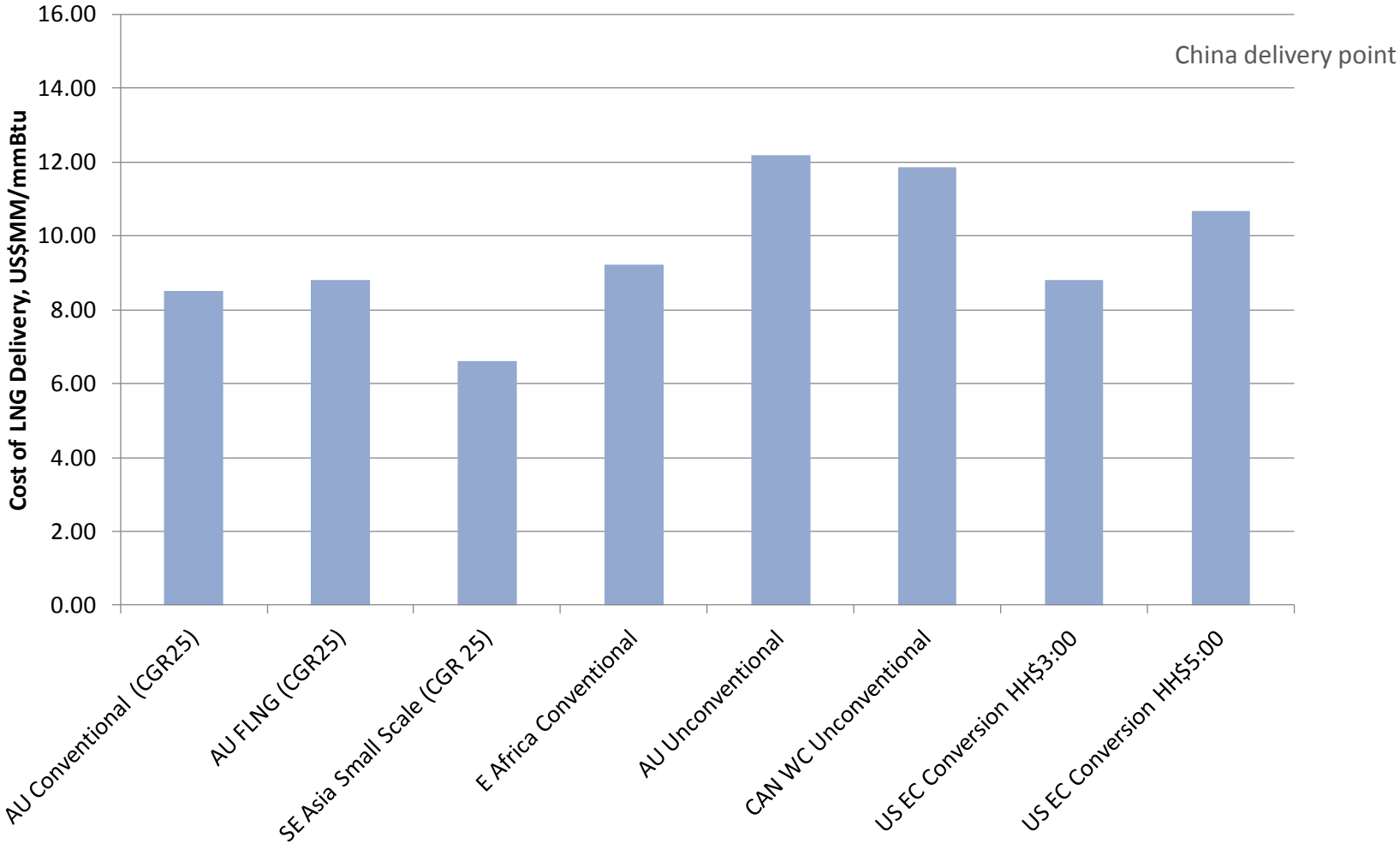
- Shell
  - Open water FLNG
  - 3.6MTPA
  - Largest ever floating structure
- Petronas
  - Mid-Scale FLNG
  - 1.2MTPA
  - Large Crude Tanker size



(Re) Emergence of Mid-Scale Developments

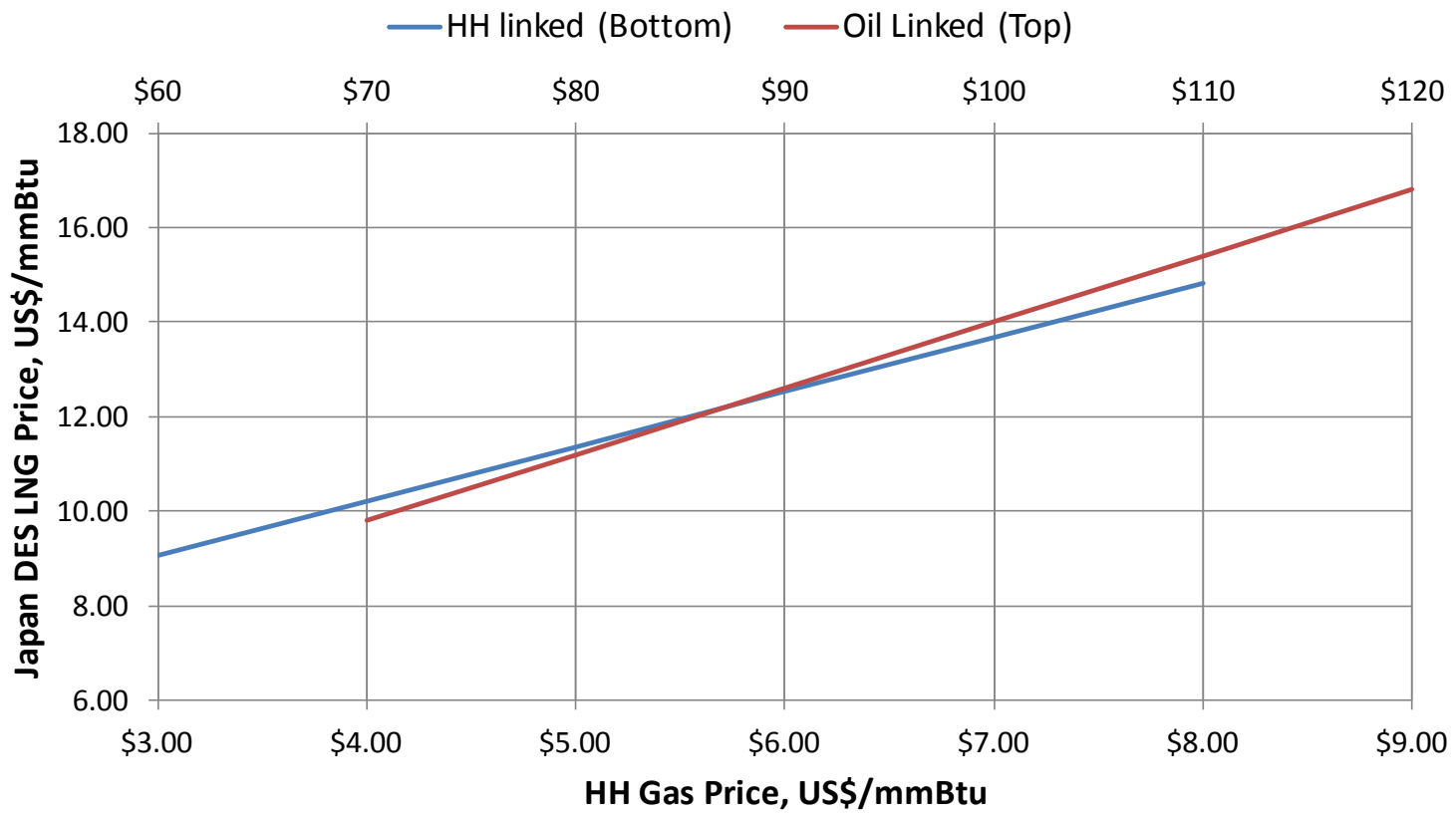
- E.g. LNG Limited
  - 0.5-1.5MTPA
  - Smaller footprint/plot
  - Industrial area location

ESTIMATED UNIT DELIVERY COSTS

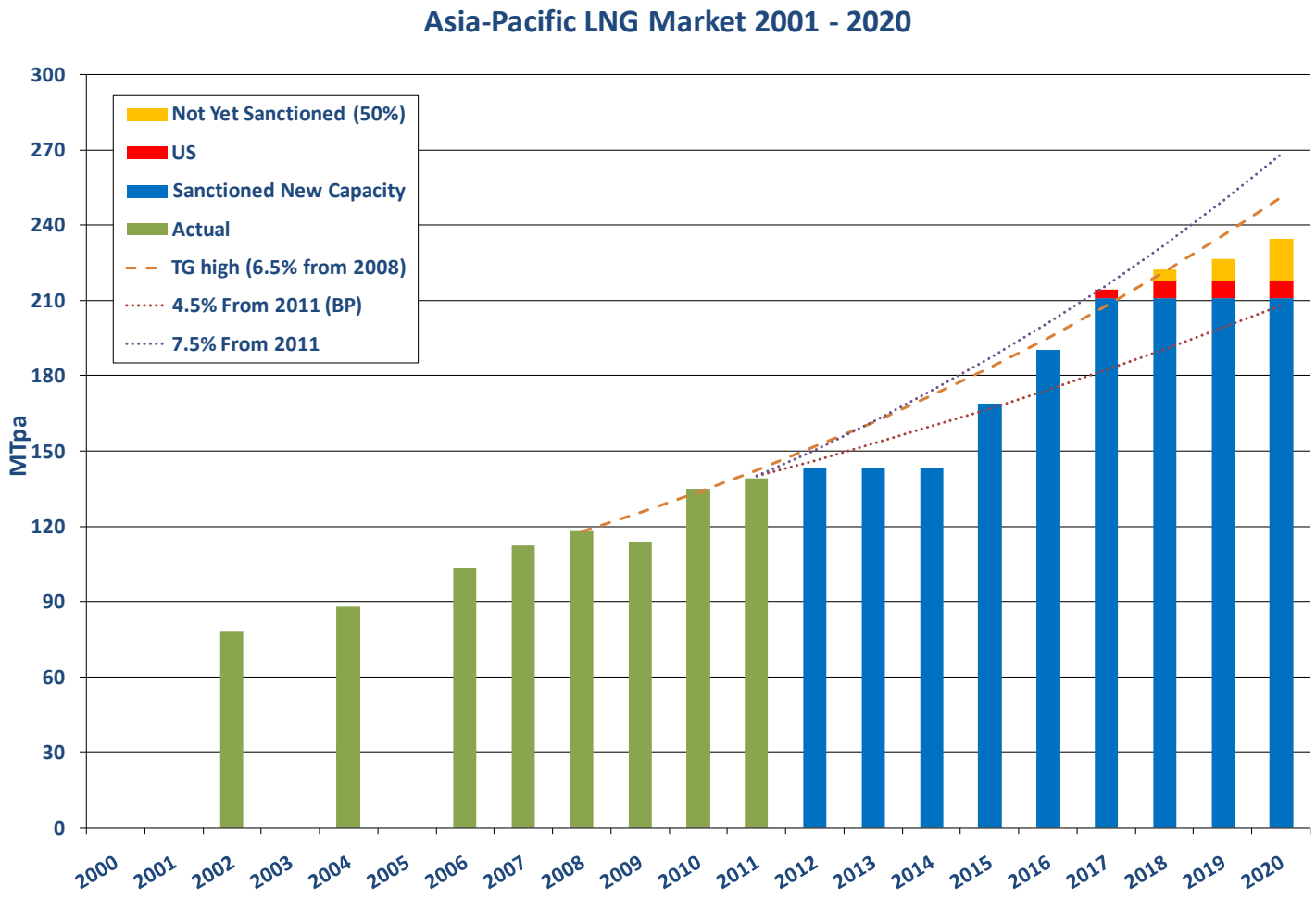


Source: RISC analysis

PRICING MODELS – ARE THEY THAT DIFFERENT?



ASIA PACIFIC STRONG DEMAND GROWTH



Source: RISC analysis

SCHEDULE/TIMING/APPROVAL ISSUES

History suggest that very few LNG projects achieve initial suggested timelines:

East African (Mozambique) Projects - “Expected first LNG Sales in 2018”

- Still developing Petroleum regulatory regime
- Gov’t requirement for local benefits
- Potential for domestic obligations

Canada – “Producing by end 2013”

- Approvals
- Costs

USA

- Approvals (non-FTA and FERC/environmental)
- Currently 6 projects with non-FTA approvals, with limitations (Freeport)
- 1 project sanctioned (August 2012, Start-up ~end 2015)
- Panama Canal expansion delays

CONCLUSIONS – KEY POINTS

- Australian Capital Costs are high, but
  - Headline Numbers do not tell the whole story
  - Not all LNG projects are the same
- New approaches could/should bring savings and opportunities
  - FLNG, Mid-Scale
- Strong demand growth appears to be continuing
  - Buyers still active, and growing in number/diversity
- Competition from N America and E Africa
  - Canadian projects likely to face similar issues to Australian projects
  - American projects still face political uncertainty
  - E. African projects face all the above plus regulatory uncertainty.

- Currently unsanctioned Australian projects likely to face increased market complexity and price competition
  - Downward pressure on pricing in the medium term
  - Slower progress on sales agreements
  - Low political risk remains an advantage for Australian projects?

FLNG SLIDES

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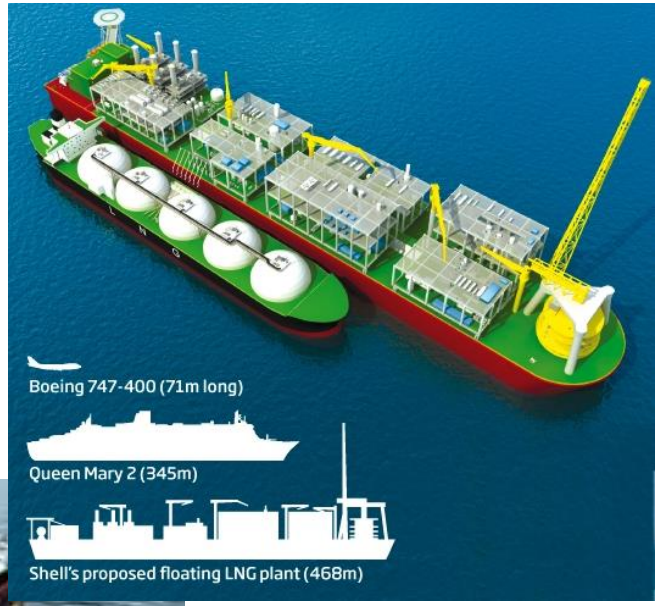
WHAT IS FLNG

FLNG -3 different approaches

- Shell
  - Economies of Scale in open water FLNG
  - 3.6MTPA
  - Largest ever floating structure



- Petronas
  - Mid-Scale FLNG
  - 1.2MTPA
  - Large Crude Tanker size

- Pacific Rubiales / Exmar – Small Scale, sheltered water
  - 0.5MTPA
  - Jetty, Barge, Storage Tanker

FLNG – ADVANTAGES

- Significant scope reduction compared to traditional development
  - No pipeline or onshore facility
- Cheaper
- Minimal environmental impact

- Simpler project execution
- Build in a controlled environment
  - Shipyards have established processes, procedures, know-how and skills required.
- Faster delivery

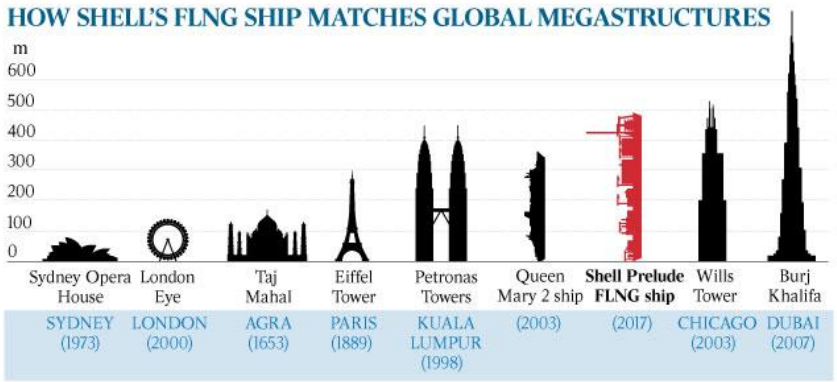
- Allow development of smaller gas fields (previously stranded)
  - Key issue for resource owners

- Perceived as higher risk by buyers and financiers?

SHELL APPROACH – ECONOMIES OF SCALE

Prelude was the first sanctioned FLNG project, in May 2012. Due to come on production in second half of 2016.

- Large scale single train , 3.6MTPA (plus LPGs and Condensate)
- Largest floating structure ever built ~490mx75m
- Permanent mooring, on station for 25 years
- Shell LNG Technology (C3MR Process)
- Back to the future
  - Underlying use of “old” steam turbine technology
- Design one build many
  - Abadi, Sunrise, Browse (Calliance/Brecknock/Torosa)



PETRONAS APPROACH – KEEP IT SIMPLE

Kanowit was sanctioned in November 2012 but is due on production end 2015.

- Mid scale single train , 1.2MTPA
- Suezmax type tanker scale
- Permanent mooring
- APCI Nitrogen expansion technology
  - "New" (previously employed at back end of APCI-X process)
  - Less efficient than MR process
  - Gas Turbine driven
- Design one build many – 2nd FLNG project sanctioned for Rotan field

EXMAR/B&V APPROACH – SMALL & SIMPLE

Pacific Rubiales sanctioned the project mid-2012. Exmar will build own and operate the facility on behalf of PR. Project due to come on production end 2014/early 2015.

- Onshore gas field supply
- Single train. 0.5MTPA
- Barge mounted, tethered to Jetty
- Black and Veatch Prico Single Mixed Refrigerant process
  - Many in operation in Algeria, China
  - Gas Turbine driven
- Separate tanker based storage moored alongside
- Tolling arrangements

DIFFERENT SOLUTIONS TO ISSUES

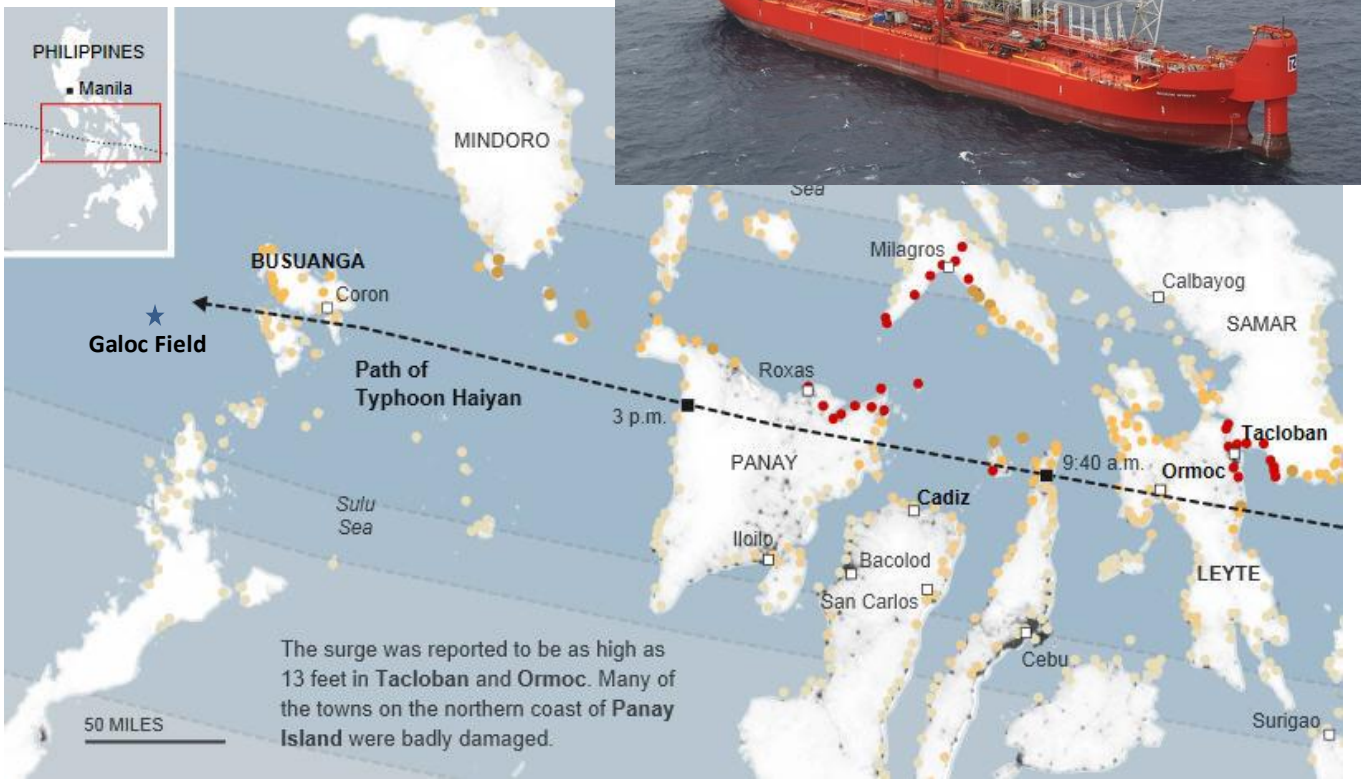
Ship to Ship Transfers have been going on for several years.

- Utilise flexible cryogenic hoses
- Transfer rates of around 5000m^3/hr

PERMANENT MOORING

- Typhoon Haiyan was possibly the strongest tropical storm ever experienced. 195mph/300+kph wind speeds
- Haiyan passed directly over the Galoc field
- Rubicon Intrepid is a 1981 built tanker 235m in length
  Converted to an FPSO on 2007
- Remained on-station throughout the passage of the storm

- Production interruption
  4 days
- Only minor damage



CONCLUSIONS AND KEY POINTS

- FLNG already has a number of different guises
- We anticipate further developments and adaptations
- Cost reductions probable as FLNG development becomes more “the norm”
- Break-even field size will reduce with reduced costs and offtake rates
- Still in the “Yet to be proven” category
  - Buyers and financiers need to see evidence of success from early developers to become more comfortable

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