





Oxford Institute for Energy Studies Natural Gas Programme Howard V Rogers LNG Costs, Russian Exports and Global Interactions December 9th & 10th 2015





OIES Natural Gas Research Programme

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- A gas research programme at a Recognised Independent Research Centre of Oxford University, specialising in fossil fuel research
- Probably the only European academic research group focussed on natural gas.

<u>WE PRODUCE</u>: independent research on national and international gas issues

WE ARE FUNDED BY: sponsorship by 20 companies and governments in gas producing and consuming countries WE ARE NOT:

consultants, sellers of exclusive, high price business reports

In 2013 and 2014 the Oxford Institute was voted the world's No.1 Energy and Resource Policy Think Tank

http://repository.upenn.edu/cgi/viewcontent.cgi?article=1008&context=think_tanks, P. 95

<u>ok</u>

Themes

- LNG Project Costs 'LNG Plant Cost Escalation', Brian Songhurst, OIES, February 2014, <u>http://www.oxfordenergy.org/2014/02/Ing-plant-cost-escalation/</u>
- Russia's Export Strategy 'The Political and Commercial Dynamics of Russia's Gas Export Strategy', James Henderson and Tatiana Mitrova, September 2015, <u>http://www.oxfordenergy.org/2015/09/the-political-and-commercial-dynamics-of-russias-gas-export-strategy/</u>
- The Forthcoming LNG Glut (what the gas world - outside North America - is focusing
 On) - 'The Impact of Lower Gas and Oil Prices on Global Gas and LNG Markets', Howard Rogers, July 2015, http://www.oxfordenergy.org/2015/07/the-impact-of-lower-gas-andoil-prices-on-global-gas-and-Ing-markets/



LNG Cost Trends





Data from Wood Mackenzie (used by permission)



Upstream Capital Cost Index (UCCI)

Research Question:

'Given that the general E&P cost base doubled between 2004 and 2014, why did the LNG cost base treble or even quadruple?'

Source: IHS CERA Upstream Capital Costs Index (UCCI) http://www.ihs.com/info/cera/ihsindexes/index.aspx



Recent High Cost Locations Squew Trend (Australia, PNG, Norway)





Australia suffered from:

- Too many projects proceeding in parallel.
- Laws restricting use of imported labour.
- Currency appreciation.
- Project Schedule Slippage



Challenges in Reducing LNG Project Costs

- Using barge-mounted liquefaction plant built in a shipyard/module yard in China or Korea to take advantage of the lower cost base and higher productivity.
- Use of alternative liquefaction processes and new EPC contractors. An example could be using the Black & Veatch PRICO process and using Chinese construction.
- Bringing in a competitor to GE/Nuovo Pignone who currently have the exclusive position of supplying the refrigeration compressors and drivers. Other major vendors include Siemens and Dresser for the compressors and Rolls Royce for the gas turbine drivers.
- Cooperation between the owners of different projects in the same area to take advantage of synergies and shared use of facilities.
- Reconsider the use of expensive design competitions (multiple FEEDs) which require high cost multiple client teams and payment of multiple contractors with very little perceived value.



Europe – keen to reduce dependence on Russia but tied into long-term contracts

Russian exports and market share in Europe

Gazprom's long-term contracts to Europe



- Russia's share of the European gas market has been above 25% for most years since 2000, and is currently over 30%
- Gazprom's stated ambition is to maintain its share at 30%, although there
 is a suspicion that it expects sales to be higher than this
- Long-term contracts offer security to 2020 before going into decline
- New average 70% take-or-pay level implies that exports could fall to 100bcm by early in the 2020s if Europe is serious about diversification.
 - Russia has a 100 bcma (10 bcfd) gas bubble in West Siberia !!!!!



- Questions over Chinese demand and production remain
- How reliant will Chinese authorities want to be on imported gas?
- Can Russian gas compete commercially?
- Will China want to limit its political exposure to Russian sources of energy?



Current status of Russia's Asian plans

- Energy strategy to 2035 sees rapid growth in hydrocarbon exports to Asia
- Power of Siberia pipeline appears to be firm construction has started on both sides of border
 - Flexibility remains in 2019-2021 start date
 - Potential for renegotiation remains
- Russia would prefer Altai pipeline, but discussions appear to have stalled given Chinese uncertainties
- LNG plans are going backwards Vladivostok LNG postponed indefinitely, no Sakhalin 2 expansion before 2021, Far East LNG no longer a priority
- A level of desperation appears to have emerged on the Russian side, with the proposal of a third pipeline from the Far East a clear example
- Realistically only one Russian pipeline is needed before 2025 unless Chinese gas demand growth accelerates rapidly



LNG Demand 2008 - 2015



Regional Gas Prices 2013 – 2016 (including futures)







Beyond 2015 – The 'Big Six' Uncertainties

- Demand for Natural Gas and LNG in Asia, particularly (short term) speed of Japanese Nuclear re-start and longer term – Chinese LNG demand.
- New LNG Markets, including Bunkers
- European Demand Recovery.
- Scale and pace of US LNG export approvals and construction (production response to price).
- Scale of LNG supply ramp-up from non-US suppliers, especially Australia, East Africa, Canada, Russia (and potentially Qatar post moratorium).
- Response by Russia to 'overspill' of excess LNG into European market in 2018 – 2023 period.



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Key Issues:

- Russia's Response in terms of Price Volume in Europe,
- Timing of New LNG FID's



Long and Short Run Marginal Costs – Russia & LNG to European Market



Gazprom has 100 bcma 'spare' productive capacity which could cover SRMC at \$3.80. European hub prices need to stay below \$9/mmbtu to deter new LNG investment. Once LNG FID has been achieved, US LNG will flow at European hubs above \$6/mmbtu, Non-US LNG at European hub prices above \$3/mmbtu



Programme

Research

Future Demand Trends



Source: GIIGNL, Author's Calculations



Scenario 3, (Low Asian Demand, Low European Demand) Russia Maintains Price not Volume, LNG FID's Slip 3 Years







Conclusions

- 19 bcfd of new LNG plant (FID'd/Under construction) starting up between 2015 and 2021. (8.5 USA, 8.5 Australia, Remainder Russia, Malaysia, Indonesia).
- With Asian LNG demand lanquishing, Europe becomes the 'sink market'. Hub gas prices (and Asian LNG spot prices) could fall to \$4/mmbtu coal switching support level.
- Glut should clear in early 2020s (Asian demand and European domestic production decline).
- Competition for next tranche of new supply: Russia (gas bubble but at what price ?) or LNG (can cost of supply be reduced from \$9 – 10/mmbtu) ?

Gas Programme Books Published since 2003



2016: 'LNG Markets in Transition – The Great Reconfiguration' A joint OIES and KAPSARC Publication





Thank You for your attention.

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