

Natural Gas & LNG in Shifting Markets

Thursday 5 October 2017, London

Access for Women in Energy (AccessWIE) and PETRONAS co-organised a seminar on Natural Gas and LNG. The event was held at PETRONAS London office on 5 October 2017.

The seminar provided an overview of timely developments shaping gas markets, LNG supply and demand growth as well as price trends. Examples of major LNG projects were presented, showcasing ways of meeting future demand using new business models.

The discussion started with welcoming remarks from Mr Ziaril Zakaria, CEO Petronas LNG UK, who showed a brief video of PETRONAS impressive Floating LNG, the first in the world. It was followed by complementary presentations from leading gas experts, including:

- Ms Maggie Stretch, VP Marketing & Origination at Cheniere, showcased the drivers behind the US successful experience of reversing its position from a LNG importer to exporter within a short period and driving the evolution of global LNG trade dynamics;
- Mr Giles Farrer, Director LNG & Global Gas Research at Wood Mackenzie, raised concerns about excess in LNG supplies and discussed whether the market can absorb them; and

- Mr Benjamin Klooss, Programme Manager for Oxford Policy Management, shared the experience of Ghana, a new LNG comer and commented on the African nation's rationale behind turning to LNG.

Lord Howell, Co-Chair of AccessWIE and Chairman of the House of Lords International Relations Committee, commented on the presentations, adding the all-important political dimension which continues to drive many gas deals and investment decisions.

Dr Carole Nakhle, CEO of Crystol Energy and Director of AccessWIE chaired the discussion. She highlighted, among others, that, unlike the global oil market, gas markets are fragmented though LNG is gradually globalising gas trade, adding that with the increasing sophistication in LNG projects, it is hard to believe that the end of the oil and gas era is near.

Mr. Fasludeen Hadi, CEO Petronas Energy Trading, also representing the host, concluded the discussion with the main takeaway that the oil and gas industry is going through major changes but it is not wasting a crisis: it is putting up a fight and technology is key.

The following pages summarise the key highlights of the discussion.



Speakers (from left to right): Giles Farrer, Maggie Stretch and Benjamin Klooss

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U.S. LNG: Driving Change in the Global LNG Market

- Sabine Pass Liquefaction and Corpus Christi LNG Terminal, Cheniere's large LNG export projects along the Gulf Coast, represent a track record of innovation and delivery.
- Sabine Pass Liquefaction Project
 - Originally developed as an import facility
 - First license application for lower-48 U.S. export project
 - Substantial Completion of 3 trains in 10 months since May 2016
 - 6 train development – 27 mtpa (~3.8 Bcf/d in export capacity) plus land for further expansion
- Corpus Christi LNG terminal
 - First greenfield export development in lower-48 U.S.
 - 5 train development – 22.5 mtpa (~3.2 Bcf/d in export capacity) with trains 1 & 2 under construction plus land for further expansion
- Over 60 mtpa of U.S. LNG capacity is under construction.
- The new U.S. LNG business model is primarily based on destination flexibility, flexible volumes and transparent pricing amongst others.
- With US LNG ramping up, responding to global market signals and including a wide range of customers, there is an increase in the percentage of U.S. LNG supply in the portfolio composition of major buyers for 2020 (Figure 1) with approximately 50% sold to Asian entities and 42% sold to end users.

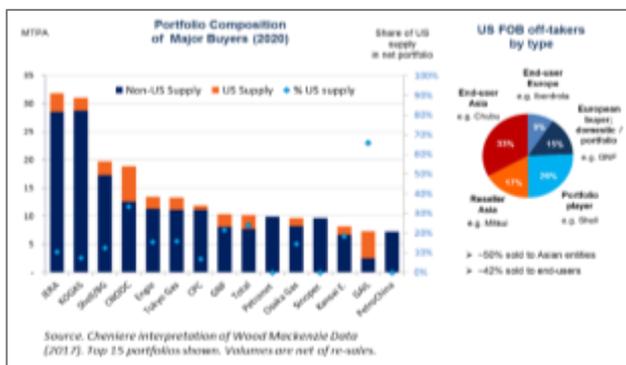


Figure 1: Portfolio composition of Major Buyers or 2020. Top 15 portfolios are shown net of resales. Cheniere interpretation of Wood Mackenzie data (2017). Courtesy of Cheniere.

Based on Sabine Pass cargoes progress, since start up, more than 170 cargoes have been loaded and delivered to 25 countries primarily to Latin America and Asia (as of August 2017). This is an example of how destination flexible supply reduces the rigidity of current trade which is quickly changing the global gas market.

- U.S. LNG *is* already changing the global gas market:
 - It has changed the industry providing buyers with: price diversification and transparency, destination flexibility and increased supply availability and market competition.
 - It is set to drive further change with growing liquidity / hub formation / price discovery and resulting in a more competitive and more resilient trade system.
 - It has the cost advantage (Figure 2) and that competitive cost sets price marker for new LNG supplies.

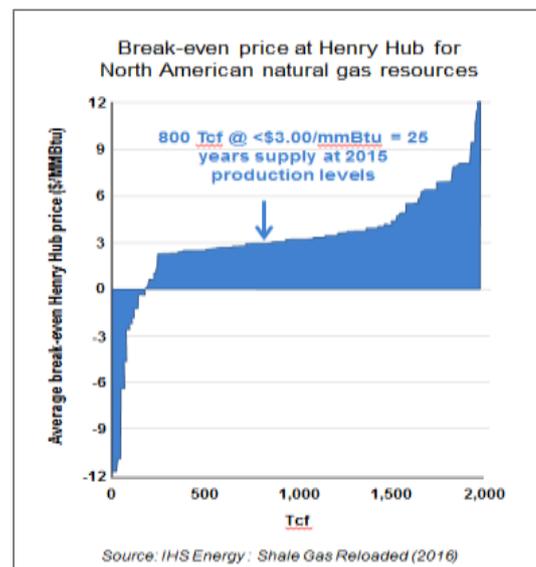


Figure 2: Break-even price at Henry Hub for North American natural gas resources. Source: IHS Energy: Shale Gas Reloaded (2016). Courtesy of Cheniere.

- The LNG supply wave from U.S. is 'not done yet'. Cheniere is able to move quickly to expand its platform with two permitted brownfield trains and there is also enough land at company's both project sites to allow for significant further expansion.

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Over-supply forever or time to invest? What will affect the pace of LNG market recovery?

- The global gas market has been relatively balanced with Asian and European prices connecting in summer (Figure 3), and this winter the market is expected to be quite tight again.

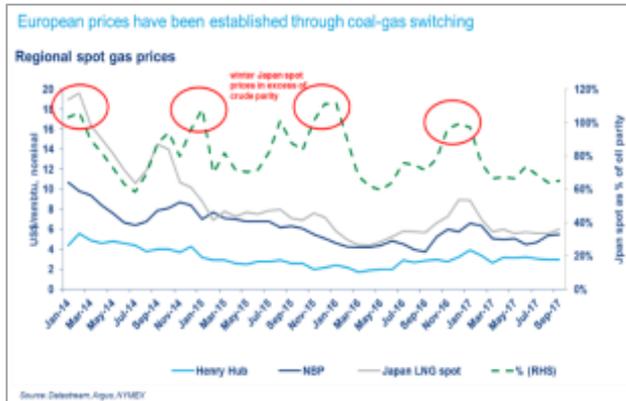


Figure 3: Regional spot gas prices. Courtesy of Wood Mackenzie.

- However, the LNG market is likely to move into oversupply during 2018 as LNG demand growth is unlikely to keep up with incoming supply and European LNG imports are expected to rise.
- Currently, Europe has lots of supply and there is limited upside to its demand. With indigenous gas production in Europe expected to decline, there will be an increase in gas imports and therefore the opportunity for LNG.

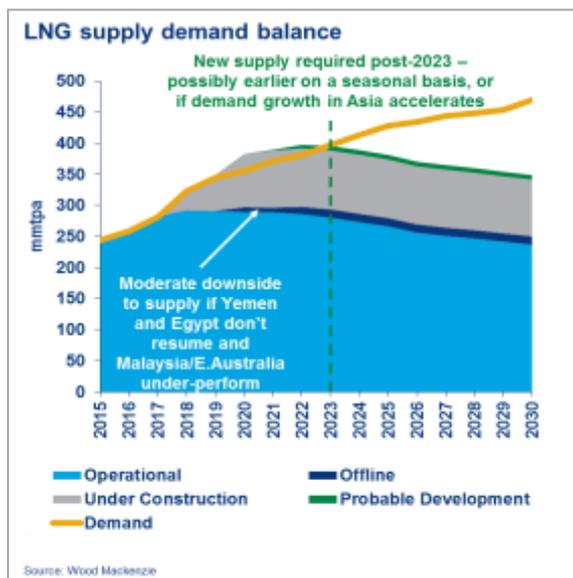


Figure 4: LNG supply demand balance. Courtesy of Wood Mackenzie.

- Some of the uncertainties that could reshape LNG outlook include: in countries like China and South Korea anti-coal and anti-nuclear sentiment and environmental policies have led to growth in the LNG market and resulted in strong gas prices and increasing interest in renewables. Asian LNG demand growth could drive an earlier than expected recovery.
- As LNG supply is required, project sanction has slowed. It takes around 4-5 years to build a train. New LNG projects will be required by 2023 (Figure 4) but moving projects to sanction in the current environment will continue to be challenging.

Emerging LNG Markets: The case of Ghana

- The LNG market is shifting with more flexibility and the emergence of new importers: 60% of LNG growth was absorbed by new LNG consuming countries in 2016.
- In the case of Ghana, domestic field start-ups will help stabilize electricity supply, provide state revenue, employment and aid infrastructure development.
- As the cheapest fuel for power generation, gas also can be incorporated as a bridge between renewable and non-renewable power.
- However, the demand and indigenous gas production outlook are highly uncertain according to the Ghana Gas Master Plan (figure 5).

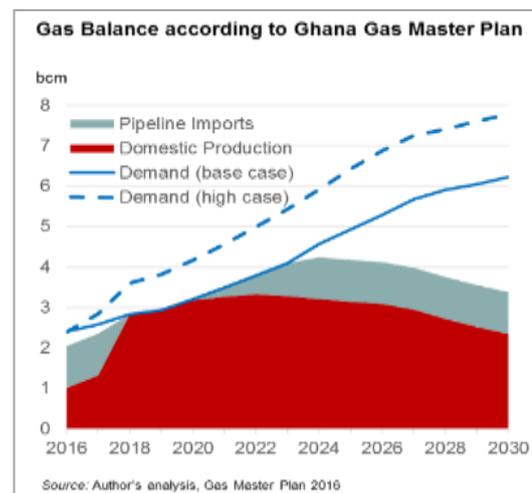


Figure 5: Gas balance according to Ghana Gas Master Plan. Courtesy of Oxford Policy Management.

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- Moreover, LNG may be a lower cost source of supply than indigenous gas.
- Importing LNG is becoming a possibility for nascent markets like Ghana due to Floating Storage Regasification Units (FSRU). They enable flexible access to LNG at favourable prices.
- The opportunity for LNG buyers is now and LNG and domestic production can benefit local economies especially through FSRUs.
- In the case of emerging importers like Ghana, it is important to have flexible options, and an integrated gas and electricity plan.
- Longer-term, gas prices may rise and that is a risk. It is always advisable to remain prudent on investments.

Access for Women in Energy (AccessWIE) establishes a community of practice, offering women a peer-group platform to meet with their contemporaries both female and male in the private and the public sectors across the world of energy.

AccessWIE engages its members in regular informed debates on global energy related issues. These are usually held on a quarterly basis and include seminars, business meetings and roundtable discussions to address strategic issues involving energy globally. Our central aim is to support the development of women in the energy sector – across the whole supply chain related services and all sources of energy: from oil, gas and coal to renewables and nuclear.

AccessWIE was founded in 2007 by Dr Carole Nakhle, who is the Chief Executive Officer of Crystol Energy. The group is co-chaired by Lady Judge (The Hon. Barbara Thomas), Chairman Emerita of the UK Atomic Energy Authority, and Lord Howell, President of the Royal Commonwealth Society and of the UK Energy Industries Council.

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