27th WORLD GAS CONFERENCE | JUNE 25-29 | WASHINGTON DC | 2018 | IGU

Pathway to Liquidity for LNG in the Energy Markets
IGU LNG Committee

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Liquidity for LNG in the Energy Markets

The liquidity is a measure of the ability to buy or sell a product without causing a major change in its price and without incurring significant transaction costs, **represents a high advantage for a market.**

Main drivers identified which impacts on liquidity

1. LNG Hub formation
2. Capital Costs
3. Shipping
4. Receiving and Small Scale Terminals
5. Market Supply
6. Sales & Purchase Agreements (SPA's)
7. Quality

1-LNG Hub formation

- **Price transparency** is a key requirement for expanding the liquidity of LNG.

Benefits of liquidity to market players

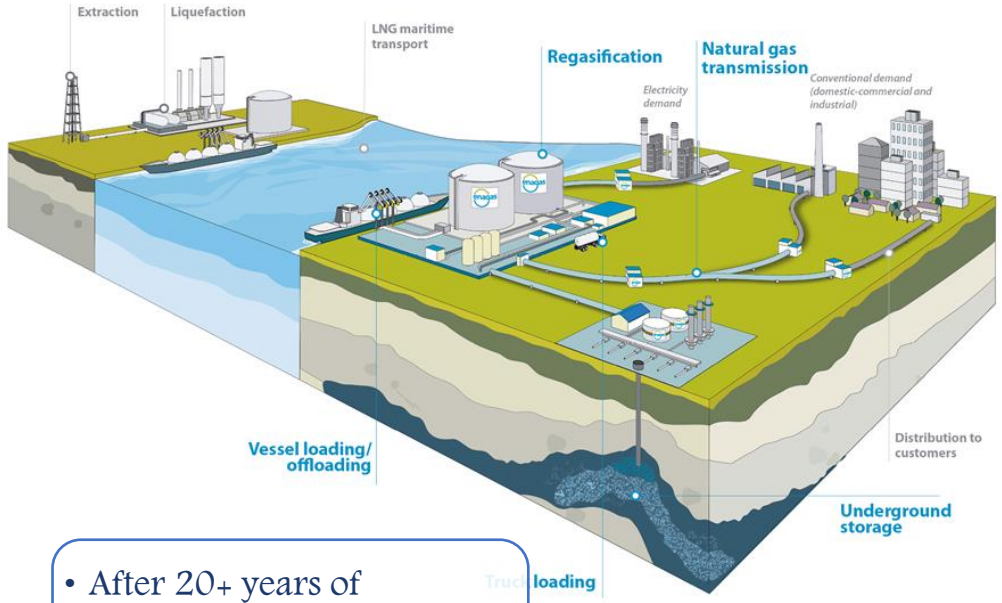
1. More pricing options/arbitrage.
2. Demand security- what's the trend in contracting long-term LNG?
3. Transparency benefits.
4. Traders: Physical & Financial.

Conclusion and recommendations

- LNG hubs would increase liquidity.
- It should be required net consumption of LNG, there may be times when supply is short and players are unwilling to release cargos into a secondary market.

2-Capital Costs

- The LNG supply chain is **a capital intensive operation**, involving the pre-treatment, liquefaction, storage, shipping, storage and regasification of gas.



- Opportunities for reducing liquefaction facility costs:

Shared infrastructure and site selection

- Encourage cooperation among operators.
- Choose liquefaction plant sites wisely.
- Integration with a power plant.

Technology & project execution

- Foster competition among suppliers.
- Develop modular and/or standardized approaches to plant construction.
- Etc.

Life extension & debottlenecking

- After 20+ years of operation, many LNG liquefaction plants have undertaken life extension programs to increase their asset's useful life

Conclusion and recommendations

- While none of these represents a 'silver bullet' which will radically reduce costs overnight, there are reasonable expectations that some of these might work.

3-Shipping

A liquid LNG shipping market helps to **arbitrate between markets.**

Barriers to a liquid shipping market

a) Technical and logistical constraints

- Ship size.
- Canals can be major physical constraints negatively or positively affecting the fluidity of LNG trade.

b) Regulatory constraints:

- Ship Inspection Report (SIRE)
- Restriction by port regulatory.

c) Commercial constraints: destination clause, lack of standard contracts, political barriers and commercial relationships between countries.

d) Financial constraints: In order to reduce the risk associated with long-term repayment profiles, banks will thus favor mid or long-term charters.

e) Human constraints: qualified staff.

Recommendations to remove barriers to a liquid shipping market

- **Second hand market**
- **Contractual tools** to promote the development of the spot and short-term market.
- **Optimization strategies:** Pooling strategies, Backhauls, Swaps or Financing.

4-Receiving and Small Scale Terminals

Main factors with impact on the evolution of the liquidity of global LNG markets:

Market Capabilities	Services offered	Commercial issues
• Access to NG hubs • Types of LNG import terminals • Availability of a trading platform at the terminal..	• Regasification, loading and unloading of LNG vessels, storage of LNG in tanks, truck loading, gassing-up and cooling down operations, bunkering, etc.	• Access regime • Contract characteristics • Costs of services.

Conclusion and recommendations

To obtain a global, flexible and liquid market, LNG Terminals have a key role and operators should constantly **optimize utilization at their facilities** and investments in improvement to **allow that large and small scale activities coexist at the terminals.**

5-Market Supply

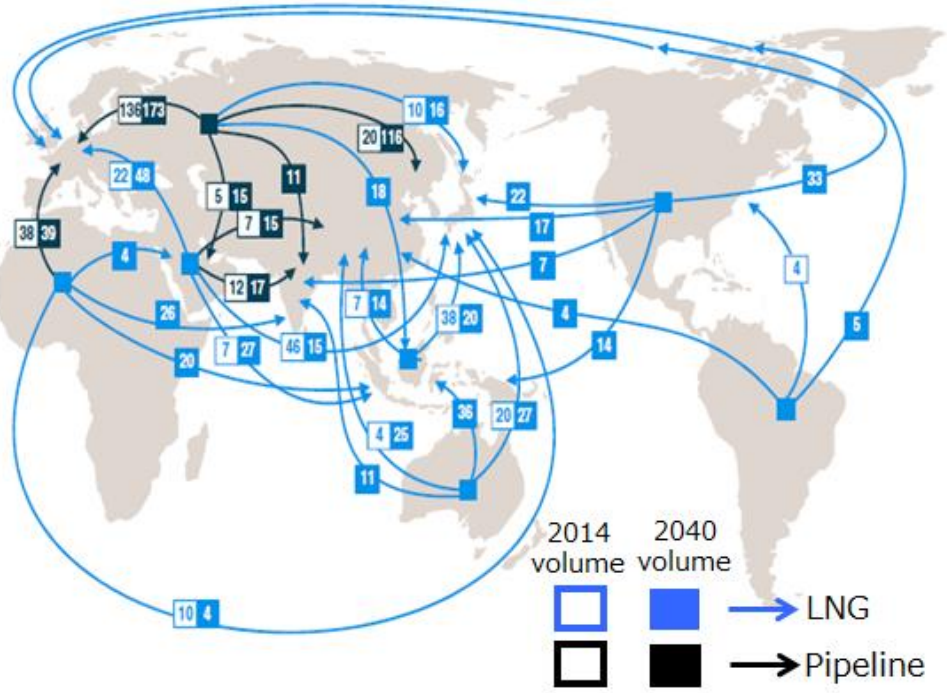
Enhancing LNG market liquidity

1. Expectation for **growth of short-term/spot** out to 2020.

2. LNG market outlook:
   From a traded volume of 264 mtpa in 2016,
   to increase up to 400 mtpa in 2030.

3. Trade flows of LNG are expanding throughout the world.

Global natural gas trading flow from 2014 to 2040 (MTPA)



Conclusion and recommendations

To keep the momentum towards the market liquidity, the **number of participants on both sides needs to grow continuously** and adequately in order to prevent concentration and a biased distortion.

6-Sales & Purchase Agreements (SPA's)

How do LNG sale and purchase agreements enhance LNG liquidity.

Commercial issues to consider

- Collaborative LNG Purchases
- Volume
- Price transparency
- Contract Term
- Flexibility: flexibility clauses.
- Modified Take-or-Pay
- Standardized Terms

Operational issues to consider

- Compatibility
- Quality Measurement
- Quality Standardization
- Development of Annual Delivery Program

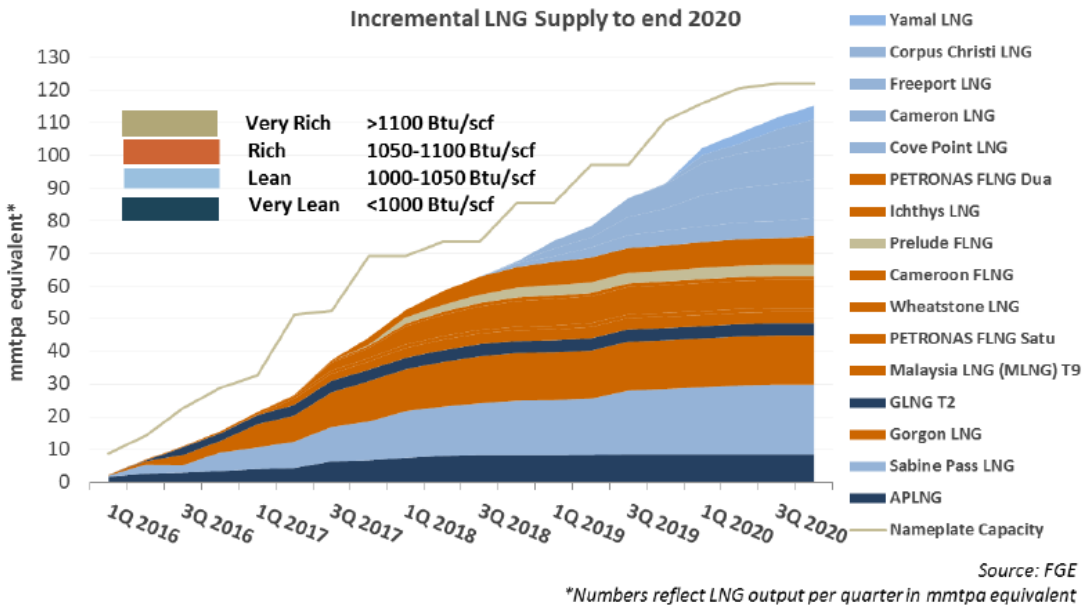
Other issues to consider

Cool-Down as a "Service", Collaborative LNG Sales, Adoption of Worldscale for LNG, Wider Adoption of Contracts of Affreightment, Blockchain and Smart Contracts….

The flexibility, standardization and creativity will be supported and encouraged by a properly regulated environment for the full LNG value chain.

7-Quality

- **The harmonization of LNG quality** and gas interchangeability is a **key driver to facilitate tradability and liquidity** as well as safety and operability for domestic, commercial and industrial applications.
- The prevailing view is that **the world is divided into regions** where different specifications predominate and this will continue, **with "rich" LNG required in some and "lean" LNG required in others.**



Source: FGE

**Numbers reflect LNG output per quarter in mmtpa equivalent*

- New markets where the LNG/gas market is at the early stage of the developments **may need adapt to absorb different qualities of LNG.**

Conclusions

Each driver has an important influence on liquidity, but they are not enough individually, **and it is need a global improvement of all drivers to develop a real LNG liquid market.**

1. LNG Hub formation
2. Capital Costs
3. Shipping
4. Receiving and Small Scale Terminals
5. Market Supply
6. Sale & purchase Agreements (SPA's)
7. Quality

Thanks for your attention