

# 3-1. Changing LNG market dynamics – implications for supply security in the APEC region

## **APERCC Workshop**

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# What is LNG supply security?

- **IEA's definition of gas security**

- It's risk management;
- Short-term risks: politics, accidents or extreme weather conditions;
- Long-term risk: new supplies cannot be brought online to meet growing demand because of economic or political changes.

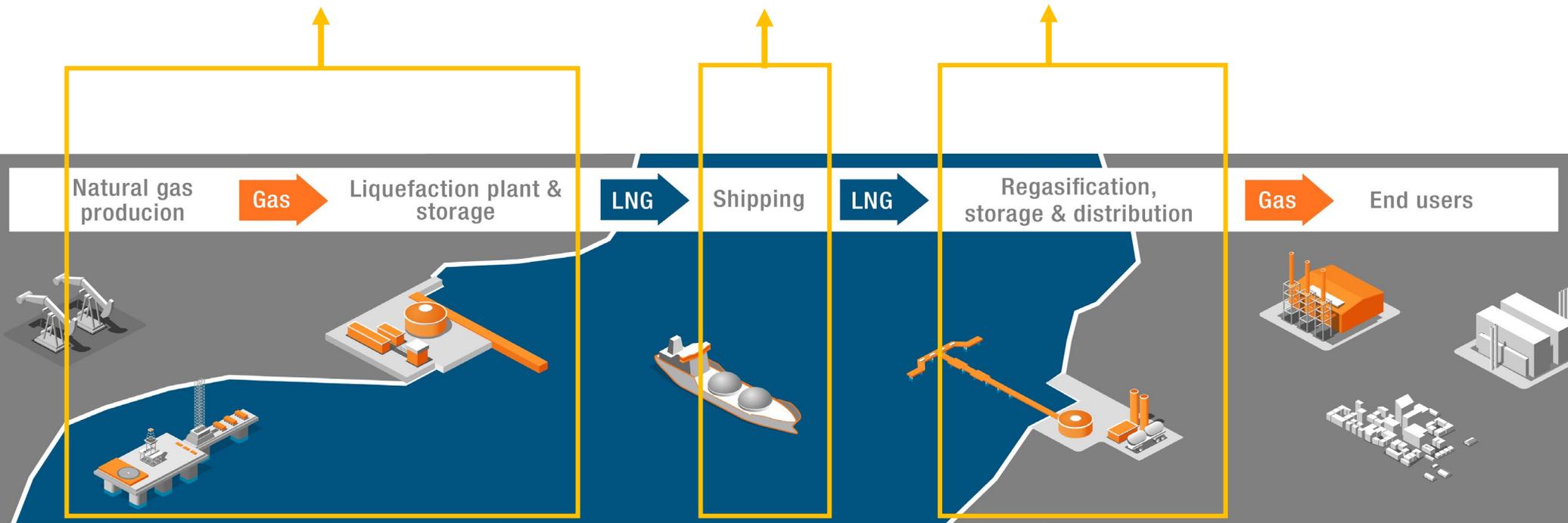
- **Jonathan Stern<sup>1</sup>'s definition**

- Short-term supply availability versus long-term adequacy and the infrastructure for delivering this supply to market;
- The threats to supply include sources of gas supplies, the transit of gas supplies and the facilities through which gas is delivered.

<sup>1</sup>Jonathan Stern is Chairman and Senior Research Fellow of the Natural Gas Programme at the Oxford Institute for Energy Studies Professor Stern has become an internationally known speaker and author on natural gas and security issues in Europe, the former Soviet Union and Asia.

# Changing dynamics in the LNG supply chain

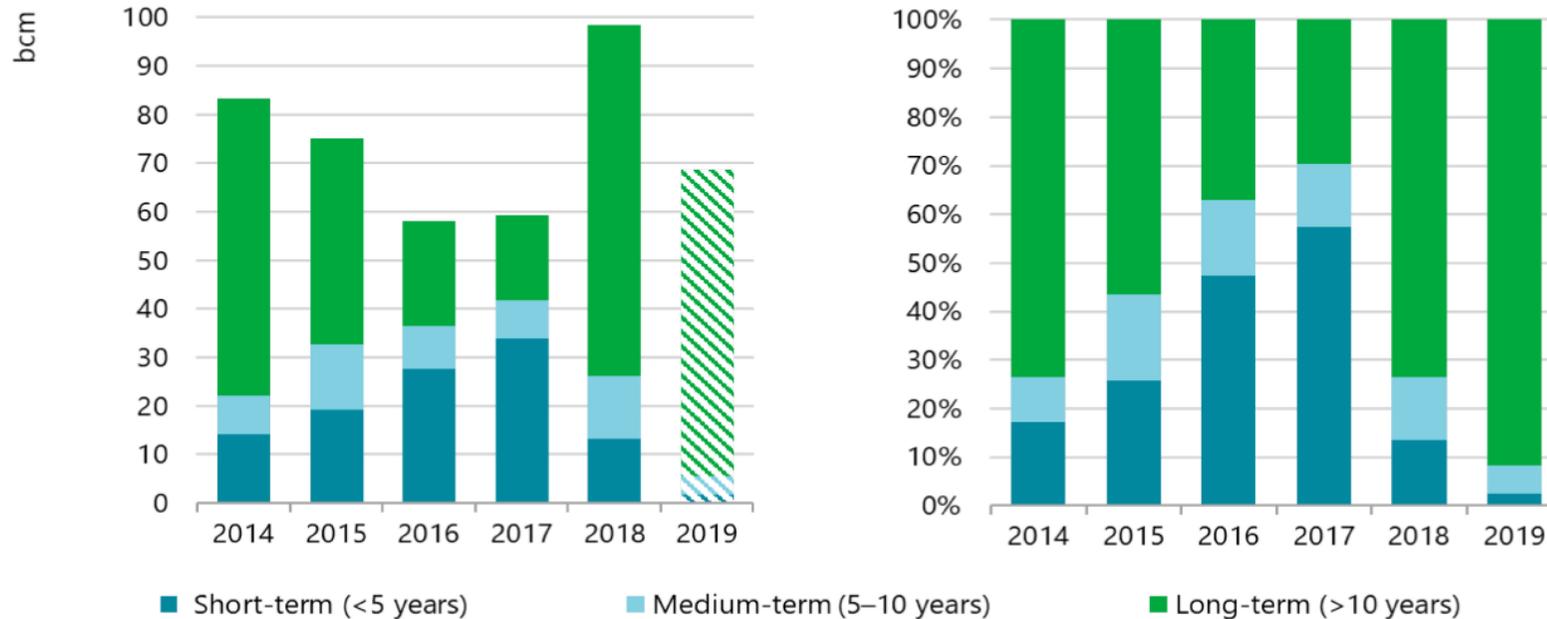
- LNG contracts
- Emerging portfolio players
- LNG project construction
- LNG shipping business model
- Carrier technology
- LNG terminal and gas storage



Source: [https://cdn.wartsila.com/images/default-source/twentyfour7/in-detail/lng-value-chain-optimisation-02.png?sfvrsn=9e788f45\\_0](https://cdn.wartsila.com/images/default-source/twentyfour7/in-detail/lng-value-chain-optimisation-02.png?sfvrsn=9e788f45_0)

# Significant changes in LNG contracts

## Contract length of signed LNG SPAs, 2014-19



Note: 2019 data only includes information available at the time of writing.  
Source: IEA Global Gas Security Review 2019

- 2014-17: Many LNG projects came online (especially Australia and the US), resulted in robust spot market and drop in the share of long-term contracts.
- 2018-19: Share of long-term contracts grew again, driven by demand growth and avoidance of spot price volatility.

# Increasing share of portfolio players....

- **What is an LNG portfolio player?**

A company that holds a portfolio of LNG supply from different regions as well as various shipping, storage and regasification assets

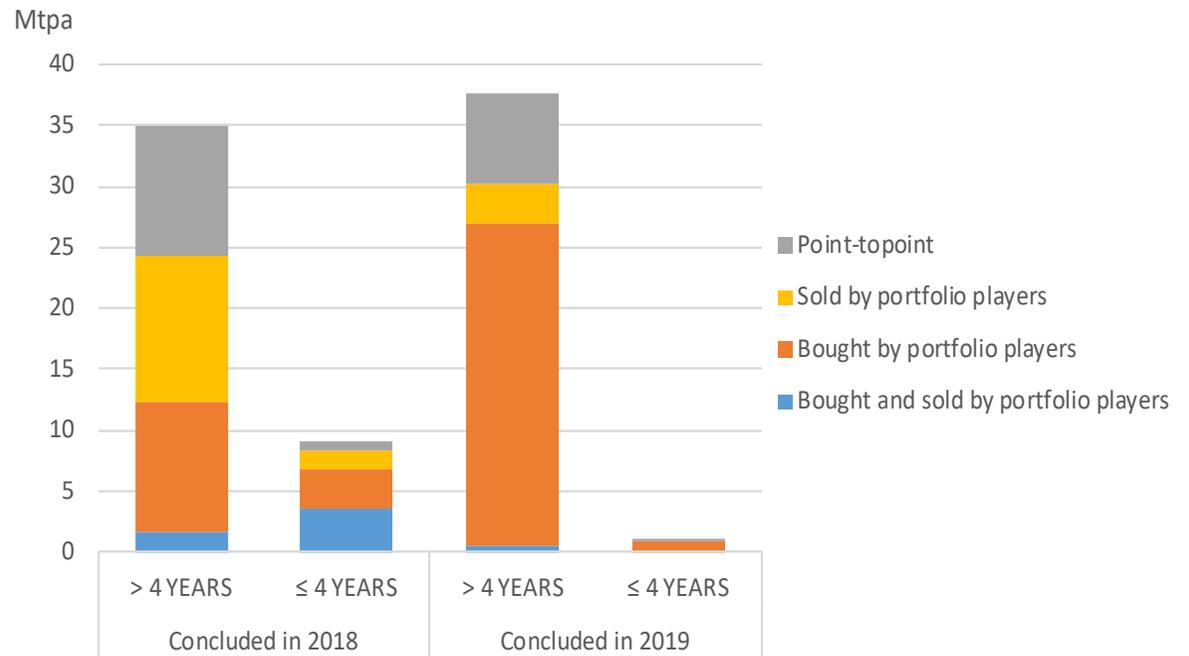
- **Types of LNG portfolio players**

- A multinational oil and gas company, such as Shell, Total, ExxonMobil, BP, Chevron;
- A utility company, such as Petronas and Osaka Gas;
- A trading company, such as Mitsubishi and Mitsui.

# ...strengthens LNG supply security

- More flexibility on supply sources and more efficient cargo delivery
- Responding quickly to fluctuating market demand
- Promoting FID of progressing LNG projects
- Bridging between sellers and buyers in a market transition period

**Contracted volumes by type of contractors, 2018 and 2019**



Source: GIIGNL 2019 Annual report

## ...and shapes LNG shipping industry

- **LNG carriers are required to operate in a more complex and flexible manner**

- short notice of shipping service
- uncertain routes to various buyers
- shorter contract commitment and ability to divert cargoes, etc.

- **Daily charter rates changed**

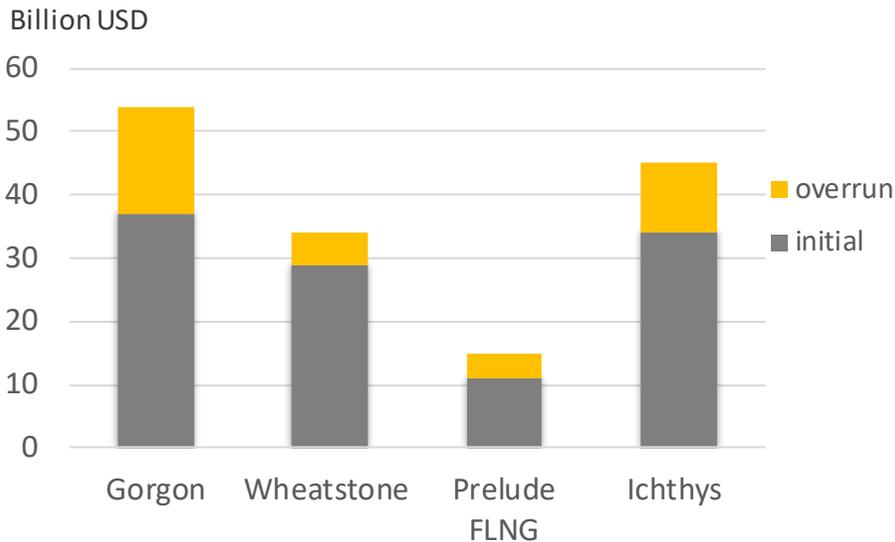
The charter rates paid to carriers depend on the flexibility that the carrier offers.

- **LNG carriers have an opportunity to optimise their operations**

The portfolio business model allows the LNG carriers to optimise their operations through advanced trading algorithms in real-time while increasing flexibilities to accommodate the complex services required.

# Ballooning costs of LNG projects

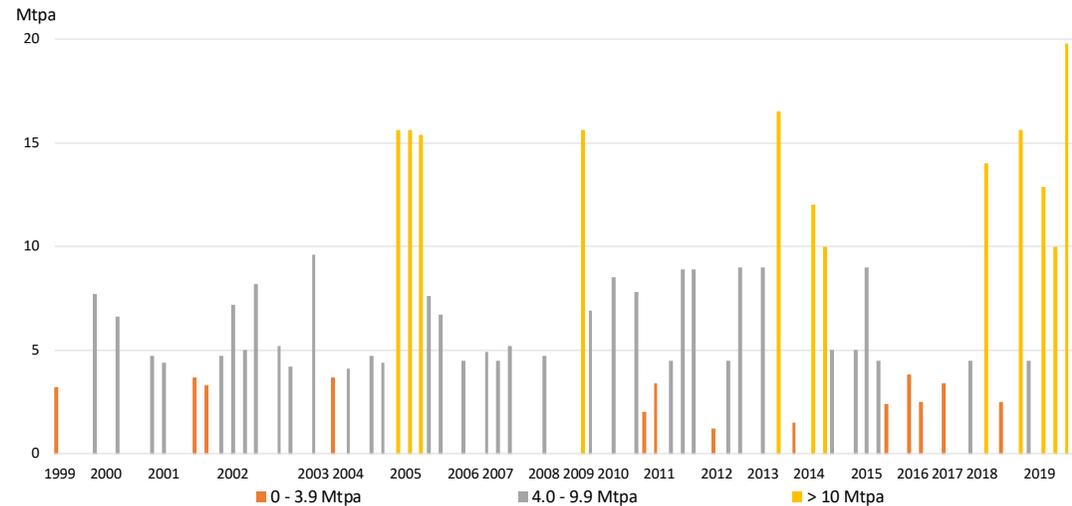
## Initial and additional cost of Gorgon, Wheatstone, Prelude LNG and Ichthys



Source: IEEJ analysis.

- Projects are more complex and could not be accurately estimated in the initial stage.
- Design defects could delay the whole projects, especially in large-scale projects.
- Rise in labour costs as there are only few people with relevant skills.
- Project locations are remote, which further increases transport and accommodation costs.

## The liquefaction capacity of LNG projects, 1999-2019



# Modular construction offers a solution

- **More realistic costs**
- **Modularization construction - more efficient and lower costs**
  - Calcasieu Pass LNG: smaller liquefaction trains (design one, build many)
  - Yamal LNG: The world's largest modular construction project



Source: <https://pubs.spe.org/en/ogf/ogf-article-detail/?art=4075/>.



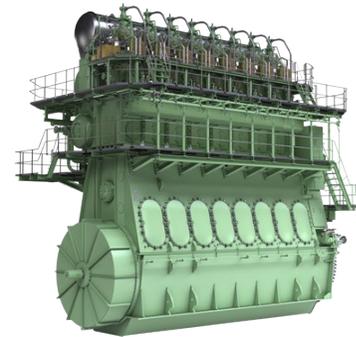
Source: <https://www.ep.total.com/en/areas/liquefied-natural-gas/our-yamal-lng-project-russia/logistics-yamal-lng-construction-truly>.

# Technological advancement contributes to higher usage of BOG and IMO rules compliance in LNG shipping

- **ME-GI and X-DF are the most fuel efficient and advanced LNG carrier propulsion systems**

- Both are slow speed two-stroke dual fuel engines. ME-GI stands for mechanically operated electronically controlled, gas injection.
- They increase the use of boil-off gas (BOG) during shipping; X-DF (the name of the engine) also allows the carrier to comply with International Maritime Organization's (IMO) restriction on sulphur contents and NOx emissions.

**ME-GI engine**



**X-DF engine**



Sources: <https://marine.man-es.com/two-stroke/2-stroke-engines/me-gi-engines> and <https://www.wingd.com/en/documents/general/brochures/x-df-faq-brochure.pdf/>.

- **Vessel obsolescence is expected to increase**

- Because of their non-compliance with environmental regulations, poor economics, and lack of flexibility.
- Could be converted into floating production storage and offloading (FPSO) units, floating storage and regasification units (FSRU) or Floating Storage Units (FSU).

# Government's role is required for LNG terminal development

- **Clear and supportive legal framework is required for LNG terminal development**
  - In order to develop an LNG terminal, several conditions have to be met, such as adequate demand, reliable supply and clear legal frameworks.
  - Korea: Policies are contradictory. Government lowered the LNG taxes by 74% to encourage the use of gas, but KOGAS is the only allowed LNG importer.
  - Thailand: Even though Third-Party Access was introduced in 2014, EGAT still faced many difficulties before receiving the first cargo from the spot market in December 2019.
  - Viet Nam: Current policy allows private participation on hydrocarbon exploration and production, but unclear about private sector roles in the rest of the value chain. There is one LNG terminal under construction and one authorised. Stronger support and a clearer framework from the government might help accelerate the development of these LNG terminal projects.

# The importance of gas storage for supply security

- **Importance of gas storage is rarely discussed**

Gas storage is also a key element to enhance energy security; it provides flexibility and security by reducing the need for immediate consumption after production or procurement.

- **World's practices**

- The US has widespread gas storage and pipeline networks;
- Italy has world's fifth largest underground storage capacity;
- China's gas capacity only accounts 3% of gas demand. Faced gas supply shortage in 2017 because of the lack of a gas pipeline network. In 2017, China set up a state-owned company to form a unified oil and gas network.

- **FSRU could be a solution, but not entirely**

FSRUs have lower investment costs and faster construction times but less storage capacity. On average, onshore terminal capacity is between 0.26 to 0.7 bcm, while FSRUs rarely surpass 0.17 bcm.

# Summary

- Emerging LNG portfolio players are expected to create more flexibility on supply sources and more efficient cargo delivery; LNG supply security could be further strengthened.
- LNG shipping industry's business model is also changed; more complex services and operational optimisation are required.
- Project developers should be more realistic about costs, adopt modular construction approaches to minimise costs and streamline the construction process.
- Technological advancement contributes to higher usage of BOG and IMO rules compliance in LNG shipping.
- Government's role is required for LNG terminal and gas storage development.



**Thank you for your kind attention.**

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