Session 4

GLOBAL LNG TRADE
Contents

- Brief history of global LNG trade,
- Key suppliers and consumers in global trade
- LNG Trade
  - Key exporting and importing countries
  - Capacity utilization of Liquefaction and Regasification terminals
- Market Liquidity
  - Supply side and Demand-side factors affecting liquidity
  - Breakeven costs of global LNG export projects,
- Cross-border NG Pipelines and their impact on LNG trade
HISTORY OF LNG TRADE
LNG – evolution

- 1940: LNG Facility at Cleveland, Ohio
- 1958: First Trans-Atlantic Shipment by Methane Pioneer: Lake Charles, Louisiana to Canvey Island, UK
- 1964: First Commercial LNG facility at Algeria - ships the first consignment by Methane Princess; the CAMEL project to deliver Algerian gas to the UK and France
- 1969: Three more trades had started - an additional delivery from Algeria to France, one from Libya to Italy and Spain, and one from the Cook Inlet of Alaska to Japan, the first Pacific project.
- 1972: USA entered the market first when deliveries started for a small Distritos (Cabot) project at Everett, MA.
- 1978: USA large contracts by El Paso Natural Gas to Columbia Gas for Cove Point, MD and Southern Natural at Elba Island, GA.
- 1982 onwards: Growth of LNG exporting and importing countries
- 2010-11: Shale gas boom in US and its entry as LNG Exporter; The first tanker shipment of LNG took place from Lake Charles
The development of the early US projects 1972 onwards took place during a period of unprecedented change in international energy markets. This included the two oil price shocks, the widespread nationalisation of the international oil companies’ concession areas within OPEC, and the restructuring of the North American gas industry.

While LNG imports into Europe continued to increase, the North American trade nearly collapsed, thereby blunting what was expected to be a substantial growth in Atlantic Basin trade. With the substantial slowdown in interest in LNG in the Atlantic, the balance of interest shifted to the Pacific as Korea and Taiwan joined Japan as importers.

Between 1975 and 1996, the Asia Pacific demand increased by an average of 3.31 BCM per year (about 2.4 MMT). In contrast, Europe and the United States increased only 0.76 BCM per year.

Since 1996 Atlantic Basin markets had begun to take off; average Atlantic growth was 3.97 BCM per year compared to Asia’s 4.22 BCM (equivalent to the capacity of a more modern 3 MMT train).

With the continuing growth of Asian markets, the principal suppliers were from the Asia Pacific region – Indonesia, Malaysia, Australia and Brunei.

The first Middle East project from Abu Dhabi dates back to 1977, but there was no significant expansion until the major new projects from Qatar and Oman in the late 1990s. Similarly, the slow growth of European and US markets until recently limited the Atlantic market.

The Asia-Pacific Basin Suppliers Dominated Growth until 1996, Accounting for 72% of Supply at that Time;

With the startup of new liquefaction plants in Trinidad and Nigeria in 1999 the Atlantic Basin suppliers started growing. By Late 1990s Indonesia has become the world’s largest supplier, but Qatar in the Middle East and both Trinidad and Nigeria in the Atlantic Basin started increasing their exports substantially.

By 2002-03 Egypt had two LNG facilities under construction and was destined to become a major LNG supplier.
Recent Past

- LNG industry has grown by leaps and bounds since the beginning of the 21st century.
- The largest LNG train in operation is in Qatar, with a total production capacity of 7.8 million tonnes per annum (MTPA).
- These facilities reached a safety milestone in 2014, completing 12 years of operations on its offshore facilities without a Lost Time Incident.
- The Qatar operation overtook the Train 4 of Atlantic LNG, Trinidad Tobago with a production capacity of 5.2 MTPA, followed by the LNG plant in Egypt with a capacity of 5 MTPA.
- The recent boom in U.S. natural gas production 2011 onwards, enabled by hydraulic fracking, has many of US LNG import facilities being considered as export facilities.
- The first U.S. LNG export was completed in early 2016.
Key Suppliers and Consumers
Key Suppliers - LNG

TOTAL: 20

- Qatar
- Australia
- USA
- Algeria
- Russia
- Nigeria
- Indonesia
- Malaysia
- Trinidad & Tobago
- Oman
- UAE
- Papua New Guinea
LNG Exports - Top Suppliers

LNG exports by top suppliers since 2018

2020 LNG exports by origin (BCM), and share of total (%)

Source: Refinitiv

Note: 1BCM = 0.74 MMTPA
Key Consumers - LNG

TOTAL: 39

- Japan
- China
- South Korea
- India
- Taipei
- Spain
- France
- UK
- Italy
- Turkey
- Pakistan
- Bangladesh
### World’s Top LNG Importing Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Million Ton 2019</th>
<th>Million Ton 2020</th>
<th>Market Share %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>76.87</td>
<td>74.43</td>
<td>21</td>
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<tr>
<td>China</td>
<td>71.68</td>
<td>68.91</td>
<td>19</td>
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<td>South Korea</td>
<td>40.14</td>
<td>40.81</td>
<td>11</td>
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<tr>
<td>India</td>
<td>23.98</td>
<td>26.63</td>
<td>7</td>
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<tr>
<td>Chinese Taipei</td>
<td>16.66</td>
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<tr>
<td>Spain</td>
<td>15.72</td>
<td>15.37</td>
<td>4</td>
</tr>
<tr>
<td>UK</td>
<td>13.55</td>
<td>13.43</td>
<td>4</td>
</tr>
<tr>
<td>France</td>
<td>15.57</td>
<td>13.06</td>
<td>4</td>
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<td>Turkey</td>
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<td>Italy</td>
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<td>Pakistan</td>
<td>8.10</td>
<td>7.42</td>
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<td>Thailand</td>
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<tr>
<td>Netherland</td>
<td>5.79</td>
<td>5.33</td>
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<tr>
<td>Bangladesh</td>
<td>4.07</td>
<td>4.18</td>
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</tr>
<tr>
<td>Portugal</td>
<td>4.12</td>
<td>4.07</td>
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</tr>
</tbody>
</table>
LNG importing Countries

Figure 2.5: 2019 LNG Imports and Market Share by Market (in MT)

Source: GIIGNL
LNG TRADE
Global LNG trade increased to **354.7 MT** in 2019, an increase of **40.9 MT** or 13% vs. 2018. This is the sixth year of consecutive growth in global LNG trade.

- **Australia** is the second largest exporter with a total of **75.4 MT**.
- **Qatar** managed to maintain its position as the largest exporter in the world, exporting **77.8 MT**.
- **Russia** is now the fourth largest exporter of LNG, with **29.3 MT** of export in 2019.
- The USA overtook Malaysia as the third largest exporter, and added a record of **+13.1 MT**.

**Japan** imported **76.9 MT** (**5.6 MT** vs. 2018).

**China** imported **61.7 MT** (**7.7 MT** vs. 2018).

The largest global LNG trade flow route continues to be intra-Asia Pacific trade **77.3 MT**.

The largest importing regions, consistent with 2018, were:
- Asia Pacific: **131.7 MT**
- Asia: **114.5 MT**

European imports surged on the back of low prices, almost doubling to **85.9 MT**.

*The diagram only represents trade flows between the top 10 exporters and top 10 importers.*
Global LNG Trade

+40.9 MT
Growth of global LNG trade

LNG Exporters & Importers
No new LNG importers in 2019

LNG Re-Exports
-2.2 MT
Re-exported volumes decreased by 59% YOY in 2019

Global LNG trade reached an all-time high of 354.7 MT in 2019, setting a new annual record.

China provided 7.7 MT in new import demand, and Europe increased imports by 37 MT.

Contraction were largest in Japan (-5.6 MT), South Korea (-3.8 MT) and Egypt (-1.9 MT).

Bangladesh, Brazil, China, India, and Jamaica increased imports through new-built terminals.

While most liquefaction capacity was added in markets already exporting LNG, a floating liquefaction project came online in Argentina, raising the number of exporters to 20.

Re-export activity dropped in 2019 to 1.6 MT (3.8 MT in 2018).

Re-exports received dropped in all markets. Asia received the largest volume of re-exports (0.9 MT), while Europe re-export the highest volumes (0.9 MT).

<table>
<thead>
<tr>
<th>Exporting Region</th>
<th>Asia-Pacific</th>
<th>Middle East</th>
<th>Africa</th>
<th>North America</th>
<th>Former Soviet Union</th>
<th>Latin America</th>
<th>Europe</th>
<th>Re-exports Received</th>
<th>Re-exports Loaded</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Asia-Pacific</td>
<td>77.3</td>
<td>31.2</td>
<td>2.9</td>
<td>9.5</td>
<td>8.8</td>
<td>2.1</td>
<td>-</td>
<td>0.3</td>
<td>0.4</td>
<td>131.7</td>
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<tr>
<td>Asia</td>
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<td>36.3</td>
<td>13.6</td>
<td>3.0</td>
<td>4.8</td>
<td>1.9</td>
<td>0.1</td>
<td>0.8</td>
<td>0.1</td>
<td>114.5</td>
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<tr>
<td>Europe</td>
<td>-</td>
<td>23.5</td>
<td>25.1</td>
<td>12.7</td>
<td>15.1</td>
<td>5.9</td>
<td>4.2</td>
<td>0.3</td>
<td>0.9</td>
<td>85.9</td>
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<tr>
<td>Latin America</td>
<td>0.2</td>
<td>-</td>
<td>0.8</td>
<td>4.2</td>
<td>-</td>
<td>2.6</td>
<td>0.4</td>
<td>0.1</td>
<td>-</td>
<td>8.1</td>
</tr>
<tr>
<td>North America</td>
<td>0.1</td>
<td>3.0</td>
<td>1.0</td>
<td>1.4</td>
<td>0.6</td>
<td>0.8</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>6.9</td>
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<tr>
<td>Middle East</td>
<td>0.1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>Africa</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>131.7</td>
<td>93.9</td>
<td>45.0</td>
<td>33.8</td>
<td>29.3</td>
<td>16.3</td>
<td>4.7</td>
<td>1.6</td>
<td>1.6</td>
<td>354.7</td>
</tr>
</tbody>
</table>

Source: GIIGNL
**LNG – Demand Forecast**

LNG being pushed into Europe in 2020. Declining domestic production requires increasing LNG imports in the later years.

Growing LNG demand as domestic gas production cannot keep up with requirement. Potential new demand creation during period of low prices.

Pipeline gas imports from US to Mexico reduces LNG import requirements, while the newer importers such as Uruguay and Colombia push up LNG demand.

Reform of subsidized domestic gas prices allows for further LNG imports.
Liquefaction Plants

Global liquefaction capacity reached 430.5 MTPA in 2019.

Capacity Additions for 2019

- 42.5 MTPA of liquefaction capacity brought online
- 11% year-on-year growth vs 2018
- Australia 87.6 MTPA overtook Qatar 77.1 MTPA as the market with the highest liquefaction capacity
- Capacity added in Australia, Russia, USA, and Argentina

FIDs and Under Construction

- Record FIDs of liquefaction projects, totalling 70.8 MTPA
- FIDs were taken in USA, Mozambique, Russia, and Nigeria
- Global liquefaction capacity forecasted to reach 454.8 MTPA by end 2020
- Liquefaction capacity forecasted to be added in 2020 in USA, Indonesia, Malaysia, and Russia

Pre-FID

- 907.4 MTPA of liquefaction capacity currently in pre-FID stage
- 350.5 MTPA from USA
- 221.1 MTPA from Canada
- 49.0 MTPA from Qatar
- 42.2 MTPA from Russia
Global liquefaction capacity reached **452.9 MTPA** in 2020.

### Capacity Additions for 2020

- **20 MTPA** of liquefaction capacity brought online
- **5%** year-on-year growth vs 2019

**Australia 87.6 MTPA**
- Market with the highest liquefaction capacity

**Qatar 77.1 MTPA**
- Market with the second highest liquefaction capacity

**USA**
- Capacity added in the USA: +20 MT

### Pre-FID

- **892.4 MTPA** of liquefaction capacity currently in pre-FID stage as of Feb 2021
- **351.6 MTPA** from USA
- **227.8 MTPA** from Canada
- **50.0 MTPA** from Australia
- **44.0 MTPA** from Russia
- **37.2 MTPA** from Mozambique

### FIDs and Under Construction

- **Energía Costa Azul T1** Only 1 project took FID in 2020: **3.3 MTPA**
- **Qatargas Petroleum** took FID on North Field East in Feb 2021: **32 MTPA**
- **139.1 MTPA** of liquefaction capacity under construction or sanctioned for development as of Feb 2021
LNG LIQUEFACTION PLANTS
## World’s Top LNG Producing Countries

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<thead>
<tr>
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<th>Market Share %</th>
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<tbody>
<tr>
<td>Australia</td>
<td>77.8</td>
<td>22</td>
</tr>
<tr>
<td>Qatar</td>
<td>77.1</td>
<td>22</td>
</tr>
<tr>
<td>USA</td>
<td>44.8</td>
<td>13</td>
</tr>
<tr>
<td>Russia</td>
<td>29.6</td>
<td>8</td>
</tr>
<tr>
<td>Malaysia</td>
<td>23.9</td>
<td>7</td>
</tr>
<tr>
<td>Nigeria</td>
<td>20.6</td>
<td>6</td>
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<tr>
<td>Indonesia</td>
<td>15.0</td>
<td>4</td>
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<tr>
<td>Algeria</td>
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<td>3</td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>10.1</td>
<td>3</td>
</tr>
<tr>
<td>Oman</td>
<td>9.8</td>
<td>3</td>
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<td>Papua New Guinea</td>
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<td>Angola</td>
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<td>Peru</td>
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<td>1</td>
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<tr>
<td>Norway</td>
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<td>1</td>
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<tr>
<td>Equatorial Guinea</td>
<td>2.6</td>
<td>1</td>
</tr>
</tbody>
</table>
Liquefaction Capacities Utilization Levels

- Global liquefaction capacity - 430.5 MTPA at the end of 2019
- In 2020 - 20.0 million tonnes per annum (MTPA) of liquefaction capacity was brought online
- Global liquefaction capacity - 452.9 MTPA at the end of 2020
- Average global utilization rate in 2019 - 81.4%
- Average global utilisation rate in 2020 - 74.6%
Halt in Investments due to CoVid-19
LNG Receiving Terminals

23.4 MTPA of receiving capacity was added in 2019

- +6 new terminals between 2019 – February 2020
- +3 expansions at existing terminals between 2019 – February 2020
- 821 MTPA of global regasification capacity as of February 2020

Growth in 2019 was driven primarily by new-built terminals in existing LNG import markets: Bangladesh, Brazil, China, India, and Jamaica

120.4 MTPA of new regasification capacity under construction as of February 2020

3 new FSRUs
Bangladesh, Brazil, and Jamaica

India and Thailand expanded existing LNG plants
Regasification Terminals Utilisation Levels

- LNG Receiving Terminals Capacity beginning of 2021 - 840 MMTPA
- Existing Terminals - 133, Under Construction - 30
- Japan has highest - 210 MMTPA i.e. 25% of global regas capacity
- Increase in Regas Terminals in 2020 - 4
- Increase in Capacity in 2020 - 19 MMTPA
- New countries joining - Myanmar
- New Capacities coming up 2021 - Brazil, Croatia
- New Markets Developing 2021 onwards - Ghana, El Salvador, Morocco, Coast De’ Ivory, Cyprus, Nicaragua, Germany etc.
- Average Regas Terminals Utilisation level in 2020 - 43%
- Additional Regas Capacity - allows peak requirements to be met, seasonal winter demand requirements, Security of supply
Market Liquidity
LNG Market Liquidity

Supply Side
- Large Liquefaction capacities coming up (450MTPA) - Qatar, Australia, USA etc.
- Shipping fleet growing - 572 active vessels, 35 new delivered in 2020
- Import markets - developing LNG Hubs
- Re exports - Singapore, South Korea, India etc.
- Ship reloading and Trashipment

Demand Side
- Term of contracts - getting over, period getting smaller, short term in vogue
- Growing LNG capacity access - capacity holders growing, access to third party, traders
- FSRU - catering to quick, localized and smaller demands
- New Applications eg. Bunkering, Truck loading
- Price - arbitrage with alternate fuels, markets
- Weather - seasonality, temperature and climate impact
LNG Demand and Supply: face to face in 2021
LNG GROWTH

LNG trade volume growth
MTPA (DES)

Spot LNG deliveries
Cargoes
% of total market

2019 LNG trade volume: 3.59 MTPA
Continued increase in Spot Deliveries
GLOBAL LNG TRADE: Emerging Gap in Demand and Supply
Global LNG demand continued to grow despite a global pandemic
LONG TERM LNG MARKET TRENDS

Global LNG balances – impact of delays in Mozambique’s LNG projects

Million tonnes

-20 -15 -10 -5 0 5 10 15 20 25 30

Loose market

Tight market

2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

Hollow boxes indicate extent of removed oversupply

Hashed boxes indicate extent of additional undersupply

Source: Rystad Energy GasMarketCube, research and analysis

The chart shows the difference between total available production and LNG demand

Hollow boxes indicate the projects’ original production schedules

Mozambique LNG: operator Total aimed for a 2024 start-up, but Rystad Energy estimated 2026, now pushed back even further to 2026

Rystad Energy

RYSTAD ENERGY
Breakeven costs of global LNG export projects
LNG Export Market Projects

Estimated break even costs of new LNG projects

Liquefied natural gas export projects on North America's West Coast have high capital costs, but may be able to deliver for cheaper than expected.

- LNG Canada (Shell)**
- Woodfibre LNG (Rystad)
- S. Gulf Coast new-build (OIES)
- U.S. Gulf Coast low (Rystad)
- U.S. Gulf Coast high (Rystad)
- LNG Canada (Rystad)
- Canada West Coast (OIES)

*Based on delivery to Asia **Based on $2 feed gas price
Royal Dutch Shell, Oxford Institute for Energy Studies, Rystad Energy
Julie Gordon  |  REUTERS GRAPHICS
Cross-border Natural Gas Pipelines
Trans National Pipelines

- Transnational pipelines create long term economic relations between nations for meeting energy needs.
- Transnational pipelines are point to point and have limited flexibility in terms of capacity, supply volumes and destination.
- Transnational pipeline projects and LNG Import Projects are complimentary with each other in order to meet the energy needs of the nations.
Trans National Pipelines V/S LNG

Break even point for LNG at different pipeline transportation costs
Regional Accessibility: Pipeline projects
Q & A

Thanks