G20 Energy Transitions Working Group (ETWG)

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Presentation Agenda

2018 Price, Demand, Supply and Infrastructure Developments

LNG Security of Supply and Flexibility

LNG Bunkering
Top Observations from 2018

Asia leads global LNG demand, with Japan, S. Korea, China importing over half of the world’s LNG.

China becomes the largest natural gas importer.

Chinese demand jumped 150 percent between 2017 and 2018, over half of the global gas demand increase.

LNG Freight rates reach a record high above 170,000 USD/day in November.

Currently at ~ $70,000 USD/day

Prices & Demand

European Monthly Spot price increases in 2018 and peaks at $9.52 mmBtu in September;

Currently at ~ $8.00 mmBtu

Henry Hub annual 2018 average price closes at $3.16 mmBtu, up from $2.99 mmBtu in 2017;

Currently at ~ $3.40 mmBtu

Asian LNG Spot prices spike to a 4-year high for the October 2018 delivery in Asia at $11.40 per mmBtu;

Currently at ~ $7.00 mmBtu
Price Formation – LNG volume growth will encourage a more open, transparent and highly competitive natural gas (LNG) market, especially in the Asia-Pacific Regions.

Pipeline Imports 2005 to 2017

Northwestern Europe 2005 to 2017

LNG Imports 2005 to 2017

Source: IGU Wholesale Price Survey 2018 Edition
**Top Observations from 2018**

**Supply & Infrastructure**

Prelude, the world’s largest FLNG platform becomes operational, making Australia the largest LNG exporter, surpassing Qatar for the first time.

The US nearly doubled its LNG exports, well on the way to reaching 60 mmtpa by the end of 2019.

Yamal LNG reached full capacity (16.5 mmtpa) in December, under budget and well ahead of schedule.

Progress on major pipeline projects: TAP, TANAP scheduled for 2020; Power of Siberia – near complete; Nordstream 2 – scheduled for end of 2019.

The US nearly doubled its LNG exports, well on the way to reaching 60 mmtpa by the end of 2019.

In September China imposes a 10% tariff on US LNG.

First major LNG FID, since 2015, was taken – LNG Canada.

**Prudent Investment Policies and Long-term Planning Decisions are Needed to Promote Increased Diverse and Flexible Supplies**
Innovation and Growth in LNG Trade Enhances **Security of Supply**

**Energy Security in Heating and Cooling**

**Heating security in the UK**

- Power demand
- Gas heating demand

**Cooling security in Kuwait**

- Temperature °C
- LNG imports tn/month
- Demand (TWh/d)

Source: National Grid

Source: Naturgy, Enagas

Source: IHS Markit, Weather Channel
Innovation and Growth in LNG Trade Enhances Security of Supply

Supports the integration of daily and seasonal renewables

Supports daily power generation in Spain

Backs up seasonal hydro in Brazil

Source: Naturgy, Enagas

Source: IHS Markit
Growth in LNG Trade Enhances **Security of Supply**

2008 LNG Flows

Source: RWE
Growth in LNG Trade Enhances Security of Supply

2018 LNG Flows

Source: BloombergNEF
Growth in LNG Trade Enhances Security of Supply

Enabling Gas Supply Security through the development of enhanced networks and infrastructure, more flexible commercial models, and new modular access-enabling technologies

Critical Elements for Enhancement of Security of Supply:

- Increasing of Gas Supply Globally
- Sufficient availability and supply orders for LNG carrying vessels
- Sufficient availability of storage and infrastructure connectivity
- Continued development of midstream secondary markets and flexibility of contracting including destination clause relief
- Prudent Investment Policies and Long-term Planning Decisions
Current Uptake of Alternative Fuels Technologies in Shipping

Number of ships (in operation and on order)
- Scrubber
- LNG
- Battery
- LNG ready
- Methanol
- LPG
- Hydrogen

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Total</th>
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<tbody>
<tr>
<td>Bulk carriers</td>
<td>1001</td>
</tr>
<tr>
<td>Container ships</td>
<td>434</td>
</tr>
<tr>
<td>Oil/Chemical tankers</td>
<td>381</td>
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<tr>
<td>Crude oil tankers</td>
<td>285</td>
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<tr>
<td>Cruise ships</td>
<td>258</td>
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<tr>
<td>Ro-Ro cargo ships</td>
<td>22</td>
</tr>
<tr>
<td>Offshore supply ships</td>
<td>23</td>
</tr>
<tr>
<td>Car/passenger ferries</td>
<td>22</td>
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<tr>
<td>General cargo ships</td>
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<tr>
<td>Carriers</td>
<td>61</td>
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<tr>
<td>Fishing vessels</td>
<td>35</td>
</tr>
<tr>
<td>Other activities</td>
<td>21</td>
</tr>
<tr>
<td>Tugs</td>
<td>12</td>
</tr>
</tbody>
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Total number of ships (in operation and on order): 2702
## Enabling Clean Marine Transport via LNG – Removing barriers

<table>
<thead>
<tr>
<th>Regulatory</th>
<th>Commercial</th>
<th>Technical</th>
<th>Cultural</th>
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<tr>
<td>• Regulatory regimes not aligned</td>
<td>• Hard to Access Financing</td>
<td>• Bunkering access</td>
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### Barriers

- Regulatory regimes not aligned
- Inter and Cross-Jurisdiction Gaps in Emissions Controls
- Lacking Policy Certainty
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- Future Price Uncertainty
- Bunkering access
- First mover “tax”
- Space, Range, Efficiency
- Resale Value Uncertainty
- Future Price Uncertainty
- Industry Resistance to change

### Solutions

- Regulate Pollution & Price Externalities
- Improve access to credit for marine LNG projects
- Fund innovation, demonstration, and data collection projects
- Help de-risk technologies
- Will be addressed through the other listed measures

### G20 Options

- Lead the harmonization of global emissions regulations, especially for the developing world.
- Find and Eliminate Gaps in Domestic Regimes
- Enable credit access
- Supplement traditional financing / de-risk share
- Provide de-risking funding for technology innovation and unique bunkering investment
Thank you