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#### TOWARDS RECOVERY AND SHARED PROSPERITY:

## **NATURAL GAS OPPORTUNITIES** FOR A SUSTAINABLE WORLD HOSTED BY

RINE MINISTER'S DEPARTMENT MALAYSIA

**IEF** 

**IEF-BCG Background Materials Session 2** 















# **Panel Session 2:**

### **Market Signals & Policy Pathways:**

Investment and Innovation on the Road to Recovery

Towards Recovery and Shared Prosperity



### Disclaimer

The observations presented herein are meant as background for the dialogue at the 7<sup>th</sup> IEF-IGU Ministerial Gas Forum hosted by the government of Malaysia. They have been prepared in collaboration with Boston Consulting Group and should not be interpreted as the opinion of the International Energy Forum or Boston Consulting Group on any given subject



### **Market Context**

- The Global LNG market is heavily affected by the COVID-19 pandemic, with mixed mid-term outlooks, but strong long-term market fundamentals for gas growth.
- Gas is expected to play a key role in energy transition but requires collaboration and support.



## **Session Objectives**

Review market conditions and new policy pathways that affect investment in gas demand and supply, research and development and new technologies.



### **Key Questions**

#### **COVID-19 Impact on Investments and LNG market** conditions

- How much investment in natural gas E&P and infrastructure is deferred due to COVID-19?
- Is there risk that a supply gap or bottle neck will increase market volatility on the short-, to medium-term?

#### Lesson learnt and path forward

- How can gas trading hubs facilitate further regional cooperation and gas market integration in Asia?
- Natural gas market share will grow in Asian markets but may well recede in Europe under Paris Agreement pledges and net zero policies announced after the pandemic.
- What lessons if any can be drawn from Europe and other world regions or are Asian gas markets unique?

#### **Carbon management**

Which carbon management approaches (ETS, taxation, technology, standards) best support the industry?

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# COVID-19 Impact on Investments and LNG Market Conditions

# Impact of current events on additional capacity planned to come on-line by 2020-2025 split into four categories (I)



Assets ramping up or under construction

Limited risk of delays in assets operating in 2020; additional delays can be expected for assets to be commissioned by 2021-2022

Assets expected to come on-line in 2020 have their future revenues locked in through LT

contracts (hence limited exposure to today's commodity volatility), and final construction

- c. 62 Mtpa
- Project S taken t

Projects with FID taken to date

c. 48 Mtpa



Qatar's expansion

c. 44 Mtpa



Projects with no FID taken to date

~100 Mtpa on pipeline

- Assets planned to finish construction in 2021-22 could be delayed due to (i) COVID pandemic limiting working at full-capacity (i.e. workforce reduction due to infection spread, lack of raw material due to limitations in global trade, etc.) and (ii) if large LNG volumes are still uncommitted: e.g. integrated projects, with high upstream investments and equity offtake
- Under-construction assets starting production in 2023-25 more likely to ease COVID shortterm impact

Material risk of delay, particularly on projects with offtake not fully committed to date

phase requires smaller workforces limiting impact of COVID-19

- Assets that already have all offtake fully committed should experience limited risk of delay
- Upcoming very low LNG price environment and demand contraction likely to delay projects with uncertain offtake or financing
  - Increasing liquidity in 2020-2021 will make it even harder for these projects to secure extra offtake through LT contracts



# Impact of current events on additional capacity planned to come on-line by 2020-2025 split into four categories (II)



# Current events could now lead to ~10-15 Mtpa reduction in capacity scenarios by 2023 and 50-60 Mtpa by 2025



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### **Revised perspectives on Global LNG liquefaction capacity by** 2025 indicates ~30-50 Mtpa lost growth



- Potential delay of projects that were planned to be commissioned by 2020, but start not after 2021
- 2-years delay of all projects under construction and for those with FID taken
- Qatar expansion happening after 2025
- No non-FID projects coming on-line between 2020-2025



- Potential delay of projects that were planned to be commissioned by 2020, but start not after 2021
- 1-year delay of all projects under construction and for those with FID taken
- ~8 Mpta of Qatar's expansion before 2025
- No non-FID projects coming on-line between 2020-2025

#### High LNG Liq. capacity scenario



- Potential delay of projects that were planned to be commissioned by 2020, but start not after 2021
- No delay for projects under construction,
- Some projects with FID taken delayed to start production after 2025
- 25 Mtpa of Qatar's expansion before 2025
- ~15 Mtpa non-FID projects coming online between 2020-2025

No FID taken

Qatar expansion

FID taken Ramping up or under construction

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Operating in 2019



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### US playing a key role balancing the market in the short run

## US LNG netbacks are now negative to both Europe and Asia



US LNG exports utilization likely to remain low as the global market remains over-supplied



1. Calculated as NEA spot minus (1.15\*Henry Hub + shipping costs) 2. Calculated as TTF minus (1.15\*Henry Hub + shipping costs) Source: US EIA, Argus, Bloomberg, press reports, BCG analysis

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### Market likely to still be oversupplied in 2025



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#### **Demand scenario**

# LNG suppliers adjusting to lower-for-longer demand by reducing liquefaction output & delaying projects

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# Drop in utilization of liquefaction terminals, particularly exacerbated in the US



Evolution of utilization of liquefaction facilities

#### No FID on new developments taken to date, not happening since 1998 Evolution of capacity of FIDs projects per year (2014-2020 YTD)



# Lessons Learnt and Path Forward

### Market liberalization could benefit contract origination, although specific local skills are required to succeed Example: Opening of Korean gas & LNG market could create interesting opportunities for sellers

- Current regulated tariffs mainly reflects KOGAS basket of long-term supply contracts resulting into uncompetitive prices versus cheap spot LNG cargoes
- Several large buyers are waiting for expiration of their wholesale contracts with KOGAS to import directly, although regulation does not facilitate direct imports

- Restrictive regulation and lack of open third party access to LNG and gas infrastructure is incentivizing new regas developments
- Korean government has set 2025 as date to start allowing reselling LNG for volumes beyond KOGAS contracts
  - Up to 9MTPA of volumes to compete in the liberalized market post 2025 due to large KOGAS contracts expiring



# ~190 bcma linked to legacy contracts expected to expire by 2025, half of those relate to contract supplying Asia

Increasing difficulty to find counterparts for new long-term contracts



Source: Cedigaz; Press research; BCG Analysis

# Greater market liquidity and volatility driving value from trading and optimization



## LNG market liquidity continues to increase, along with greater spot market volatility

- Spot and short-term now ~30% of the global market
- Spot prices ranged from \$12 to <\$2/MMBtu in the past 2 years</li>
- Trading and portfolio optimization is delivering greater value in this environment
  - Development of financial instruments enabling greater trading
  - Time and location-based arbitrage are both more viable and higher value



## Given the market context, competitors are continuing to shift to a portfolio model

- Midstream market is increasingly consolidated
- Other Majors are moving toward a portfolio model combining origination with commercial optimization

#### Rapid growth in spot and short-term trade

#### Global volume of spot/short term<sup>1</sup> LNG trade



## Strong growth in JKM derivatives market over the past years, expected to continue

Growth in Platts JKM derivatives supported by spot liquidity and LNG indexation (K LOTS)



### LNG market shifting toward more gas-on-gas pricing ...

# Price formation for LNG Imports transitioning towards liquid price signals



Three key drivers

% WW LNG imports

#### - -----

Source: IGU Wholesale Price Survey 2020

# ... along with continued growth of spot and short term contract sales

Global volume of spot / short-term<sup>1</sup> LNG trade, and countries in LNG market (mtpa, # countries)



# Sentiment for energy transition is strong in many parts of the world

# Europe is committing to climate-neutrality by 2050

## President of European Union Ursula von der Leyen

We are acting to make the EU the world's first climate neutral continent by 2050. The climate law is the legal translation of our political commitment, and sets us irreversibly on the path to a more sustainable future ...

-EU commission press release, 04 March 2020 🕐

#### EVP for the European Green Deal Frans Timmermans

We are turning words into action today, to show our European citizen that we are serious about reaching net-zero greenhouse gas emissions by 2050. The European climate law is also a message to our international partners that this is the year to raise global ambition together ...

-EU commission press release, 10 March 2020 🕐

# Europe, Latin America and Africa lead on sentiment for #netzero and climate change



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# Several large Asian economies stand the most to gain from energy transitions

**Energy intensity of GDP vs. Energy import dependence** 

Energy intensity of economy (KOE/\$GDP)



Note: Fuel imports consists of coal, petroleum, natural gas, lubricants, and related materials Source: Enerdata, World Bank, BCG analysis

### **Renewables are becoming more cost competitive in Asia**

2015-2020 Solar and onshore wind vs. coal competitiveness index



Note: Calculated as the % difference in coal LCOE vs. the lower of the onshore wind and solar LCOEs for each country \* 100 Source: Bloomberg New Energy Finance, BCG analysis

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# Resilient Asian countries have relied on cheap coal, but the falling cost of renewables is supporting greater levels of deployment

# Solar and wind are starting to compete with coal & gas in Asia (\$/MWh)

### And renewables are taking a greater share of the mix



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Source: Bloomberg New Energy Finance, BP Statistical Review of World Energy, BCG analysis

# Green stimulus and policy measures in Asia represent significant portion of global total and support deployment of EVs

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# Chinese & Korean announced green stimulus is as large as the EU's



### Policies: China & South Korea supporting EVs through subsidy extensions



# Implications: Faster energy transitions in Asia will challenge key drivers of oil and gas demand growth

### APAC expected to drive 80% of oil demand growth through 2040 ...

2018-2040 change in oil demand under IEA SPS (MB/D)



# ... And ~50% of global natural gas demand growth

2018-2040 change in natural gas demand under IEA SPS (BCM/A)

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### But a hastened transition would have consequences for oil & gas

- Increased adoption of EVs would erode expected oil demand, especially in China where the government has prioritized deployment
- An accelerated rollout of renewable energy sources could slow the expected gas demand growth

# Three main type of natural gas markets – Asian markets moving toward market liberalization



# Carbon Management

### Cost competitiveness is the critical challenge for global gas demand



... And is increasingly challenged vs. wind/solar

Source: Bloomberg, Lazard, BCG analysis

### **Regulation of localized pollution the most effective lever for** improving gas competitiveness – Example of China

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Natural

Gas CCGT

100

Coal - Sub-

critical



#### LCOE with local pollution externality costs



Note: Based on average base case LCOE for China in 2019 per Bloomberg; Local pollution externality costs per University of Texas LCOE study Source: Bloomberg, University of Texas, BCG analysis



## Air quality policies key to driving gas demand growth

Example: China's net-zero target is a giant step in climate change action

## Improving urban air quality is a key policy priority in China

Peak emissions before 2030 and net zero by 2060 - major step for the economic (and fossil fuel) powerhouse

## PM2.5 targets in early 2013, after emissions far exceed targets set in 2012

• 2017 was the target compliance year for the new standards

#### Northern cities critical to meeting targets

- "2+26 policy" launched in 2017 targeting Beijing, Tianjin, and 26 other Northern cities with severe air pollution
- Aim to reduce PM2.5 emissions by 15% to meet 2017 targets

## Focus on switching coal boiler use and rationalizing inefficient industries

- Direct mandates to switch fuel use enforced on a local level
- Industry capacity cut among less efficient plants (e.g., steel, aluminum)

## Regulations on coal to gas switching used to achieve air quality improvements

## Government uses targeted enforcement to pursue fuel switching goals



- More than 1,100 Chinese officials were held accountable for violations of air pollution laws in November 2016
- 2,480 inspection personnel dispatched to 2+26 cities to enforce policy in September 2017 – January 2018

## 2+26 face stronger emissions limits – leading to gas demand growth



- 2+26 emissions limits enforced on 24 other industries in addition to coking
- ~43% of urban gas consumption growth from 2015-2017 took place in 2+26 cities

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# CO<sub>2</sub> price of >40\$/t needed for Asia to prompt coal to gas switching



#### Cost equivalence of coal and gas power generation

#### **Gas price - landed**

Note: Short run marginal cost for CCGT (54% efficiency) and coal plant (39% efficiency); transport cost 1 \$/mmbtu, 9\$/tonne Source: BCG Analysis



### Adoption of carbon pricing is growing, though prices often remain too low to prompt significant fuel switching



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Source: World Bank, Eurostat, Climate Policy Initiative, RGGI, BCG analysis

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### Gas commerciality is playing a crucial role on technology adoption, but carbon pricing may be a driver going forward

## Impact: DRI production is up 30% globally since 2015, reducing GHG intensity of iron and steel

Global DRI production has grown by nearly 30% over last three years



Global direct reduced iron production 2011-2018 (million tons)

DRI lowers CO<sub>2</sub> emissions and energy intensity of ironmaking



Natural gas DRI lowers CO<sub>2</sub> emissions by 66% relative to standard blast furnace ironmaking



DRI lowers the energy intensity of ironmaking by using a chemical process, while the conventional method involves melting iron ore

## DRI production growth is centered in regions with access to cheap gas



Regional growth in DRI production 2015-2018 (million tons)

Climate policy can drive greater DRI adoption



Iron & steel make up ~7% of global energy related GHG emissions



The DRI-EAF route is widely seen as the most viable way to significantly reduce the carbon intensity of the iron and steel industry

Note: DRI can be coal based or natural gas based – around 90% of global DRI is natural gas based; analysis excludes Indian DRI as most coal based DRI is produced in India

Sources: World Steel Association, Midrex, BCG analysis



# ~50% of global economy considering carbon tax; potentially extended to imports in the future



Domestic carbon tax potentially extended in future to imports

Early discussions on border carbon tax have begun in Europe

Should differences in levels of [climate] ambition worldwide persist [...] the Commission will propose a carbon border adjustment mechanism, for selected sectors, to reduce the risk of carbon leakage —The European Green Deal (2019)

1. Singapore, China, USA, Japan, Hong Kong, Thailand, Republic of Korea, Thailand and Vietnam 2. The circles represent subnational jurisdictions. The circles are not representative of the size of the carbon pricing instrument, but show the subnational regions (large circles) and cities (small circles) 3. ETS = Emission Trading System Source: DOSM, MATRADE, World Bank



### Key decisions still to be taken on EU CBT policy



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### Sectors most impacted by the border tax

	(	•	EU priority sectors for carbon border tax				er tax			
		Ceme nt	Steel	Non- fer. metals	Chem	Pulp & paper	Glass	Electri -city	EU 27 production value-added (\$B)	Segments impacted
	Construction								686	Residential, com'l, T&L
Simple supply chain	Consumer foods								263	Packaged foods, soft drinks, spirits
	Rubber & plastics								106	Various consumer,
	Packaging & coatings								76	industrial applications
	Mining & Quarrying								27	Metals, coal, non-metal
Complex supply chain	Metals & mech. engineering								328	Metallurgy, machinery, mechanical equipment
	Automotive								200	Component makers and automotive OEMs
	High-tech goods								143	Telco eqpt, PCs and mobile devices, electrical eqpt
	Pharma								124	Patented bio-pharma, vaccines, generics
	Aerospace		$\checkmark$						39	Component makers, LCA, business jets, military aircraf
	Consumer appliances								15	Washers, dryers, refrigerators, vacuums, etc.

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Source: Oxford Economics; BCG analysis

### **Regional, national, and subnational carbon pricing initiatives** and share of global emissions covered, The World Bank



Note: Only the introduction or removal of an ETS or carbon tax is shown. Emissions are presented as a share of global GHG emissions in 2012 from (EDGAR) version 4.3.2 including biofuels emissions. Annual changes in GHG emissions are not shown in the graph. Due to the dynamic approach to continuously improve data quality using official government sources, the carbon tax only covering F-gases in Spain was added. The information on the China national ETS represents early unofficial estimates based on the announcement of China's National Development and Reform Commission on the launch of the national ETS of December 2017

Source: State and Trends of Global Carbon Pricing 2018 - World Bank



### Prices in implemented carbon pricing initiatives, The World Bank

Note: Nominal prices on April 1, 2018, shown for illustrative purpose only. The Australia ERF Safeguard Mechanism, British Columbia GGIRCA, Kazakhstan ETS and Washington CAR are not shown in this graph as price information is not available for those initiatives. Due to the dynamic approach to continuously improve data quality using official government sources, the carbon tax covering only F-gases in Spain and F-gas tax in Denmark were added. Prices are not necessarily comparable between carbon pricing initiatives because of differences in the sectors covered and allocation methods applied, specific exemptions, and different compensation methods

Source: State and Trends of Global Carbon Pricing 2018 – World Bank



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# Five major developments expected to impact the carbon ecosystem and its participants



#### Value capture potential also linked to speed to market & ability to scale up quickly

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