



# **Global Gas & LNG Market, Regional impact and role of D-LNG**

International Gas Union Forum

April 2019



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With respect to operating costs synergies indicated, such savings and efficiencies in procurement spend include economies of scale, specification standardisation and operating efficiencies across operating, capital and raw material cost areas.

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# 1.0

## **Global Gas & LNG Market**





# I. Shell LNG Outlook 2019

## Growing recognition of the role of gas and LNG

Global energy demand set to grow by **18%** by 2035

Gas to meet around **40%** of this additional demand

LNG continues to be the fastest-growing gas supply source – more than half of LNG import growth in Asia

### Coal-to-gas switching led to

**78%** improvement in Beijing winter air quality in last 5 years

**176** million tonnes reduction in CO<sub>2</sub> emitted by Beijing and surrounding areas

equivalent to **37 million cars** off the road

Economic and environmental benefits making LNG an attractive road transport option

**6.7** million tonnes of LNG used on China's roads in 2018

## Asian LNG imports exceed expectations again in 2018 absorbing continued supply growth

China, India, South Korea and Pakistan led LNG demand growth in 2018



China became the world's largest gas importer, with LNG imports doubling over 2 years

LNG exports grew by **27 million tonnes** half of the growth came from Australia



Bunkering of world's first LNG-fuelled oil tanker and cruise ship

LNG trade reached **319** million tonnes

Enough to power **643** million homes



LNG imports account for over **50%** of India's gas mix in 2018

Efforts to improve air quality saw China's LNG imports surge by around **16 million tonnes** in 2018



**1400+** spot cargo deliveries in 2018

**34** contracts signed with an average length of more than **13** years

## Near term supply growth expected to be absorbed by Europe and Asia – continued need for investment in supply to meet long-term demand growth

**37** million tonnes of new LNG capacity added in 2018

**35** million tonnes additional supply expected in 2019 – Europe and Asia expected to absorb supply growth



Potential for growth of gas in European power sector – current utilisation of gas fired power generation capacity below 40%

**21** million tonnes of new FID sanctioned in 2018



Supply investment still needed to avoid shortfall by mid-2020s



# I. Global Gas & LNG Market

Growing recognition of the role of gas and LNG as the world tackles poor air quality and climate change



 SHELL LNG OUTLOOK 2019

## The energy challenge

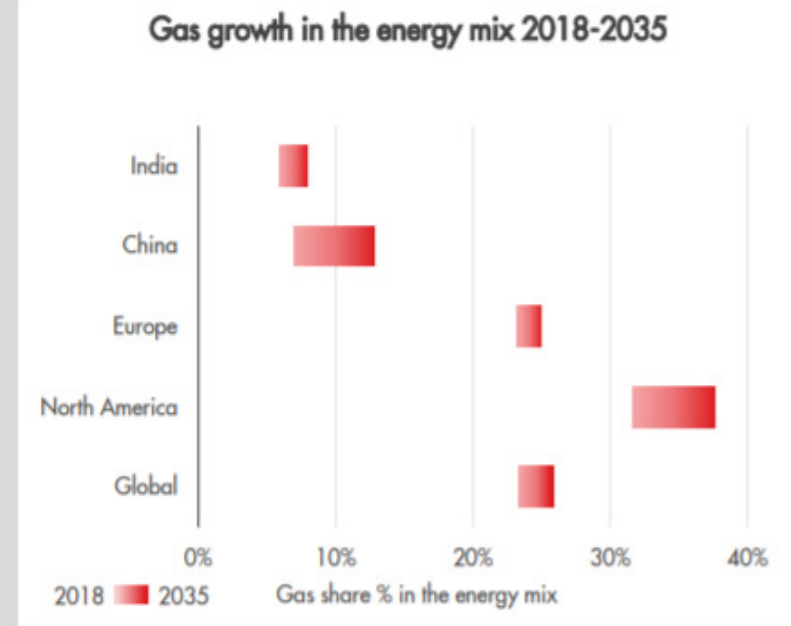
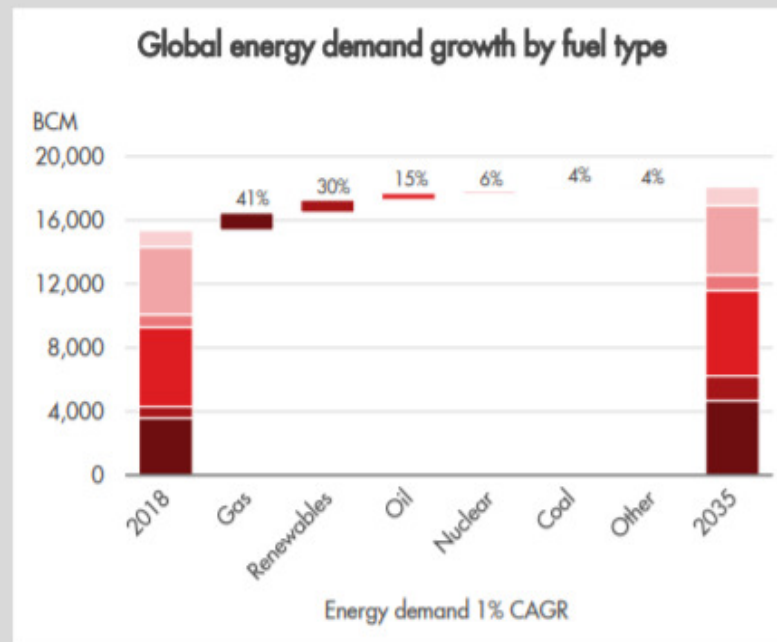
<b>Growing population</b> <p>According to United Nations estimates, the current world population of 7.6 billion is expected to reach 8.6 billion in 2030, 9.7 billion in 2050 and 11.2 billion in 2100. Nearly a billion people still live without electricity while another billion struggle with unreliable supplies of electricity.</p>	<b>Rising demand</b> <p>By 2070 the world is likely to be using at least 50% more energy than it does today as population grows and people seek to improve their quality of life.</p>	<b>Need for energy solutions</b> <p>According to the International Energy Agency (IEA), renewable generation is expected to underpin the growth of electricity from 18% to 50% of energy supply by 2050. The remaining energy demand that is difficult to electrify will still require cleaner solutions.</p>	<b>Mitigating climate change</b> <p>The world currently emits 33 billion tonnes of energy-related CO<sub>2</sub> each year. To limit the rise in global temperature to 2°C, the IEA has calculated that energy related CO<sub>2</sub> emissions need to fall to around 18 billion tonnes a year by 2040. The challenge is not just to reduce emissions, but to do this while providing more reliable energy supplies.</p>	<b>Improving air quality</b> <p>Updated World Health Organization (WHO) estimates reveal an alarming death toll of 7 million people every year caused by outdoor and household air pollution. According to WHO, global air pollution is linked to inefficient energy use in every sector of human activity including coal-fired power plants, industry, agriculture and transport.</p>
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Royal Dutch Shell

# I. Global Gas & LNG Market

SHELL LNG OUTLOOK 2019

## Gas and renewables to play a critical role in meeting the energy challenge



Source: Shell interpretation of Wood Mackenzie Q4 2018 data

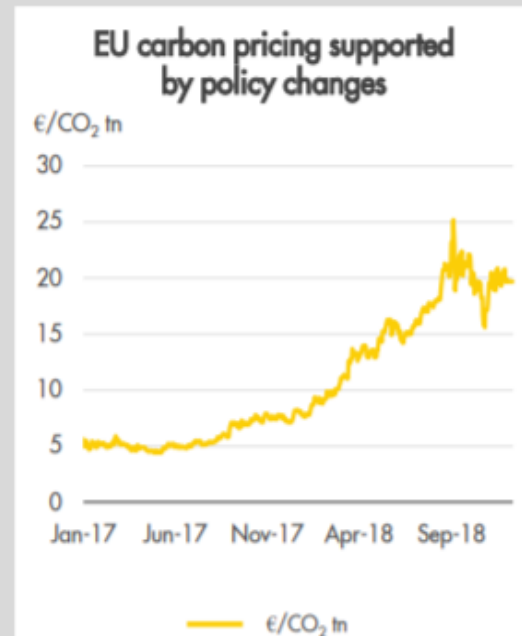
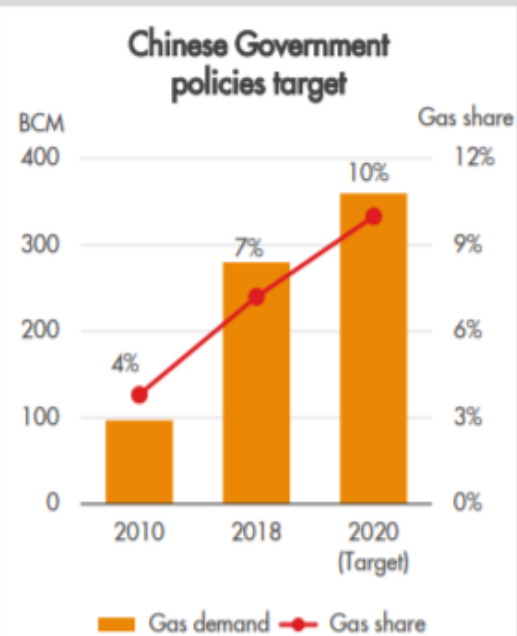
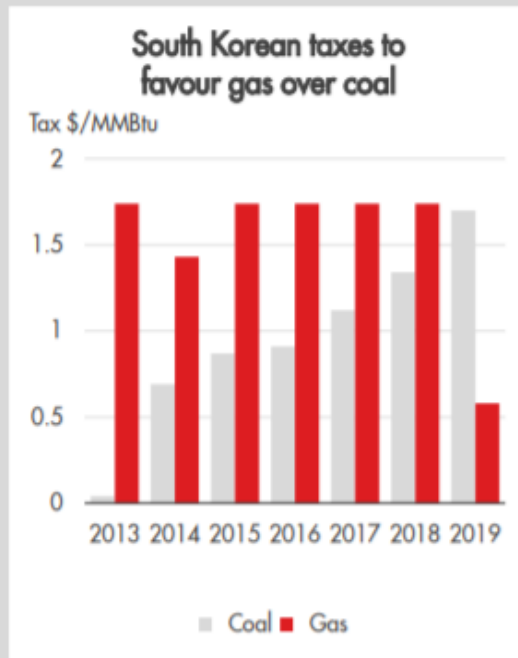
CAGR - Compound annual growth rate



# I. Global Gas & LNG Market

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## Government policies being implemented encouraging a cleaner energy mix

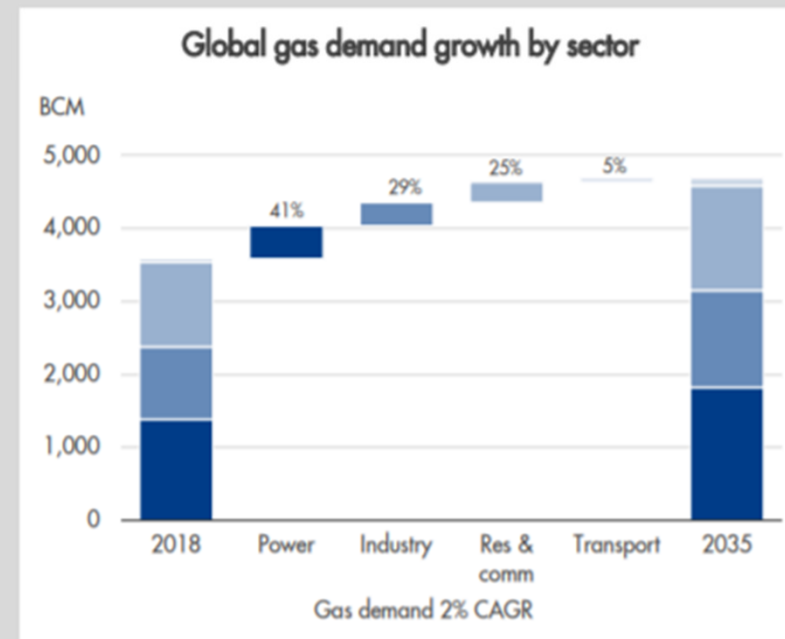
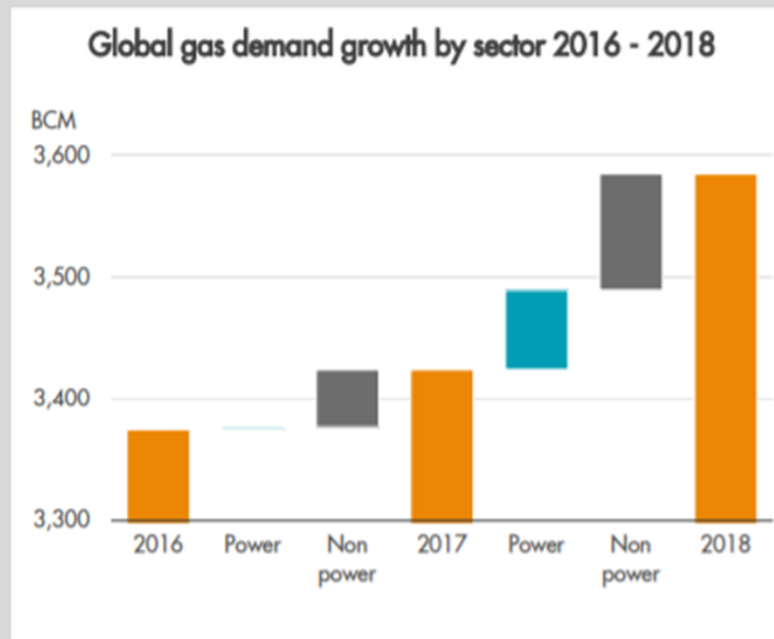


Source: Shell interpretation of IHS Markit and ICE Q4 2018 data and announced public policy

# I. Global Gas & LNG Market

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## Gas demand growth not reliant on the power sector



Source: Shell interpretation of Wood Mackenzie Q4 2018 data

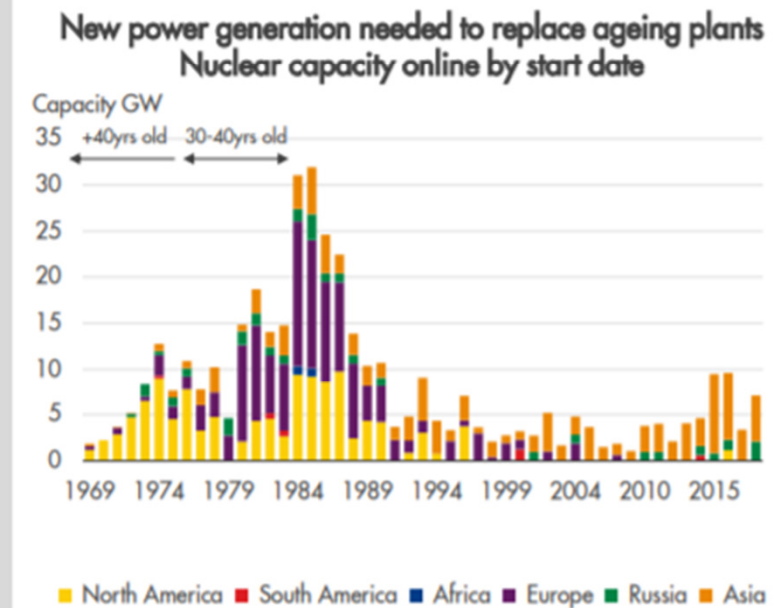
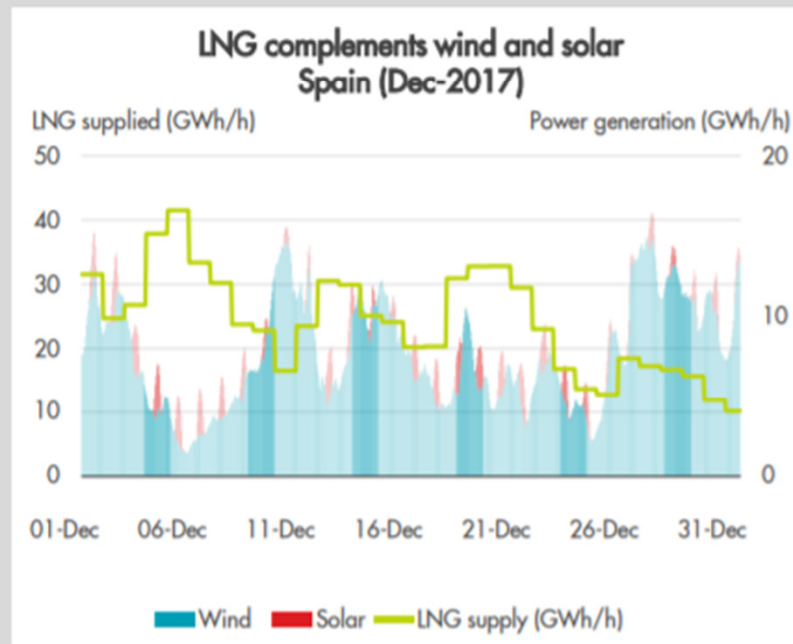
Res & Comm - Residential and Commercial



# I. Global Gas & LNG Market

◇ SHELL LNG OUTLOOK 2019

## Gas provides required flexibility for power generation



Source: Shell interpretation ENTSOG, REE, World Nuclear Association 2017 and 2018

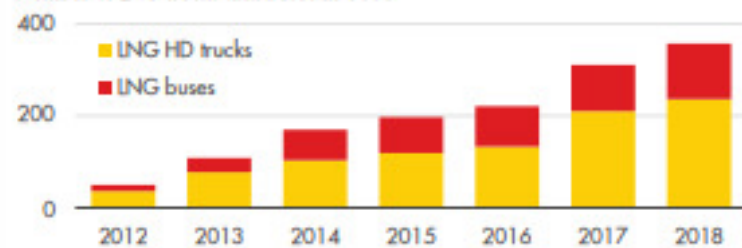
# I. Global Gas & LNG Market

SHELL LNG OUTLOOK 2019

## Economic and environmental benefits increasing the use of LNG in road transport

### China LNG fuelled heavy-duty transport

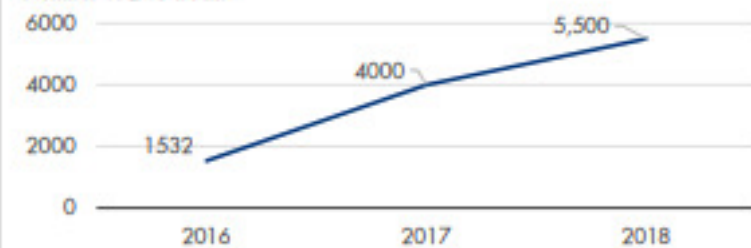
Number of LNG trucks and buses in 1000



Source : Shell analysis of Woodmac, SCI, and NGVA data

### Europe moving to LNG fuelled heavy-duty transport

Number of LNG trucks



Royal Dutch Shell

6.7 MT of LNG consumed in China for road transport in 2018

2,552 LNG fuel stations in 2018



280,000 LNG trucks expected by 2030

155 LNG fuel stations in 2018

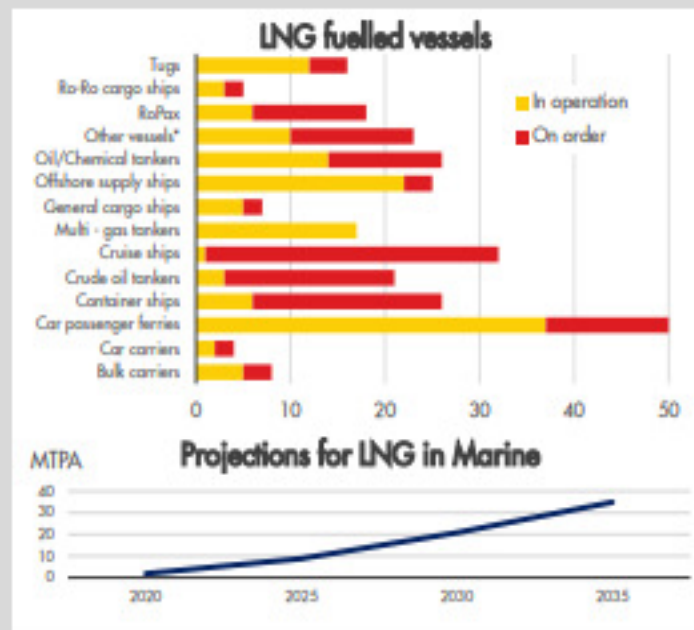
Co-financed by EU, BioLNG EuroNet is building 39 LNG stations, 2000 LNG trucks and a BioLNG production plant



# I. Global Gas & LNG Market

SHELL LNG OUTLOOK 2019

## Marine LNG poised for growth



Source: Shell interpretation of DNV-GL & Woodmac \*Other vessels includes fishing vessels, dredgers, etc.



spot cargo deliveries in 2018

### 2018

#### QUARTER 1

Mitsui OSK order LNG bunker barge to serve Total-CMA-CGM deal



World's first LNG-fuelled bulk carrier charter delivered



Carnival orders 9th LNG fuelled Cruise ship



#### QUARTER 2

Shell agrees to charter two LNG powered tankers from AET



MPA awards grants for two LNG bunker barges for Singapore



#### QUARTER 3

First Japanese LNG bunker vessel ordered



Hapag Lloyd announces it will convert a container vessel to operate on LNG



#### QUARTER 4

Crowley takes delivery of second LNG-powered container/roll on-roll off (ConRo) ship



Bunkering of the first LNG fuelled Aframax tanker by Shell Cardissa



H-Line Shipping ordered two LNG fuelled bulk carriers



World's first LNG powered cruise ship sets sail



Kairós, the 7,500 m³ bunker vessel started operations



Adnoc and Inpex sign agreement to explore LNG bunkering opportunities in UAE



Public Gas Corp of Greece signed a grant agreement with EU for construction of the first LNG bunkering vessel



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# 2.0

**Chile as a key market in  
Southern Cone**





## II. Chile as a key market in South Cone

### Gas & LNG Infrastructure

- Chile has two LNG terminal with a total regas capacity of 20.5mmcmd:
  1. Quintero: The 2.5 MMtpa LNG terminal (15 mmcmd or 530MMcf/d regasification) feeds the Santiago region
  2. Mejillones: The 1.5 MMtpa LNG terminal (5.5 mmcmd or 195MMcf/d regasification) that serves gas demand in the Antofagasta region
- Chile is linked to Argentina by several pipelines:
  1. NorAndino
  2. GasAtacama
  3. GasAndes
  4. Pacifico
  5. Methanex
- Potential to growth the market in Concepcion and Puerto Montt

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# 3.0

## D-LNG Opportunities



### III. D-LNG opportunities to growth the market

Shell Integrated Gas

#### Shell's Integrated Gas business around the world

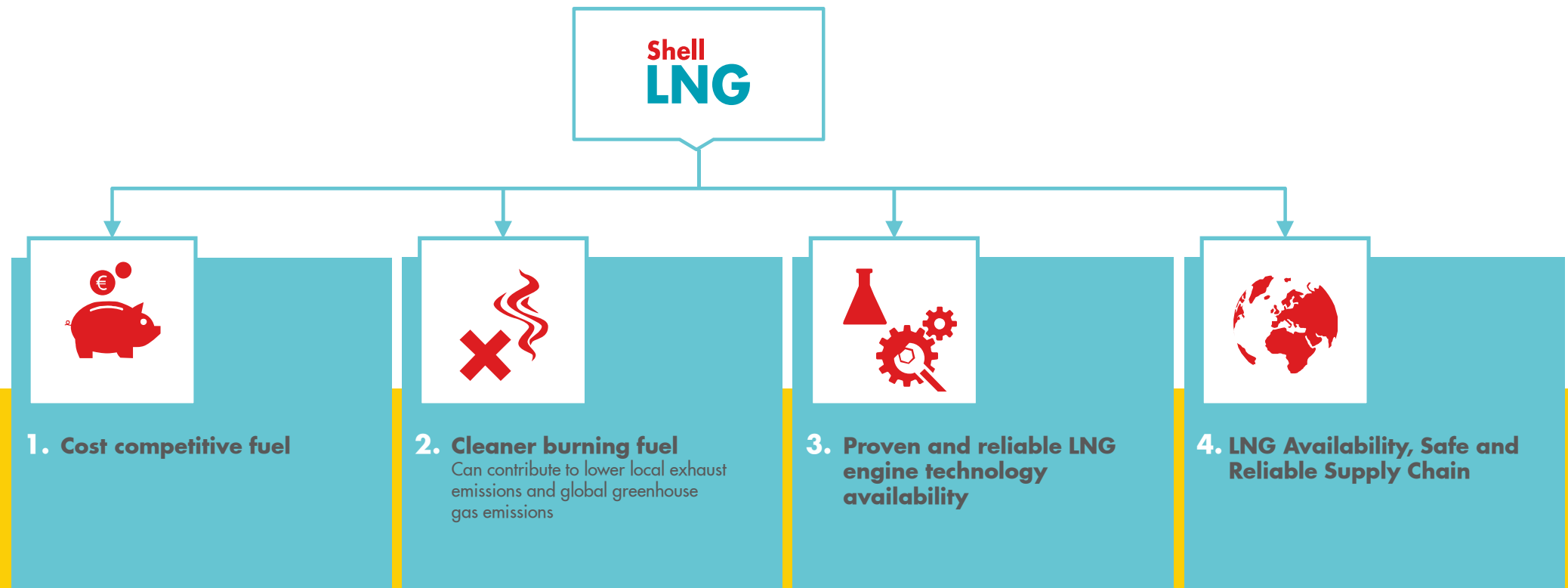
	On stream	Under construction
Liquefaction	■	■
Regasification	●	
GTL	◆	





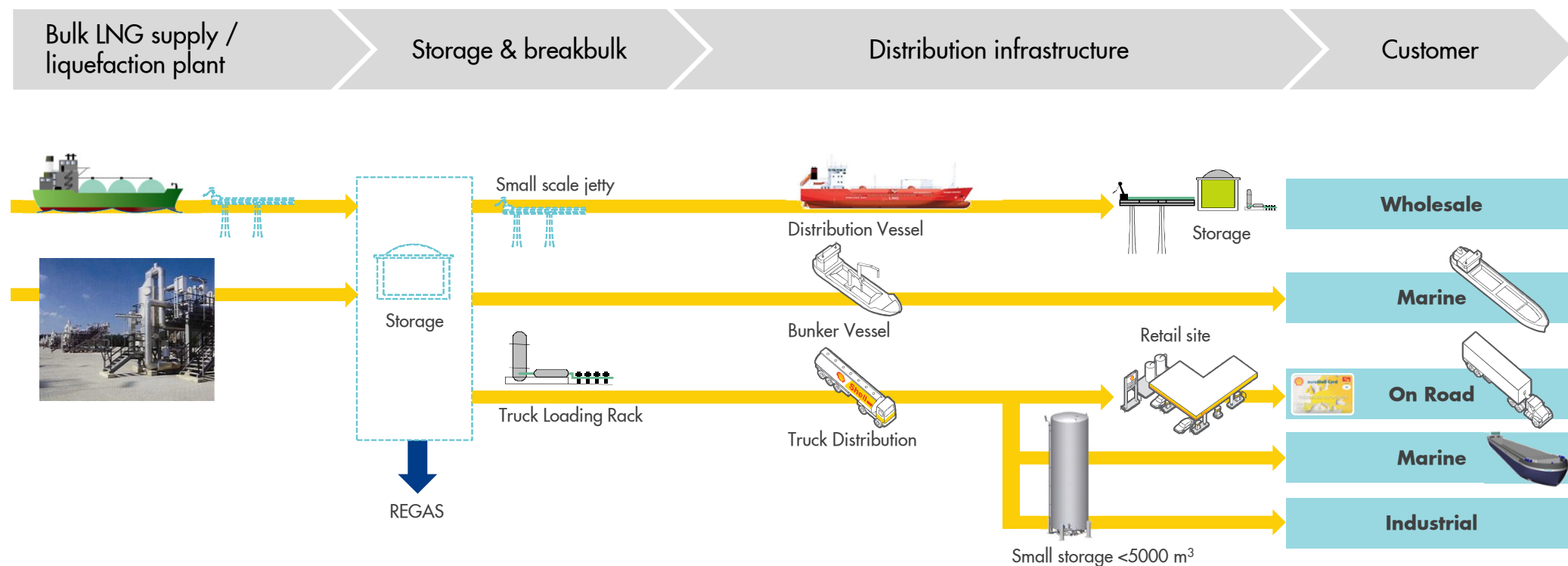
### III. D-LNG opportunities to growth the market

LNG can offer a compelling value proposition



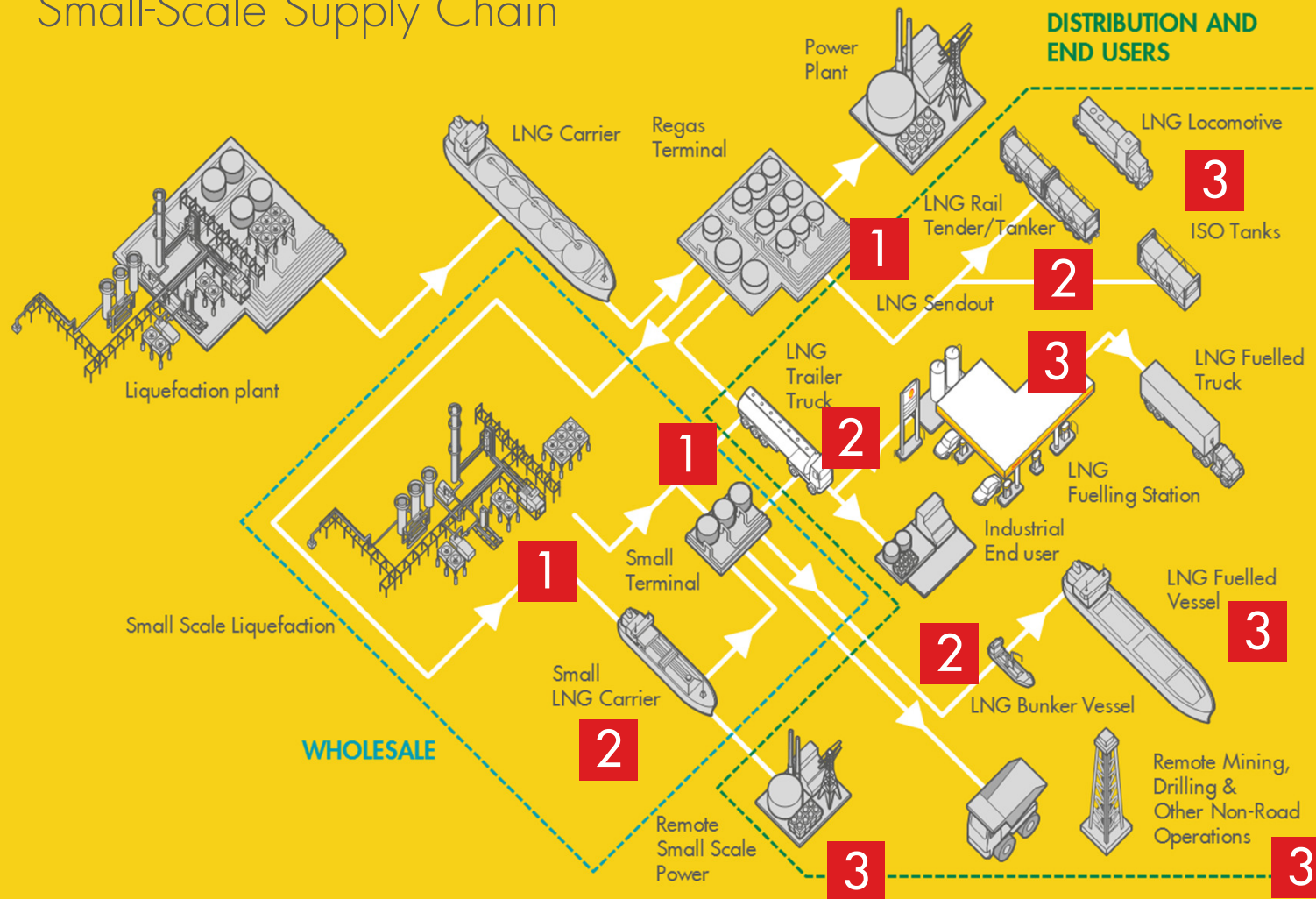
### III. D-LNG opportunities to growth the market

by leveraging an integrated LNG value chain



### III. D-LNG opportunities to grow the market

#### Small-Scale Supply Chain



**1 Loading**  
Truck loading unit or Small LNG carrier

**2 Midstream**  
Truck load transport, ISO container or small scale vessel

**3 Market**  
Regasification or direct usage



### III. D-LNG opportunities to growth the market

#### LNG Small-Scale Development – Integration is at Shell's Heart

2012



Shell acquires Gasnor, now a 100% Shell subsidiary

2014



Shell announces commitment to break-bulk jetty at the GATE (Gas Access To Europe) terminal in Rotterdam, Netherlands & LNG bunker vessel

2015



Shell charts LNG-powered Offshore Supply Vessel in the Gulf of Mexico

Shell opens first European LNG truck refueling station in Rotterdam

2016 / 2017



The Government of Gibraltar selects Shell to provide an end to end supply solution for small-scale LNG



Shell signs a supply agreement with Carnival Corporation to supply LNG to fuel two of the world's largest passenger cruise ships

### III. D-LNG opportunities to growth the market

#### Shell Partnering Solutions Across the Value Chain



##### LNG SUPPLIER

- Large global portfolio of LNG supply ensures security of supply and flexibility for customers
- Focused on building partnerships and long term relationships with customers, tailoring solutions towards the specific needs, supported by rich heritage in LNG shipping



##### TECHNICAL ADVISOR

- Trusted advisor in the end to end development of regasification projects
- Providing technical construction and assurance services for onshore and FSRU projects
- Based on deep knowledge of LNG regas operations, providing scheduling and logistics assistance



##### LEAD DEVELOPER & OPERATOR

- Partner or lead developer for regas projects globally
- Long standing experience in both conventional large scale and small scale LNG regas projects
- Developing projects end to end from inception, through feasibility, design, construction and operations phase



##### GAS MARKETER

- Experienced gas marketer to wholesale and end customers
- Combining upstream assets, pipeline and LNG terminals with marketing and trading expertise to offer fully integrated solutions to customers
- Underpinning regas project developments by taking capacity in terminals





### III. D-LNG opportunities to growth the market

#### LNG for Transport

##### Road

- Suitable for heavy-duty trucks & buses
- LNG can help reduce greenhouse gas emissions versus conventional road fuels

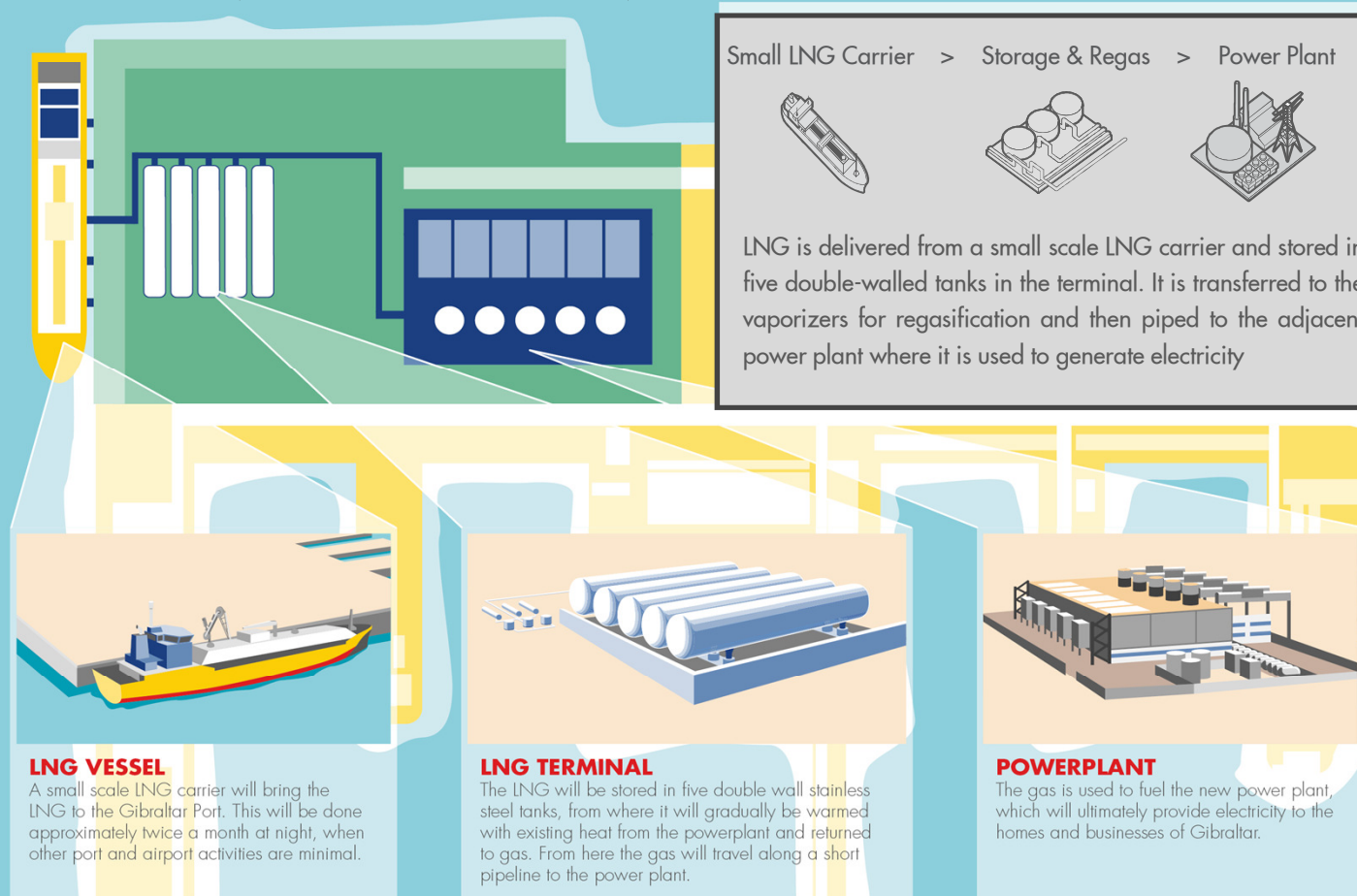
##### Marine

- LNG can fuel many types of vessels – from container and tanker ships and tugs to cruise vessels, ferries and car carriers
- It helps marine operators meet emissions targets – now and in the future, offering virtually zero sulphur and reduced nitrogen oxides and particulate matter. GHG emissions can also be reduced by over 20%
- Our approach includes developing LNG bunkering hubs in key global ports



### III. D-LNG opportunities to growth the market

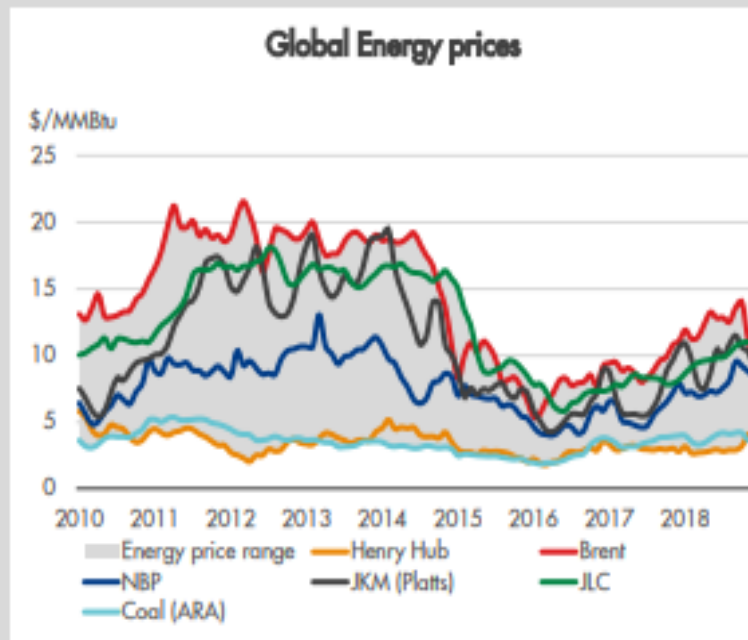
#### EXAMPLE: Small-Scale LNG – Gibraltar LNG



# I. Global Gas & LNG Market

SHELL LNG OUTLOOK 2019

## Spot prices remained robust



Source: Shell interpretation of Japanese customs data (Japan LNG import), S&P Global Platts (JKM), ICE (NBP, Brent, ARA coal), NYMEX (Henry Hub)