

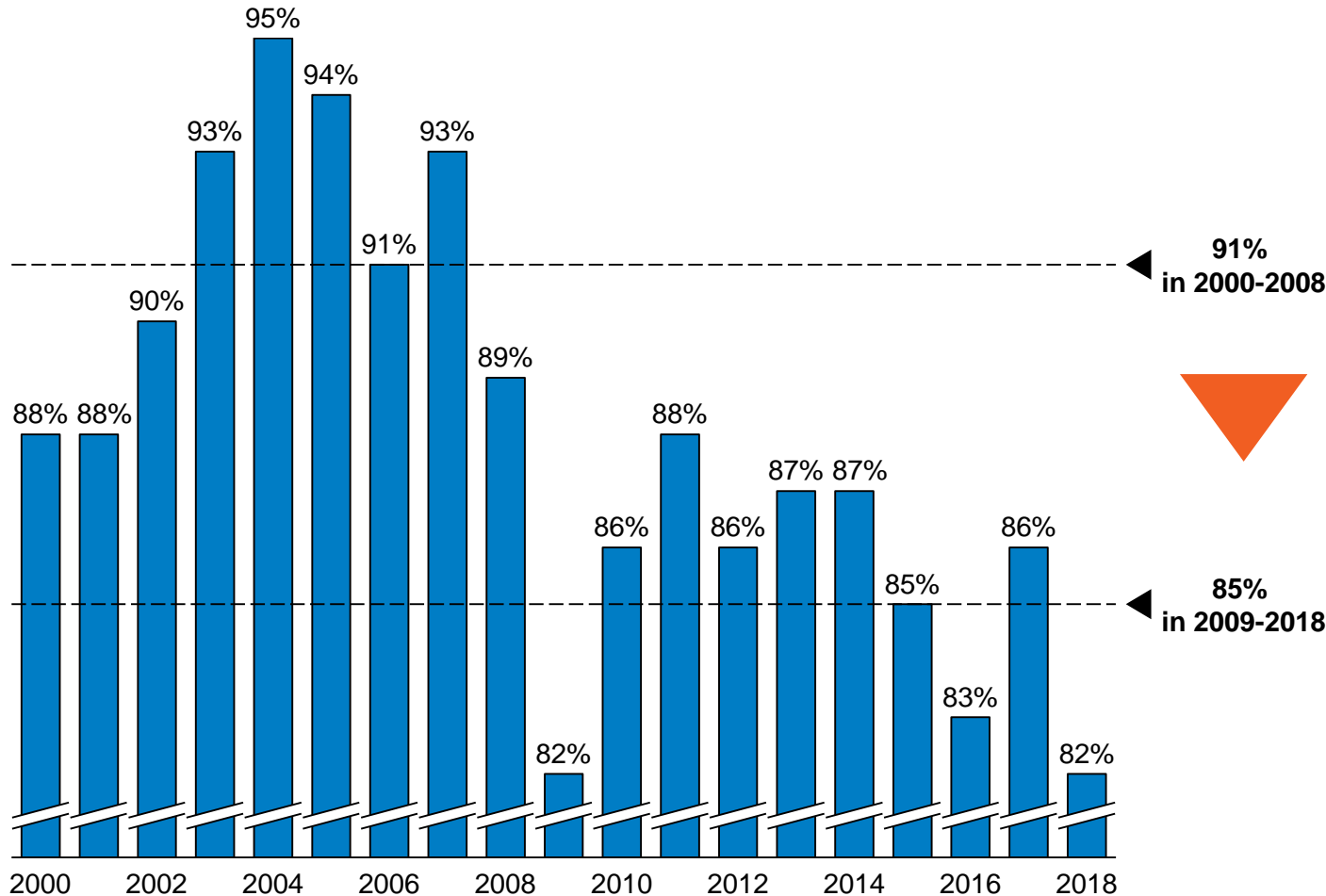
# GLOBAL LNG MARKET: ILLUSORY GLUT

December 2018

The bottom half of the slide features an abstract background composed of overlapping, semi-transparent blue polygons in various shades, ranging from light sky blue to deep navy blue. The shapes are layered to create a sense of depth and movement, resembling a stylized landscape or a complex geometric pattern.

# In 2009-2018 average liquefaction capacity utilization decreased to the lowest historical levels – 85%

## Global average liquefaction capacity utilization



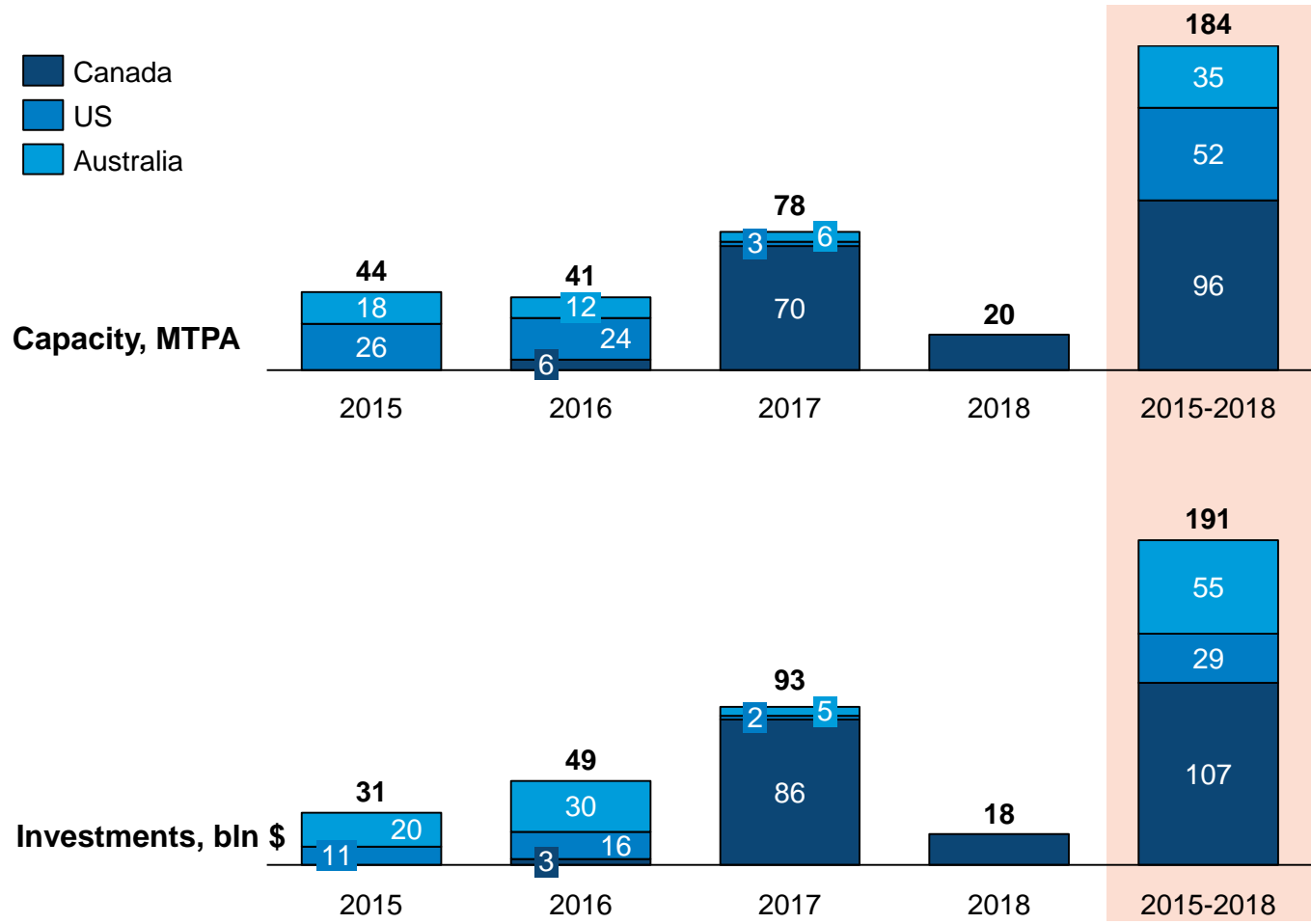
- Cyclical development is inherent to energy markets. Price environment significantly affects investment decisions on gas production and construction of LNG plants.

- In 2010-2014, amid substantial price premiums in Asian markets investors had become increasingly interested in LNG. Consequently, 93 MTPA of liquefaction capacity is currently under construction.

- As a result, the average capacity utilization of operational plants in the past 10 years has declined to the lowest historical levels – 85%, as compared to 91% in 2000-2008.

# 20 LNG projects with a total capacity of 184 MTPA were cancelled due to unfavorable price environment in 2015-2017

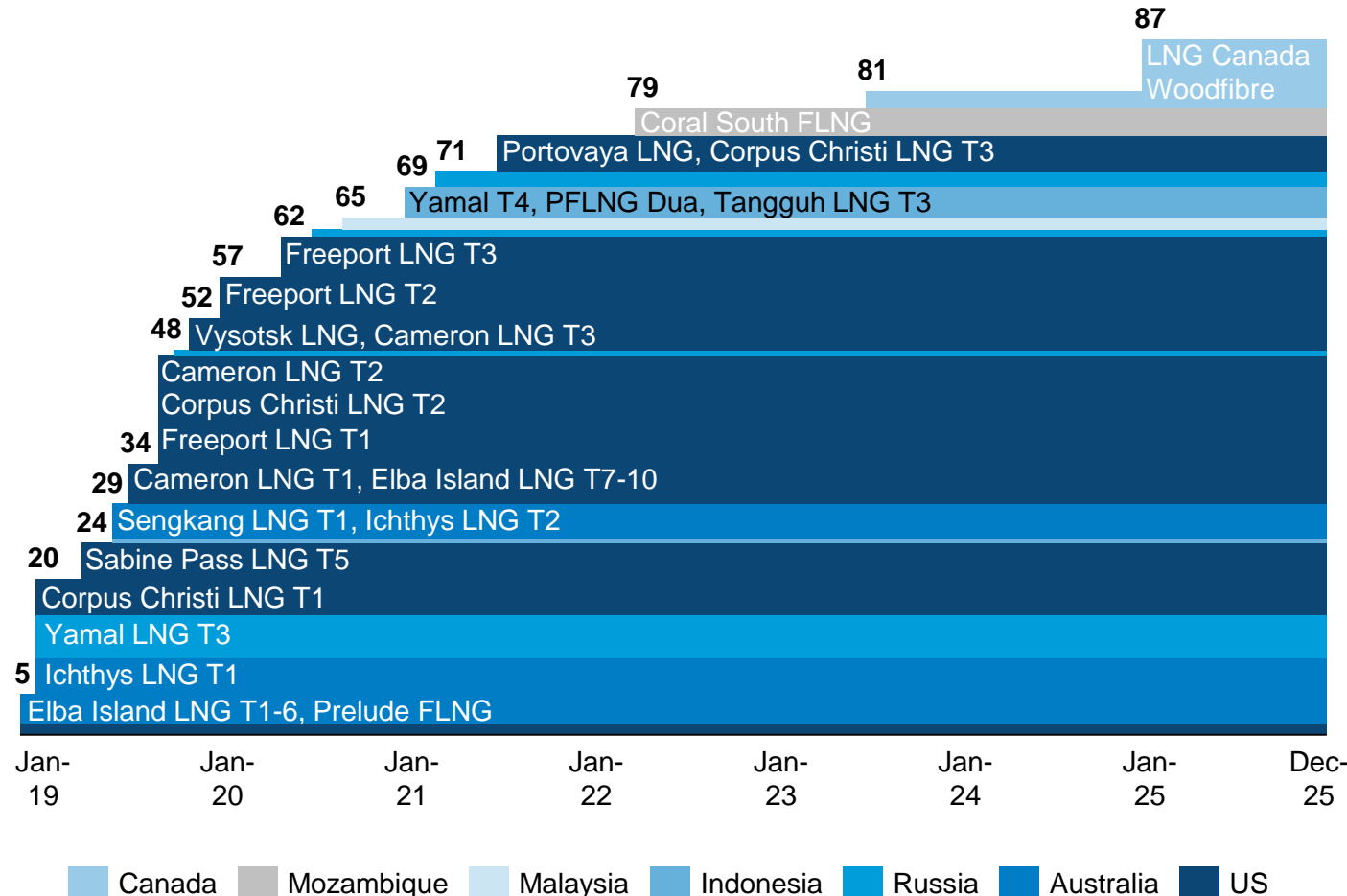
## Capacity and expected investments of the projects cancelled in the period from 2015 to 2018



- After the fall in gas prices in early 2015, oil and gas companies started to curtail their investment programs. As a result, 20 LNG projects with a total capacity of 184 MTPA were cancelled, primarily in the US, Canada and Australia.
- The total amount of investments that were planned to be made in the LNG industry over 2015-2018 is estimated at 191 bln \$.
- Over the same period, 42 projects were postponed with only half of them awaiting FIDs in 2019-2020.

# 93 MTPA of liquefaction capacity are currently under construction, of which 87 MTPA will be operational by the end of 2025

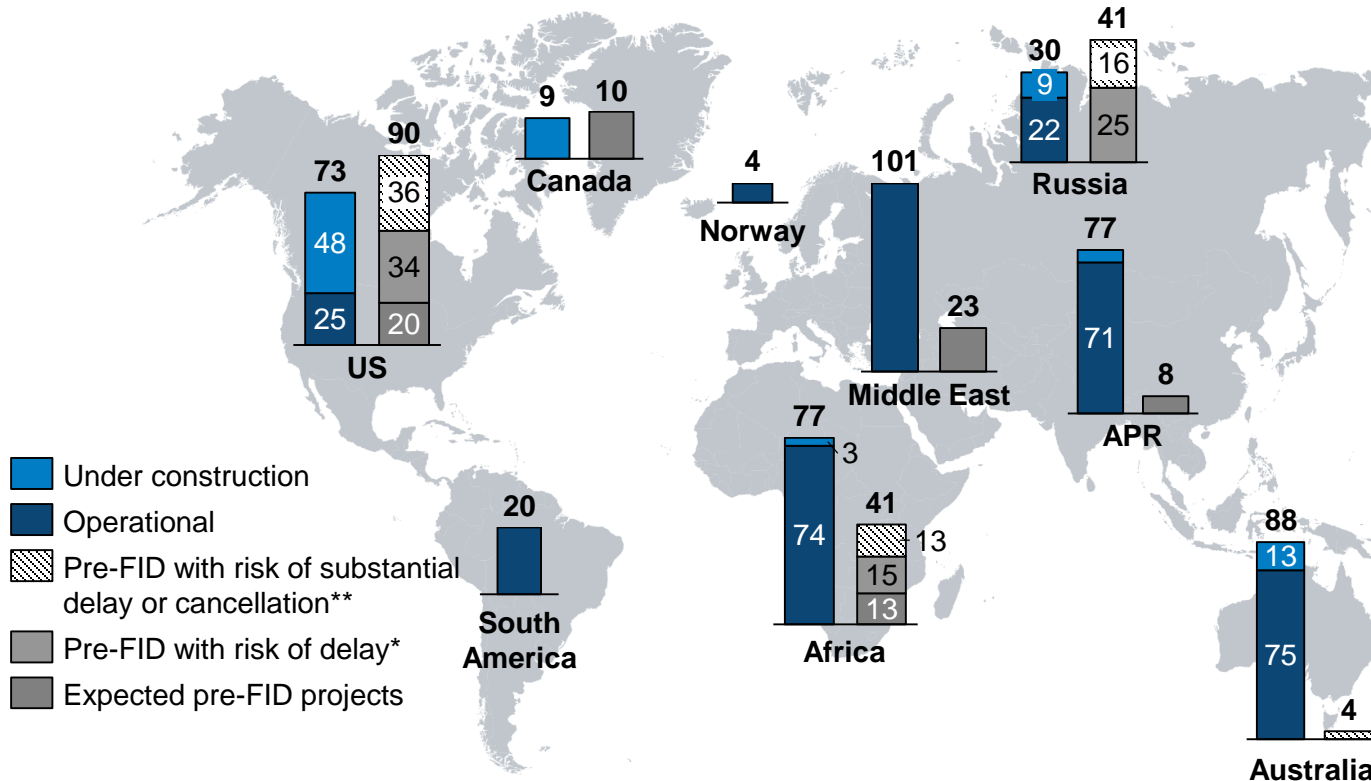
## Projected commissioning of under construction liquefaction capacity worldwide, MTPA



- 93 MTPA of liquefaction capacity are currently under construction worldwide, of which 87 MTPA will be launched by the end of 2025.
- This new wave is led by US projects as they account for 55% of the latter amount.
- It is expected that 75% of capacity currently under construction will be commissioned by the end of 2020, while only 22 MTPA will be added in the following 5 years, which is a direct result of insufficient investment activity in 2015-2017.

# Timely launch of plants under construction and Arctic LNG 2 will make Russia the 4<sup>th</sup> largest LNG producer in 2025

Status of LNG projects worldwide as of late October 2018 and their capacity as of the end of 2025, MTPA



- In the Baseline scenario, which implies that only under construction and expected pre-FID projects are launched in time, Qatar will retain its position as the global leader in terms of installed capacity with 100.5 MTPA as of the end of 2025.
- The US will take Australia's place as the producer with the 2<sup>nd</sup> largest installed capacity with 92.7 MTPA. By 2030 the US will take the lead.
- After the launch of LNG plants currently under construction Russia will take the 6<sup>th</sup> position lagging behind Malaysia and Indonesia in addition to the aforementioned states.
- In case of timely commissioning of Arctic LNG 2, Russia will gain two more positions and become the producer with the 4<sup>th</sup> largest installed liquefaction capacity.

\* Risk of delay implies the postponement for 1-2 years.

\*\* Risk of substantial delay or cancellation for Russia, where there is no practice of cancellation/abolition of projects, implies the postponement for 3 or more years; for the rest of the world – postponement for 3 or more years or confirmed cancellation.

# Transport constrains may result in underutilization of future and currently operational LNG plants

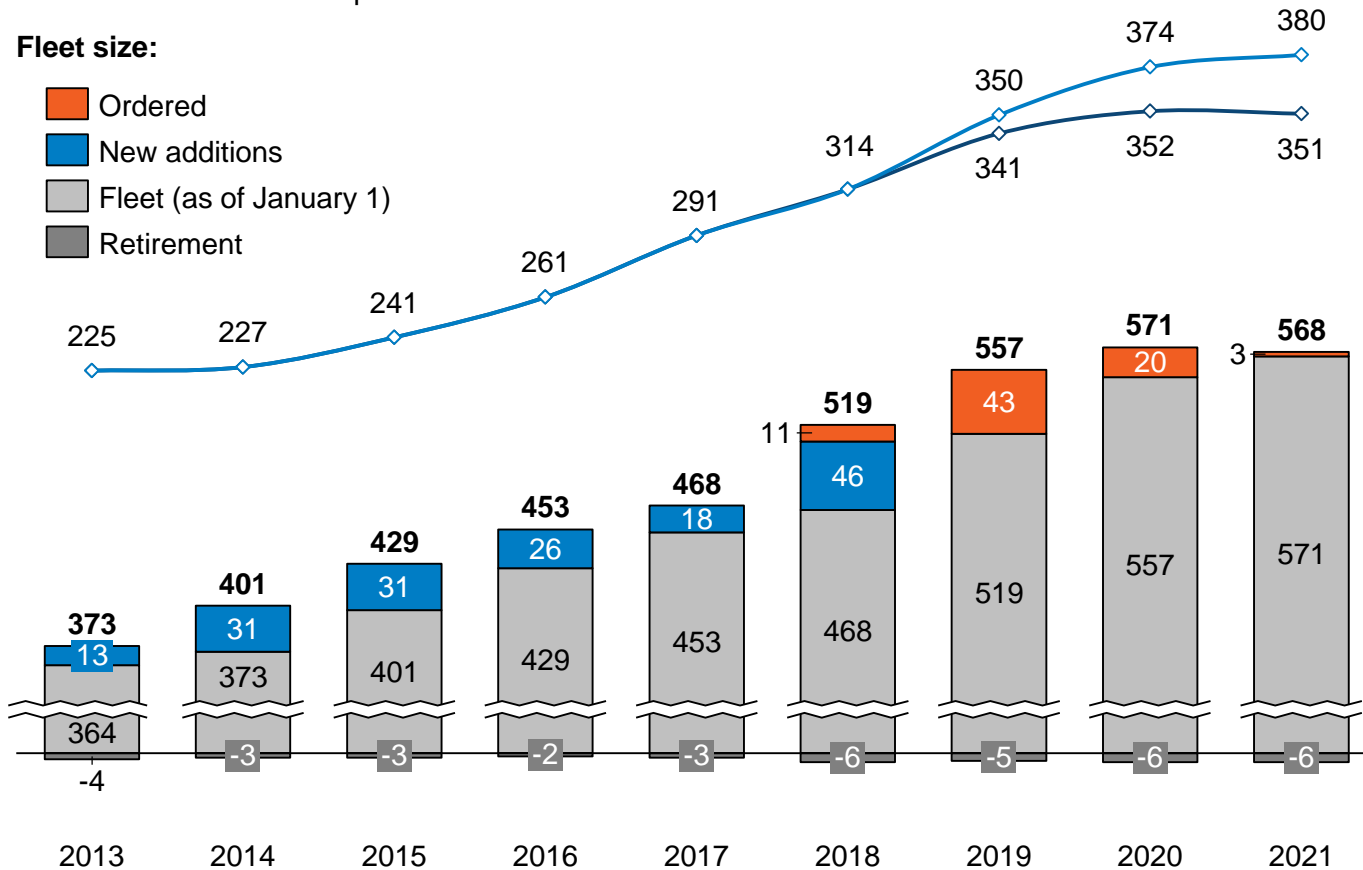
## Projected LNG-carrier fleet (units) and its capabilities (MT) up to 2021

### Fleet capabilities vs LNG supply:

- ◇— LNG supply (Baseline scenario)
- ◇— LNG-carrier fleet capabilities

### Fleet size:

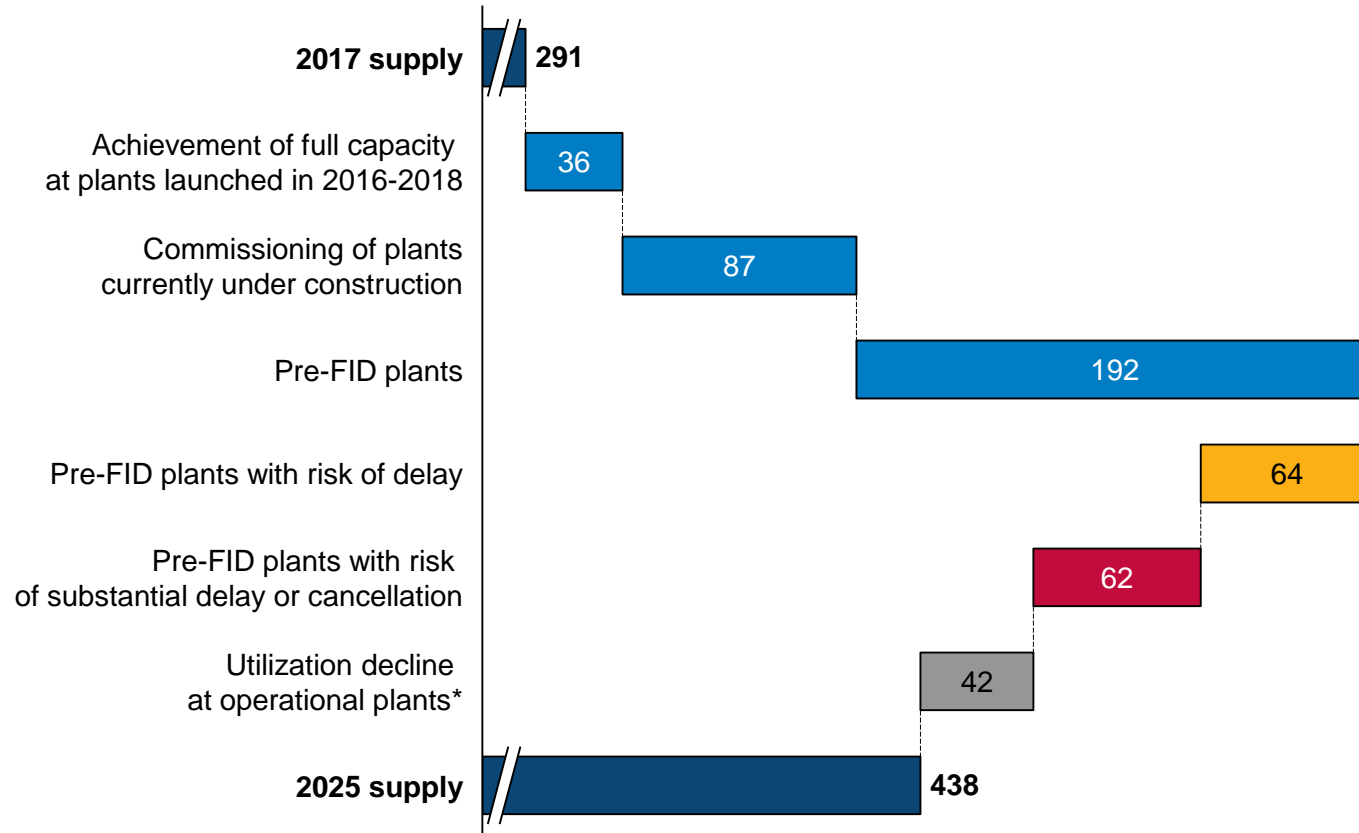
- Ordered
- New additions
- Fleet (as of January 1)
- Retirement



- In 2018 the size of the LNG-carrier fleet will increase to 519 vessels. Their total capacity of 35 MT will be sufficient to ensure exports of 314 MT of LNG, all of the re-exports and storage.
- However, in 2019 the fleet size will amount to 557 units; given the current rate of vessel turnover it will be able to transport only 341 MT of LNG. With the commissioning of LNG plants currently under construction and their 100% utilization, the LNG production potential will reach 350 MT; thus new projects will not be able to transport 9 MT of LNG in 2019.
- By 2021 the issue will become increasingly more pressing since there will be no LNG-carriers for the transportation of 29 MT of LNG.

# LNG supply growth is limited by risks of delay and cancellation of new projects as well as forced plant utilization decline

## Drivers of global LNG supply change in 2017-2025 (Baseline scenario), MT

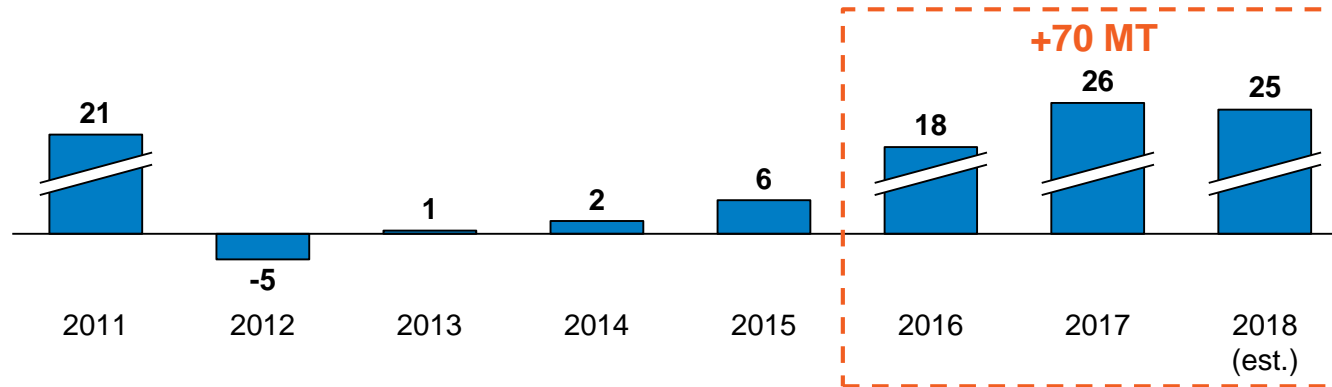


- Many companies have already announced their intentions to make FIDs in 2019-2020. In total, this potentially implies the expansion of 6 existing plants and construction of 19 new projects by the end of 2025; however, their implementation faces numerous commercial, economic, regulatory and political risks.
- With a certain confidence we expect timely commissioning of only 3 pre-FID expansions and 3 new plants, in 2025 they will be able to supply 66 MT of LNG.
- Many currently operational plants will be forced to reduce their production volume due to the depletion and redirection of gas reserves for the needs of domestic markets. We expect that by the end of 2025 their LNG output will decline by 42 MT from the 2017 level.

\* Forced decline in production capacity utilization at operational plants due to gas reserves depletion, redirection of gas reserves for the needs of domestic market, etc.

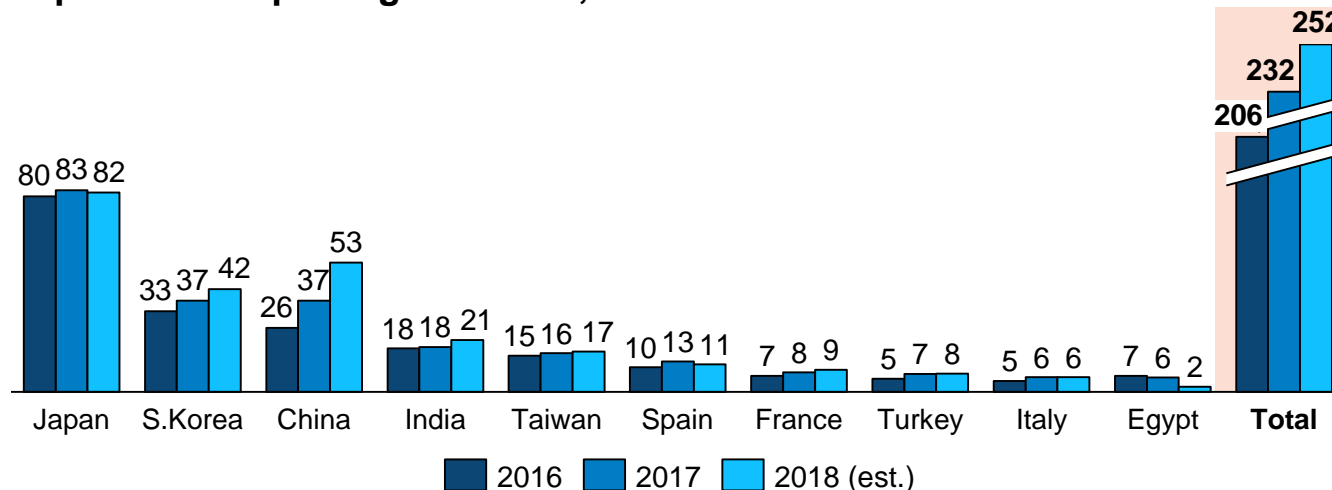
# Global LNG imports saw rapid growth in 2016-2017, this positive momentum will continue in 2018

## Year-to-year LNG consumption growth, MT



- The last two years saw notably high growth rates of global LNG imports: in 2017 the market rose by 26 MT, the APR accounted for 80% of this amount. Even the developed Asian states – Japan and South Korea – made a positive contribution as well the Southern European countries.

## Top 10 LNG importing countries, MT



- Egypt is the only major LNG market that has been reducing the imports of LNG for domestic needs in recent years: in the autumn of 2018 the country completely ceased its liquefied gas purchases due to the accelerated development of its own offshore field reserves.
- We expect that 2018 will be as favorable for the LNG industry as the previous year with the growth of global demand by 25 MT.



# In 2025 new LNG importing countries will contribute 42.7 MT to the global demand

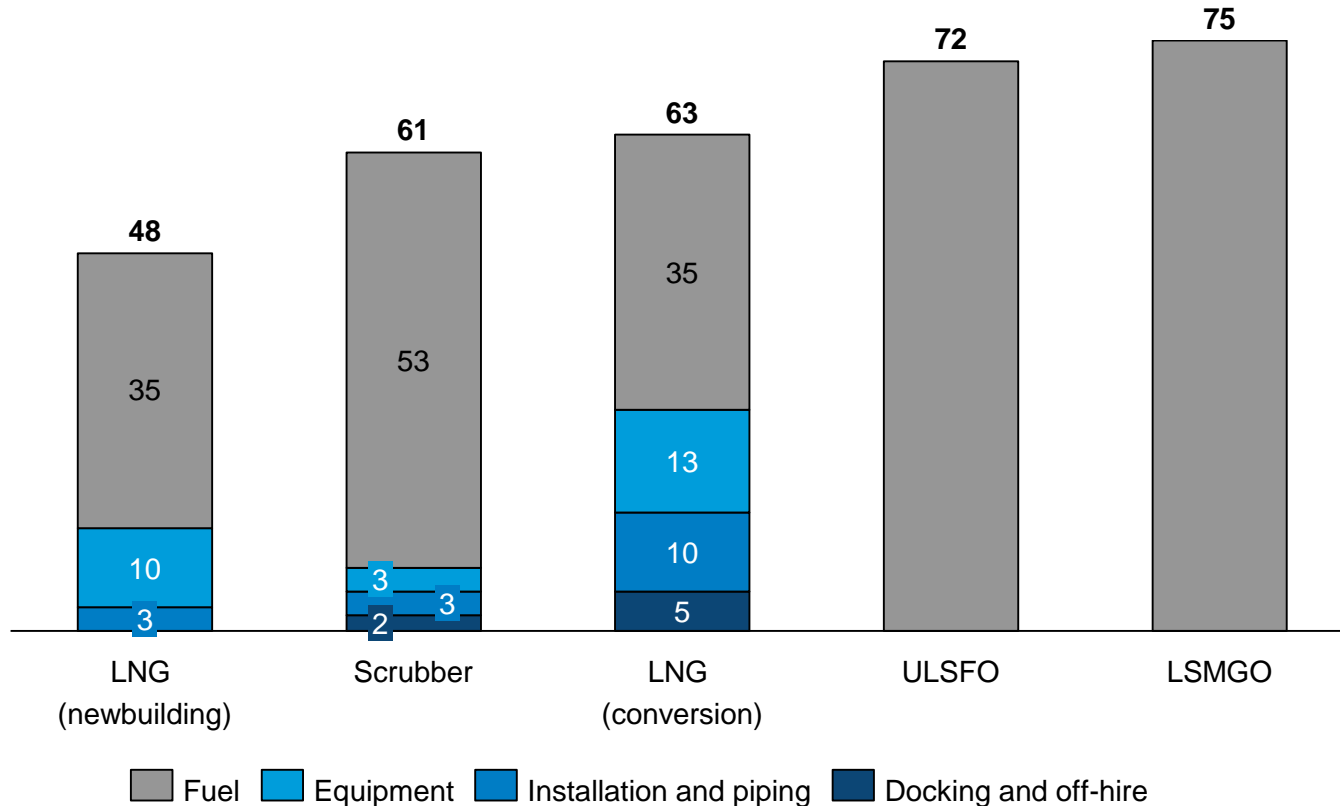
## LNG demand (MT), capacity (MTPA) and utilization (%) of regasification terminals of new importers in 2025

Country	LNG demand	Regasification capacity	Regasification capacity utilization
Bangladesh	12.4	37.7	33%
Germany	4.7	13.9	34%
Bahrain	3.7	6.0	61%
Myanmar	3.3	6.2	53%
Philippines	3.1	8.0	39%
Ireland	2.6	7.5	34%
Morocco	2.5	5.3	48%
Vietnam	1.8	2.8	66%
Estonia	1.7	5.0	34%
Ghana	1.7	2.0	85%
Hong Kong	1.2	4.0	30%
Panama	1.1	1.5	73%
Sri Lanka	1.0	2.6	38%
Croatia	0.6	1.9	34%
Cyprus	0.4	1.3	34%
El Salvador	0.4	0.5	80%
Ivory Coast	0.4	3.0	13%
<b>Total</b>	<b>42.7</b>	<b>109.3</b>	<b>39%</b>

- Increase in the number of LNG importing countries due to the construction of new regasification terminals will contribute to the growth of global demand.
- In 2018 Panama and Bangladesh received their first LNG cargoes. By 2025 another 15 countries will acquire the status of LNG importers.
- By 2025 the total capacity of the regasification terminals of new LNG importing countries will amount to 109.3 MTPA, while their consumption is expected to reach 42.7 MT.

# Introduction of MARPOL standards will contribute only 5 MT to global LNG demand by 2025 due to significant capital costs

5-year cost of MARPOL compliant marine fuels and required equipment of vessels\*, mln \$

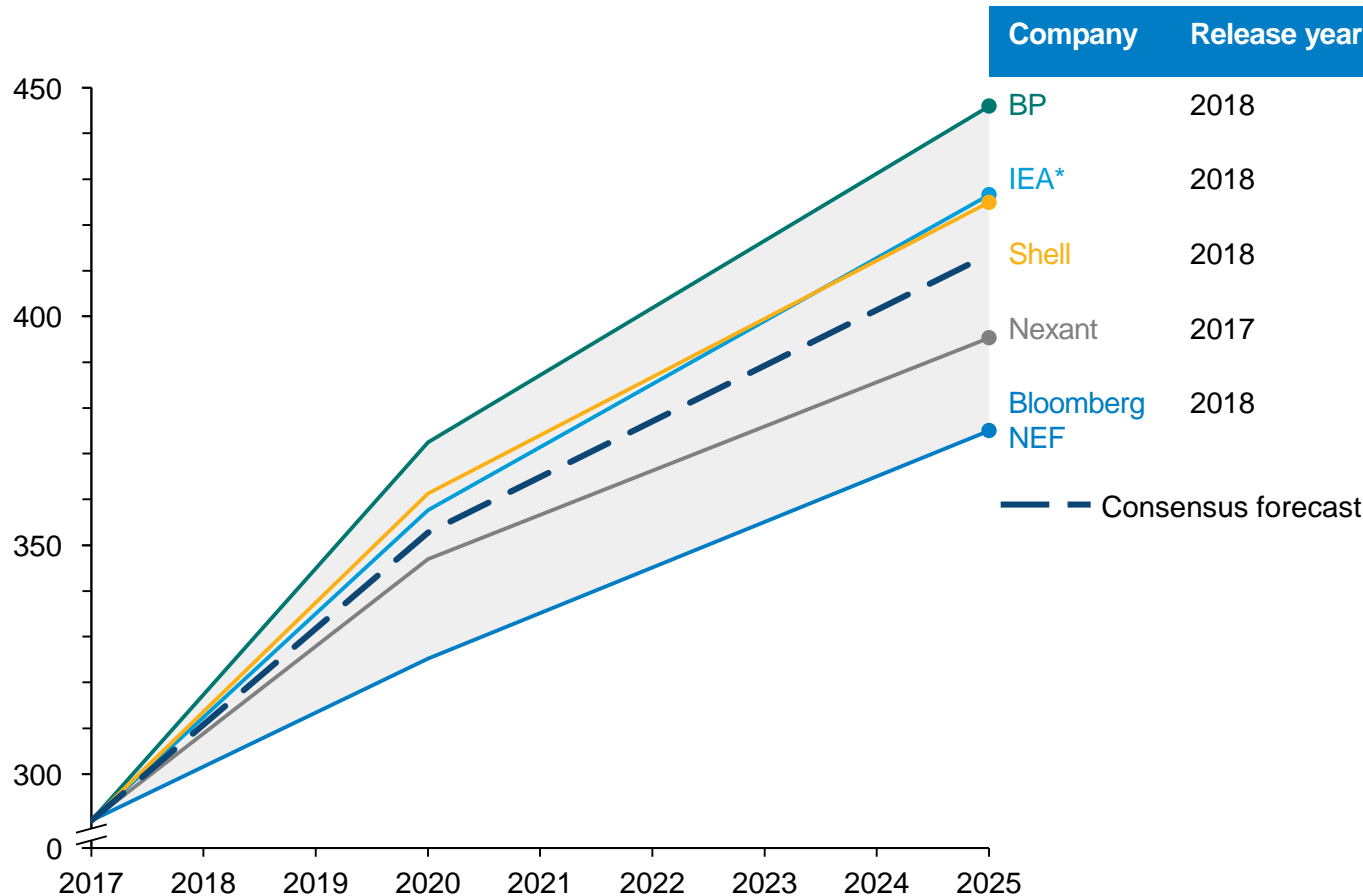


- Today global LNG marine bunker fuel consumption is insignificant as it amounts to less than 1 MT.
- LNG as a marine fuel fully meets the new MARPOL environmental requirements; however, it is not the only alternative for shipowners.
- LNG allows shipowners to cut fuel costs, but it also implies significant capital expenditures (especially in the case of LNG-conversion of existing vessels), which makes it an attractive option for actively used vessels with high fuel consumption, such as large container ships and cruise liners.
- By 2025 liquefied gas will power a fleet of more than 400 vessels, global LNG marine bunker fuel consumption will amount to about 5.1 MT or less than 1.5% of total demand.

\* Assumptions: vessel – 8500 TEU container ship; mileage – 70 thous. nm per year; fuel consumption: LNG vessels – 146 tpd, scrubber-equipped vessel – 208 tpd, ULSFO and LSMGO – 193 tpd; speed – 23.5 knots; fuel price: LNG – 383 \$/t, LSMGO – 622 \$/t, ULSFO – 601 \$/t, HSFO – 407 \$/t.

# Analytical agencies and energy companies see strong growth potential for global LNG demand

## LNG demand outlooks up to 2025, MT

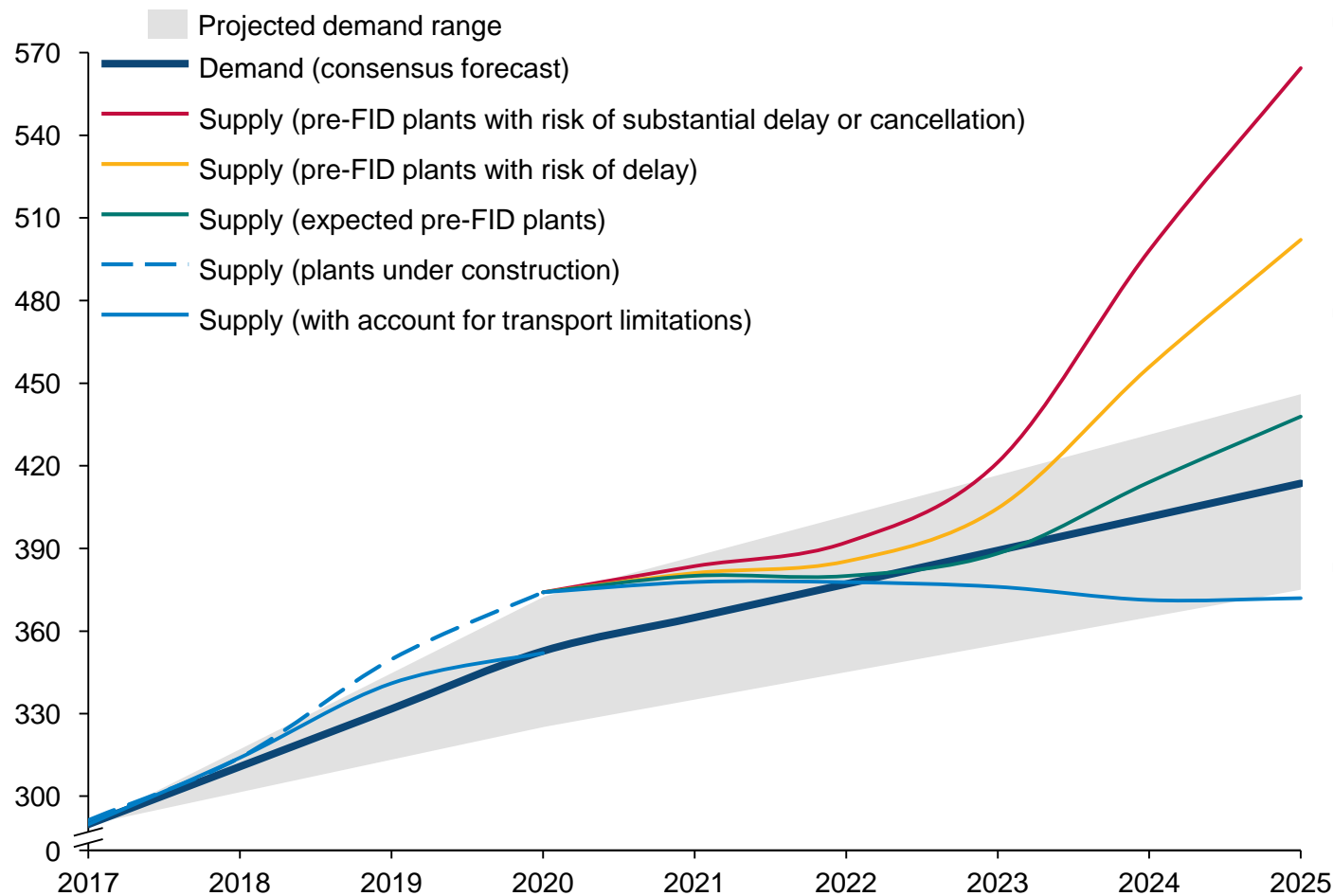


- Analytical agencies and energy companies agree that the global LNG market will see strong long-term growth.
- They expect that amid falling domestic gas production in importing countries, the defined environmental agenda and other factors, LNG demand will be increasing at an average annual rate of 3.3-5.5% and by 2025 it will reach 395-446 MT as compared to 290 MT in 2017.
- With further rapid growth of global demand their expectations may become even more optimistic since forecasts are largely based on the dynamics relevant to the date of their release.

\* IEA's outlook was adjusted to include intra-regional LNG trade that is not accounted for in the original report.

# Expectations of LNG glut are not justified, only timely FIDs and appropriate LNG-carrier fleet development may lead to a surplus

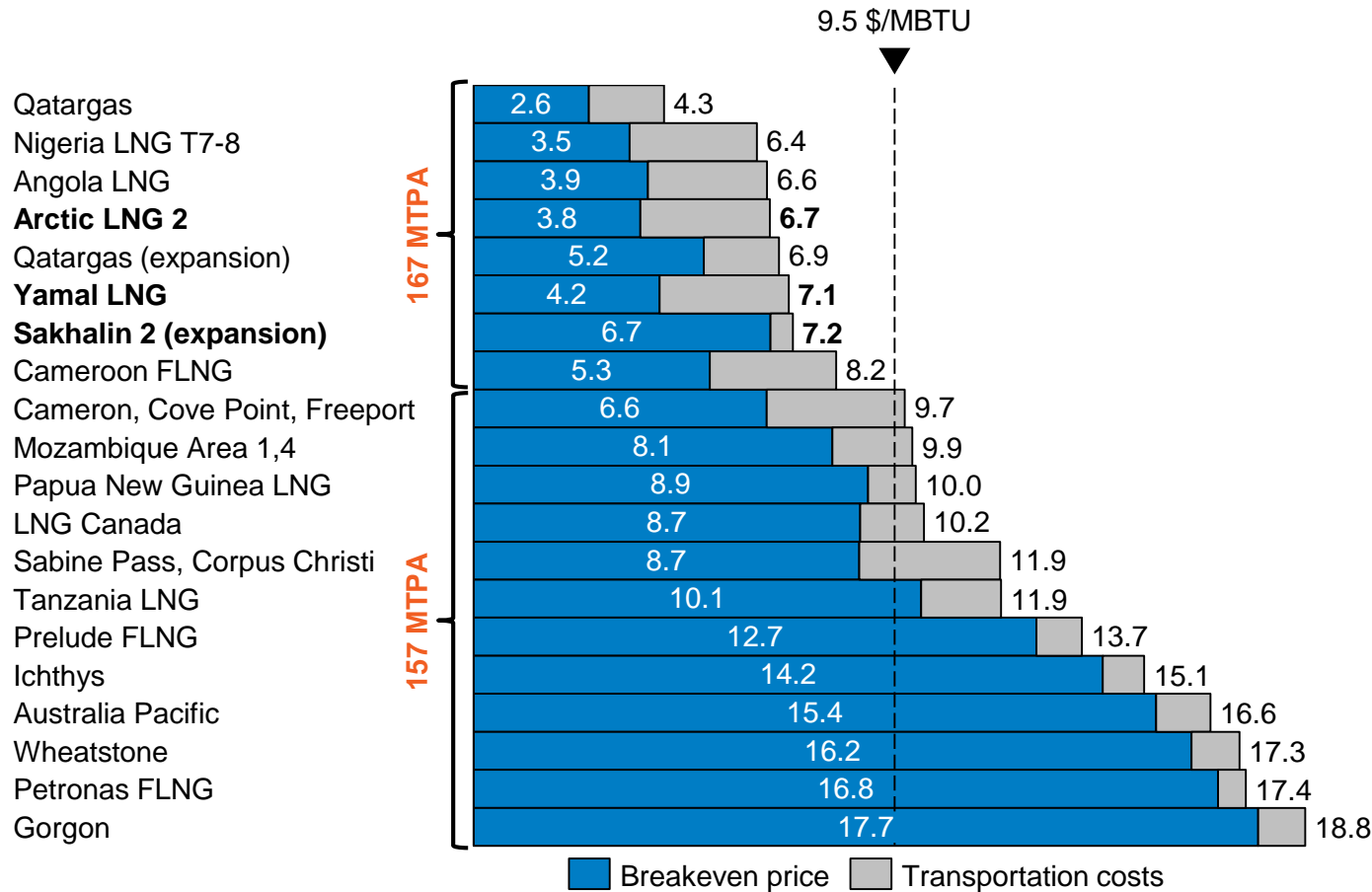
## Projected global LNG supply-demand balance up to 2025, MT



- Commissioning of the under construction and expected pre-FID plants will not cause the LNG surplus. Although the supply will exceed the consensus demand forecast, it will remain within the projected demand range.
- Global LNG market may become highly unbalanced after 2023 only with the launch of pre-FID projects with risks of substantial delay or cancellation, which is an unlikely scenario.
- The recently established expectations of LNG glut appear to be unjustified. It would be more appropriate to anticipate that the market will be balanced by 2021-2022, while the potential surplus may follow only if FIDs are made in a timely manner and the LNG-carrier fleet is developed accordingly.

# The latest oil price decline will make LNG exports from most new plants unprofitable

**Breakeven price (FOB delivery basis) and cost of supply to the APR of recent and pre-FID LNG plants\*, \$/MBTU**

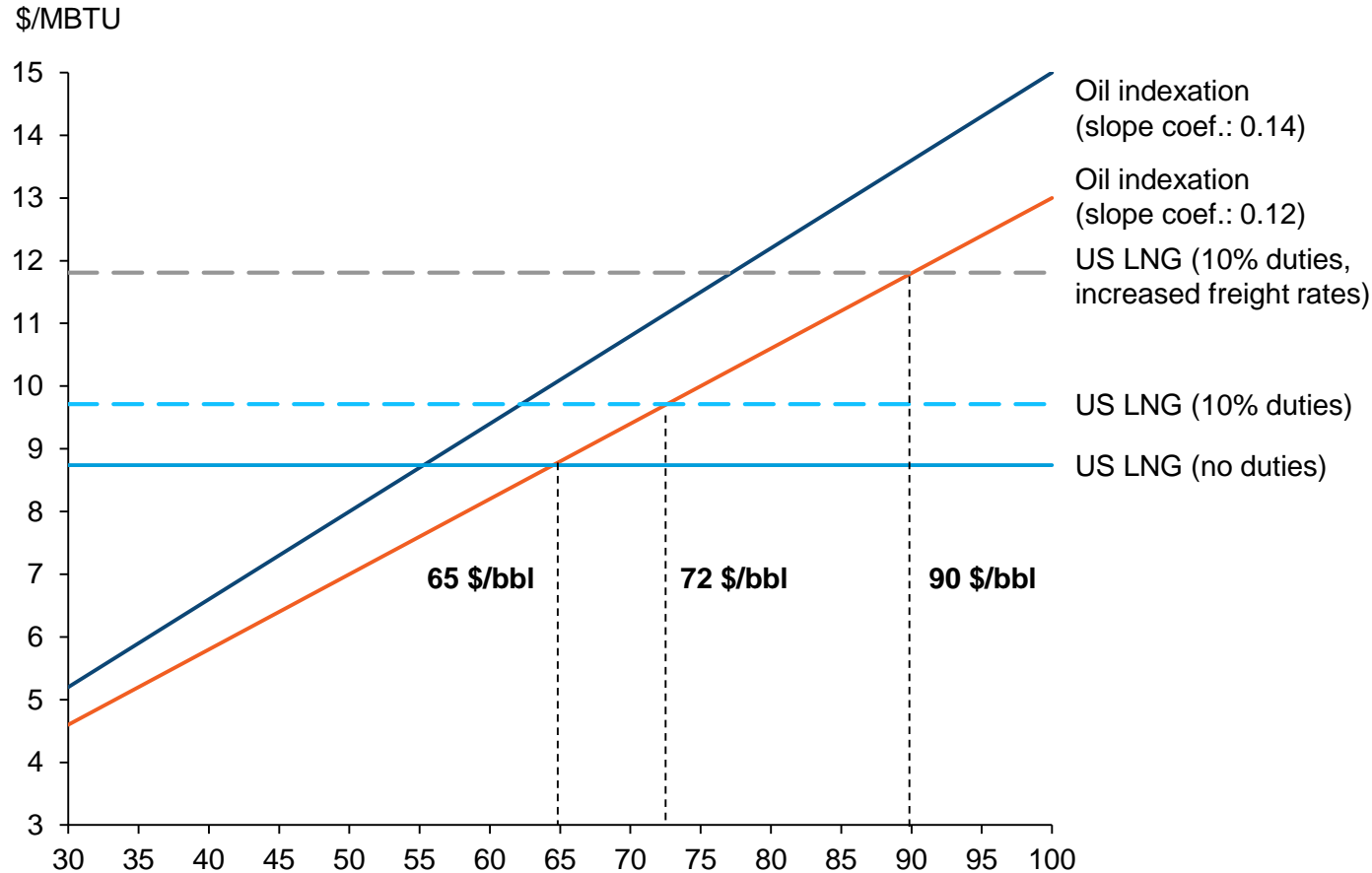


- Full capacity utilization may be achieved only at those pre-FID LNG plants that have the lowest unit production costs. These include primarily Qatari and Russian projects.
- We estimate that Arctic LNG 2 will achieve the breakeven price of 3.8 \$/MBTU, while its cost of supply will amount to 6.7 \$/MBTU provided that it will actually require 30% less investments than Novatek's previous project – Yamal LNG. This will make the upcoming plant one of the most competitive gas liquefaction assets in the world.

\* Freight rates – 140 thous. \$ per day, fuel oil price – 404 \$/t.

# Protective duties and growth of time charter equivalent rates reduced the competitiveness of US LNG in China

## Cost of US LNG in China vs LNG supplies with oil indexation pricing

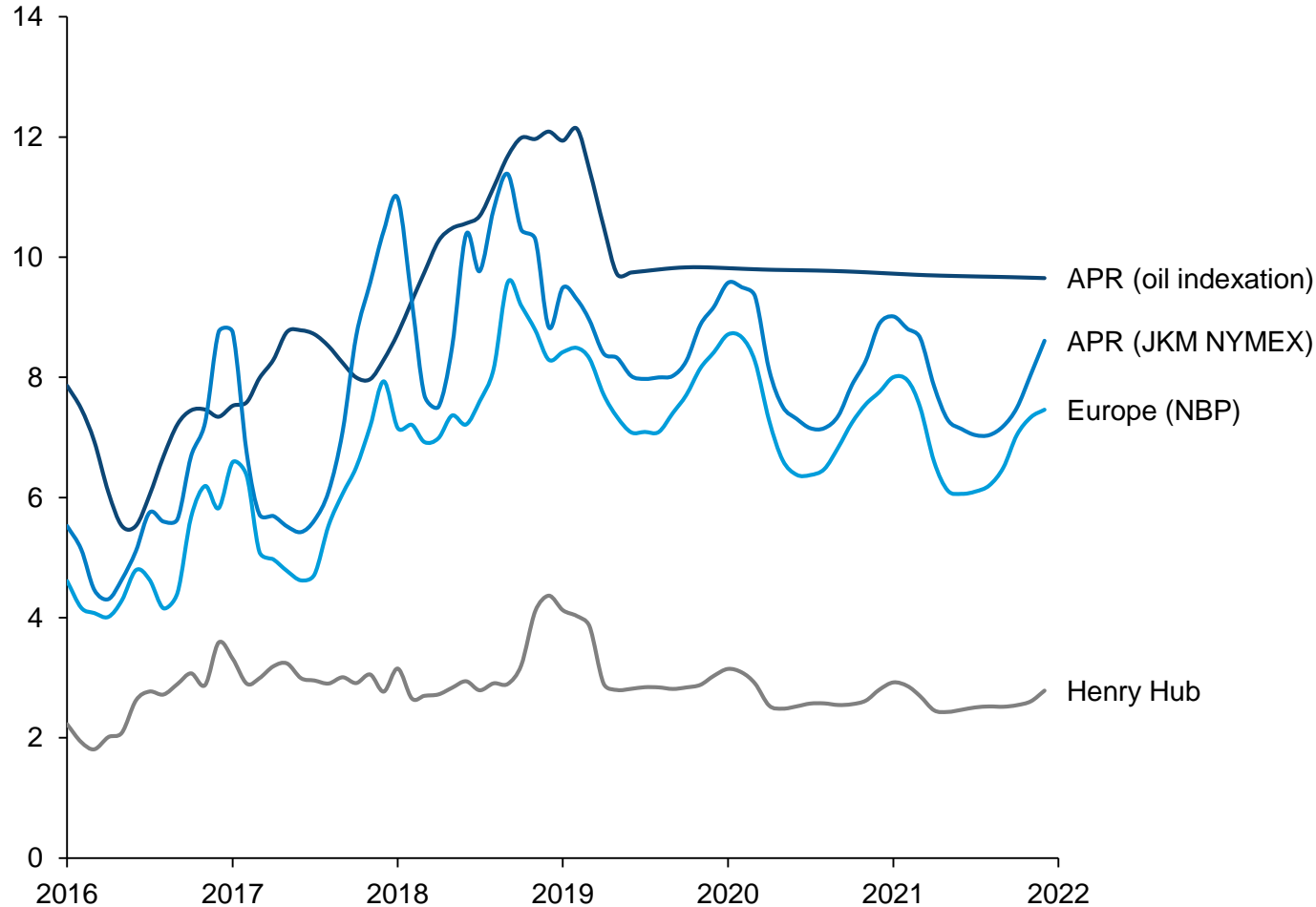


- US LNG was competitive in almost every month of 2018; however, by the end of the year several events eroded its position.
- In the course of the trade war between China and the US, in September 2018 Beijing introduced 10% protective duties on LNG imports. The cost of supply of US LNG to China increased from 8.7 to 9.7 \$/MBTU.
- In addition, the potential shortage of LNG-carriers affected the spot charter rates. In December 2017 they reached 80 thous. \$ per day for the first time since 2014, while at the end of 2018 they exceeded 150 thous. \$ per day. Their further growth up to 200 thous. \$ per day would make US LNG competitive only with oil prices above 90 \$/bbl.

\* Time charter equivalent rates increase from 80 to 200 thous. \$ per day.

# Liquefaction capacity glut will cause LNG prices to decrease until 2021, after that the trend will be reversed

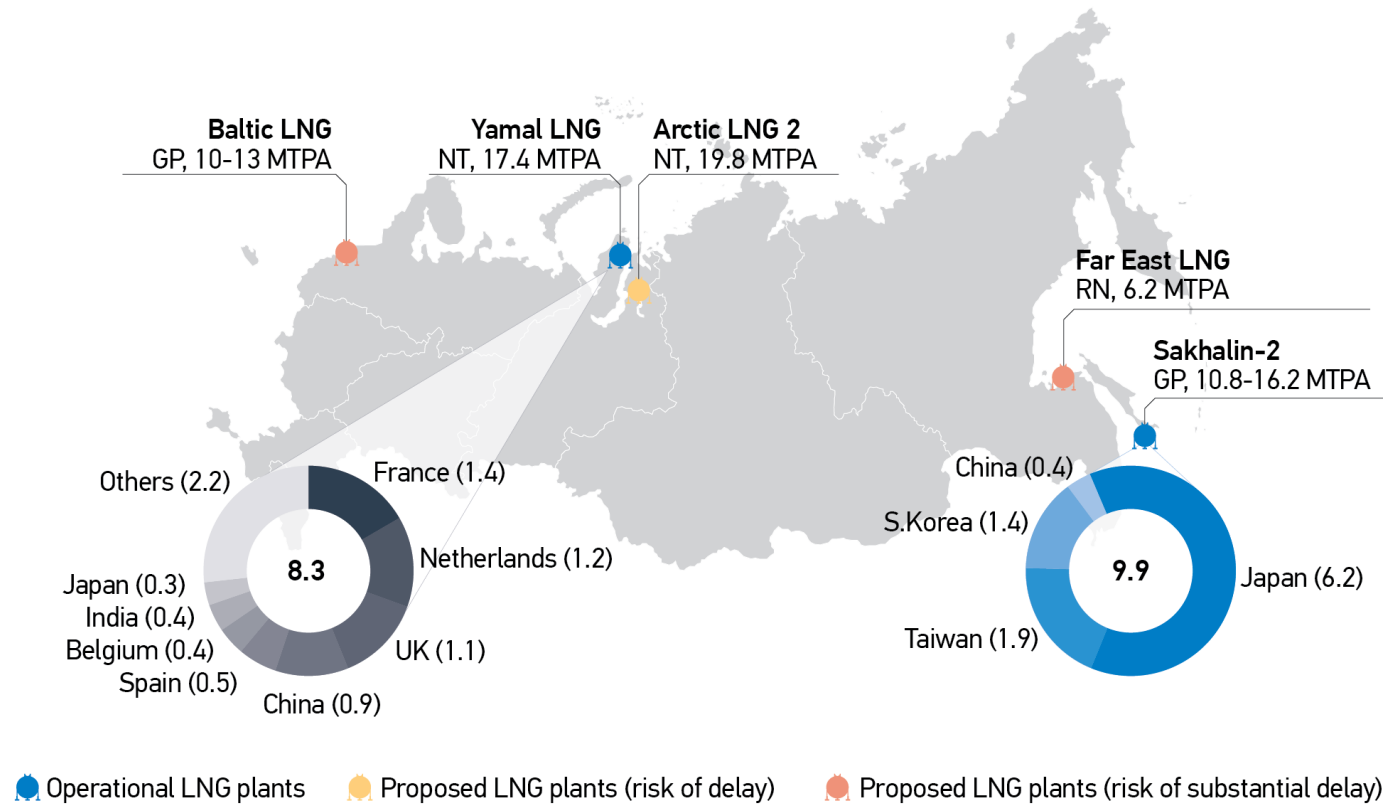
## Regional gas prices and forward curves, \$/MBTU



- Oil quotes remain to be the main factor influencing LNG prices since about 80% of contracts are oil-indexed. However, in the future prices will be mostly determined by the effects of two divergent factors: the surplus of liquefaction capacity relative to global demand that puts pressure on prices; and freight rates growth that causes prices to increase.
- Due to the incremental global LNG supply glut, we expect that gas prices will be slightly decreasing until 2021 to reach 6.9 \$/MBTU in Europe and 7.9-9.7 in Asia.
- After 2021 the trend will be reversed: time charter rates will decrease, while the LNG supply growth will be moderate. By 2021-2022 the prices may reach 8.5 \$/MBTU in Europe and 10.5 \$/MBTU in Asia, in the baseline scenario they are expected to remain at this level until 2025.

# All the planned projects have to be launched timely in order for Russian LNG to gain the targeted 15% global market share in 2025

Map of Russian LNG projects, their capacity (MTPA) and supply from operational plants in 2018 (MT)



- In 2020 the share of Russian LNG in the global market will amount to 7%.
- By 2025, if Arctic LNG 2, Baltic LNG, the third train of Sakhalin-2 and Far East LNG are not commissioned timely, Russia's share will decline to 6%. Moreover, these projects will miss the most favorable time to start operations – the emergence of the LNG deficit.
- The target announced by the Ministry of Energy – the 15% global market share of Russian LNG in 2025 – can only be achieved if the actual LNG demand will be at the consensus forecast level and all Russian plants will operate at full capacity.
- Risk minimization efforts have to be intensified in order to achieve positive FIDs on Russian projects as soon as possible.



# Contact information

123610  
Russia, Moscow,  
Krasnopresnenskaya nab.,12

phone: +7 495 543 76 43

web: <http://vygon.consulting>

e-mail: [info@vygon.consulting](mailto:info@vygon.consulting)

All materials presented in this document are for information purposes only and reflect exclusively subjective judgement of their authors, and cannot be viewed as a solicitation or recommendation to do anything whatsoever.

VYGON Consulting and their staff shall not be held responsible for any use of the information contained herein, for any direct or consequential damage caused by any use of such information, or for the accuracy of any information obtained from third parties.

Any use of the materials contained herein is only permitted by reference to VYGON Consulting as the source of such materials.