



Natural Gas Medium-term Outlook and Security Review

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Columbia University, New York, 30 October 2018

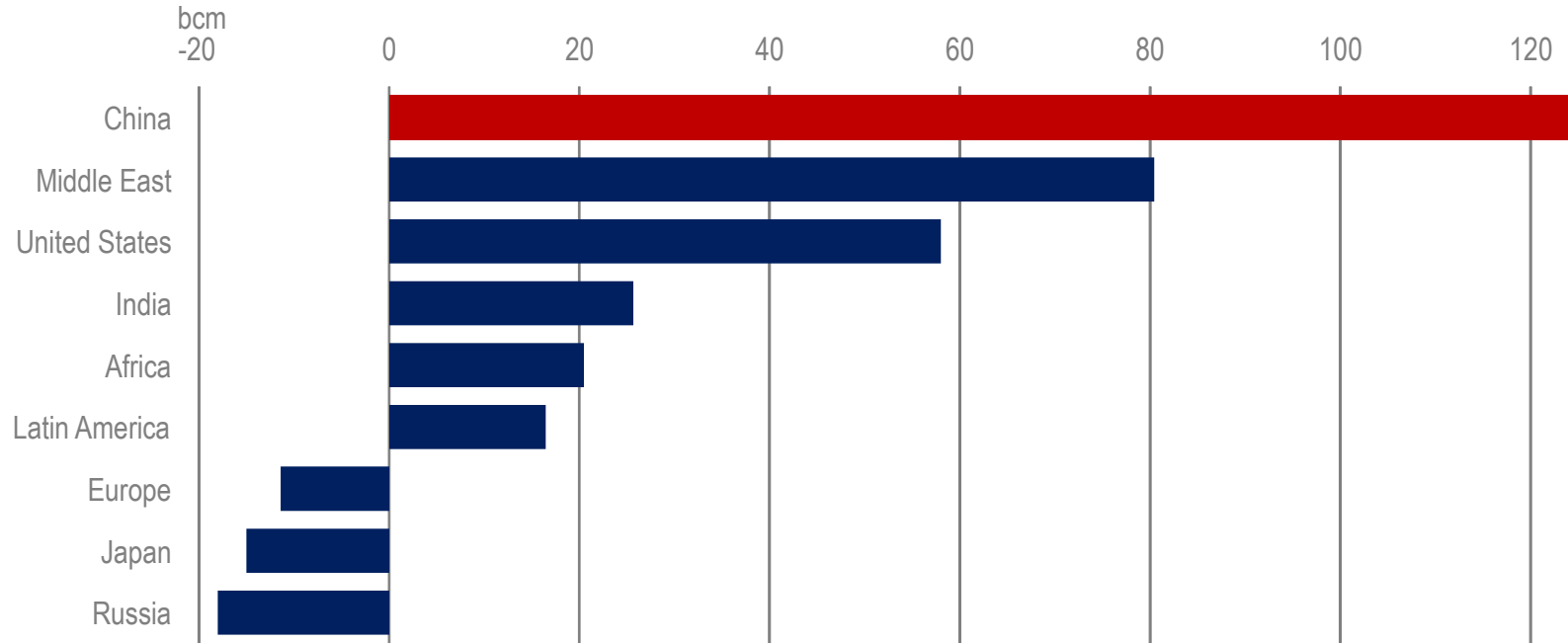


- Gas demand is in the fast lane, thanks to its flexibility & ability to ease environmental problems

- Global gas markets are being re-shaped by three major structural shifts
 - *China becoming the world's largest natural gas importer*
 - *US gas production and LNG exports rising dramatically*
 - *Industry displacing power generation as the leading growth sector*

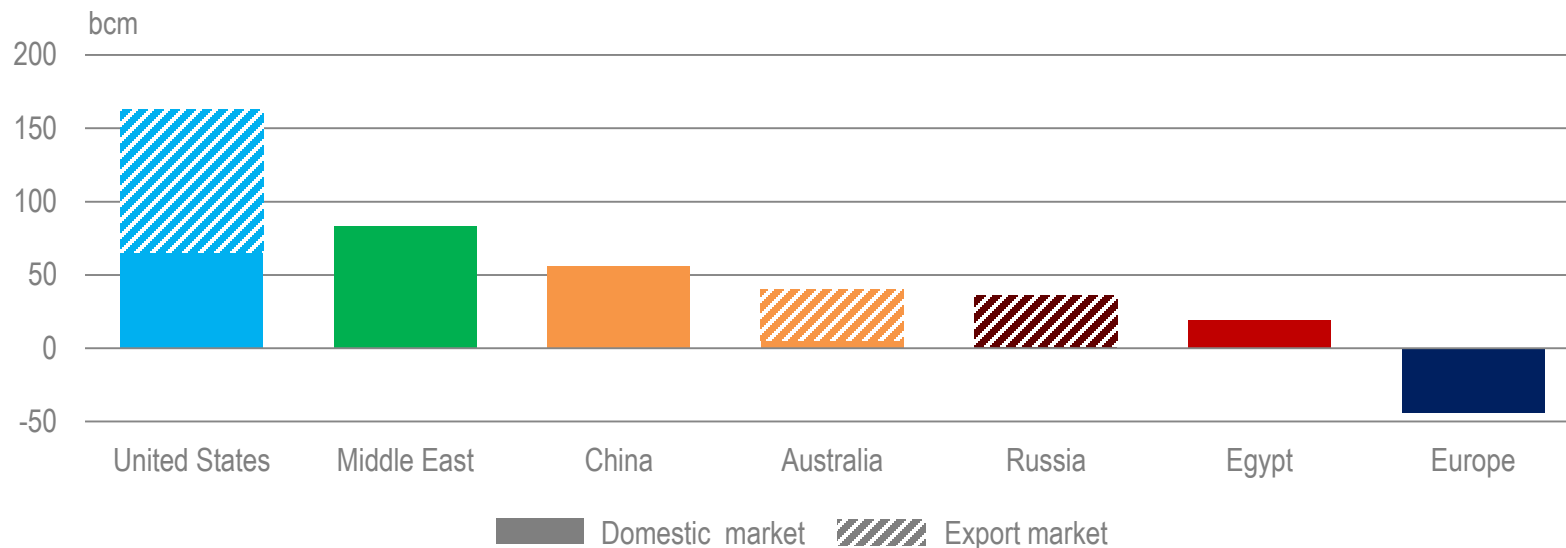
- The gas industry's future remains bright, but it is not without challenges
 - *Gas price competitiveness & market reforms in emerging markets*
 - *Curbing methane leaks along the value chain*

World natural gas consumption growth for selected countries and regions, 2017-23



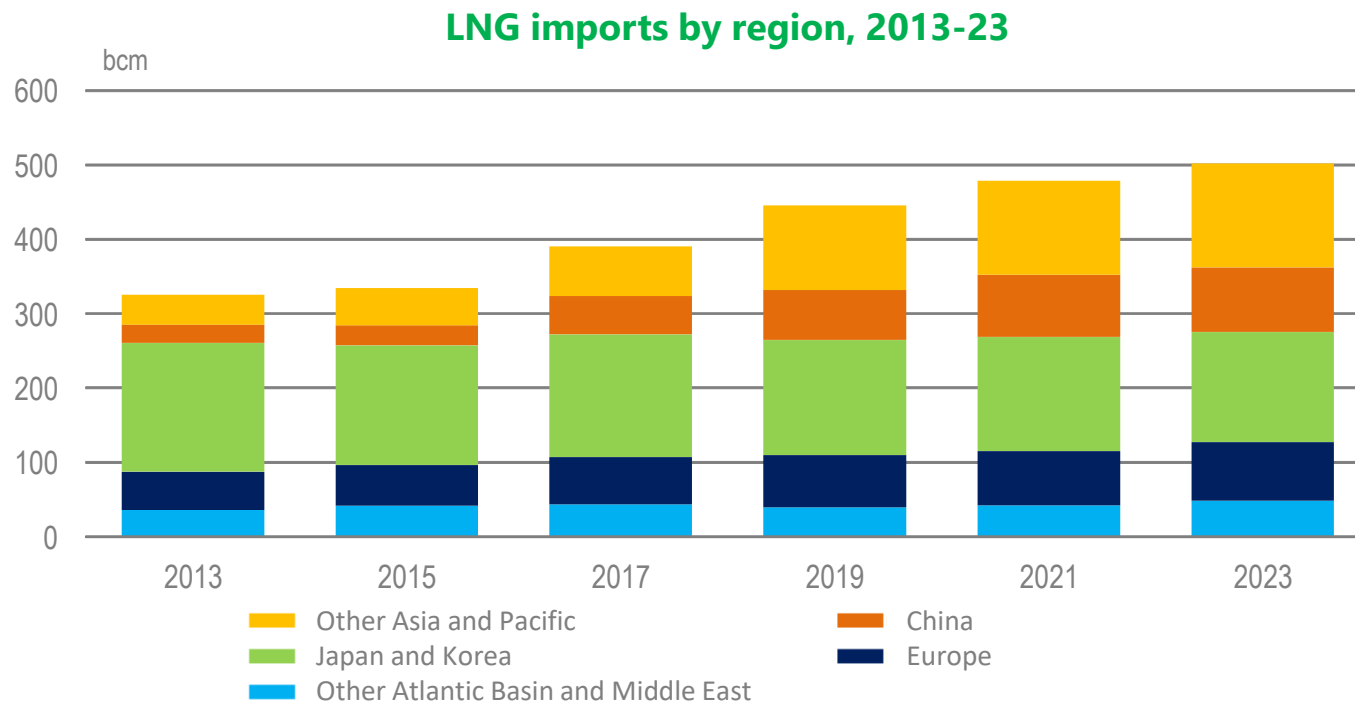
Global consumption passes the 4 tcm mark by 2022
China to account for almost 40% of growth driven by clean air policy target

Natural gas production growth for selected countries and regions, 2017-23



The United States accounts for almost 45% of global growth in natural gas production and 75% of growth in LNG exports

Strong growth in LNG imports is driven by Asia

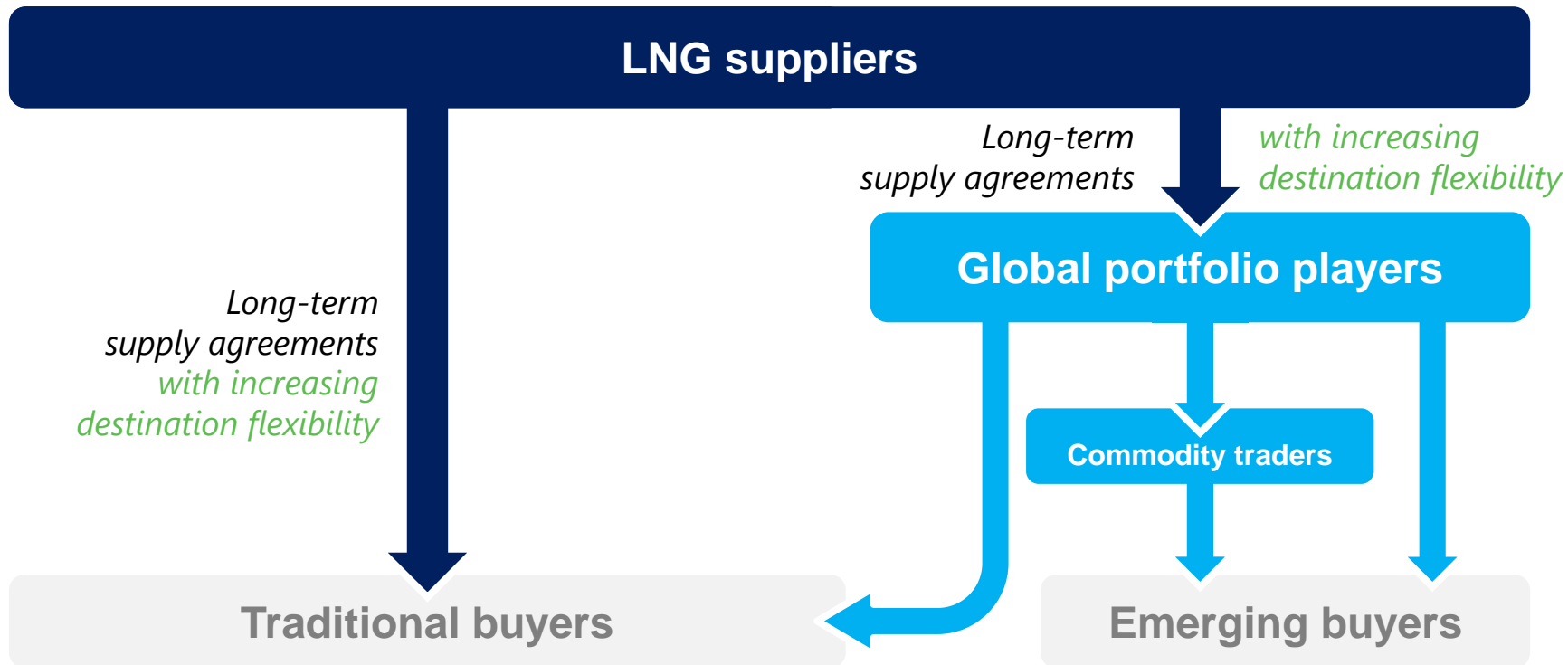


LNG trade passes 500 bcm mark by 2023, reaching almost 40% of global gas trade from around a third today; Developing Asian markets account for almost half of LNG market by 2023

- China's unprecedented demand growth led to winter supply shortages, which prompted policy and industry responses
 - Further increase and diversification of the natural gas supply portfolio
 - Strong infrastructure development with a focus on underground storage
 - New policy guidelines for natural gas targets

- Last winter events showed the resilience of Europe's natural gas system
 - Importance of coordination policies' implementation
 - Promoting network integration and cooperation

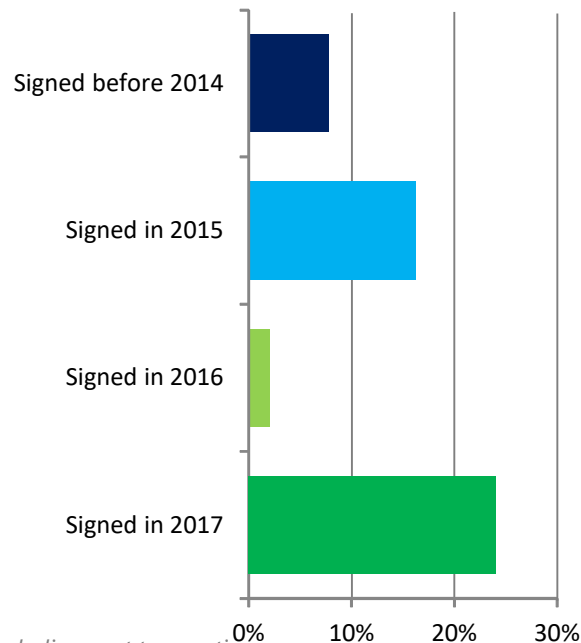
Midstream LNG market emerges thanks to contracts flexibility



Access to flexible supply is a prerequisite for a global and resilient LNG market
Portfolio players supply new buyers thanks to their access to long-term flexible supply

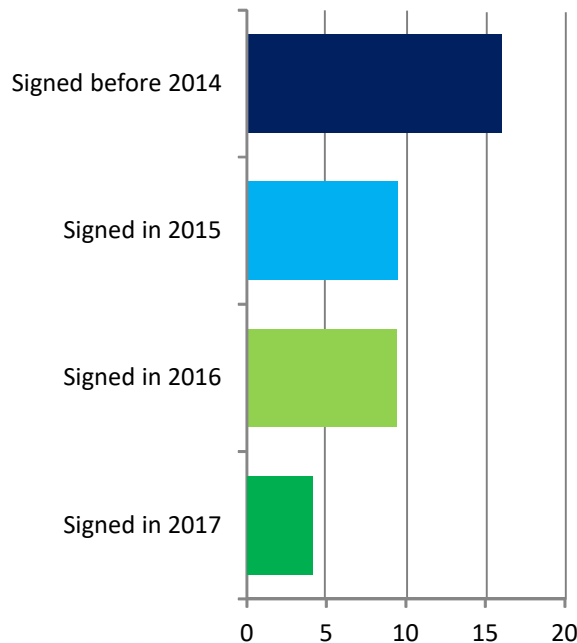
Time flexibility

Share of short term volumes (up to 1 year)*



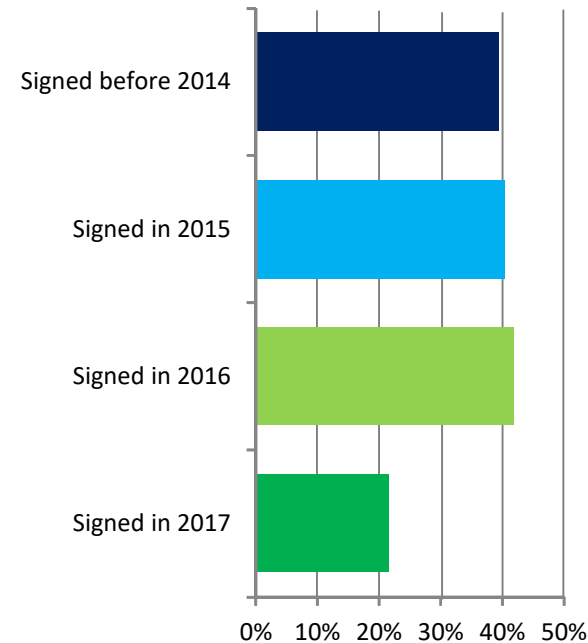
Time flexibility

Average duration (years)



Destination flexibility

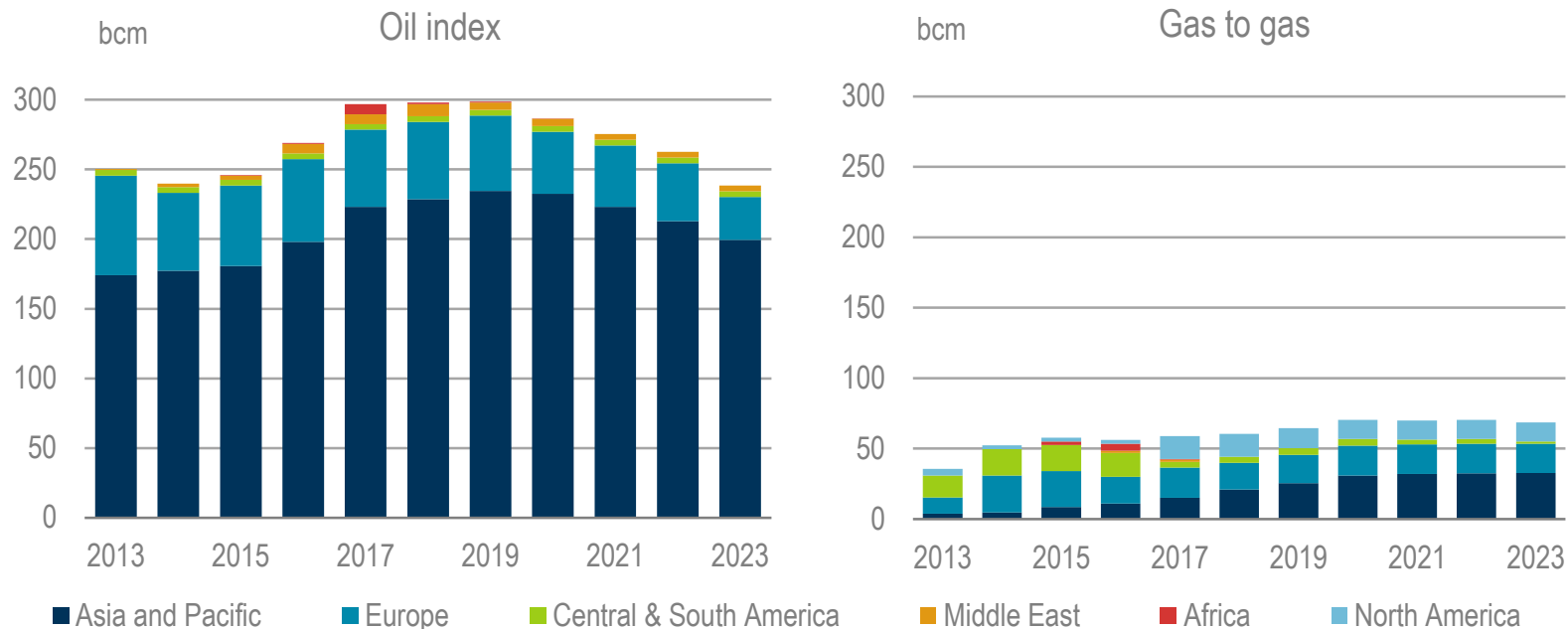
Share destination free volumes



* Excluding spot transactions

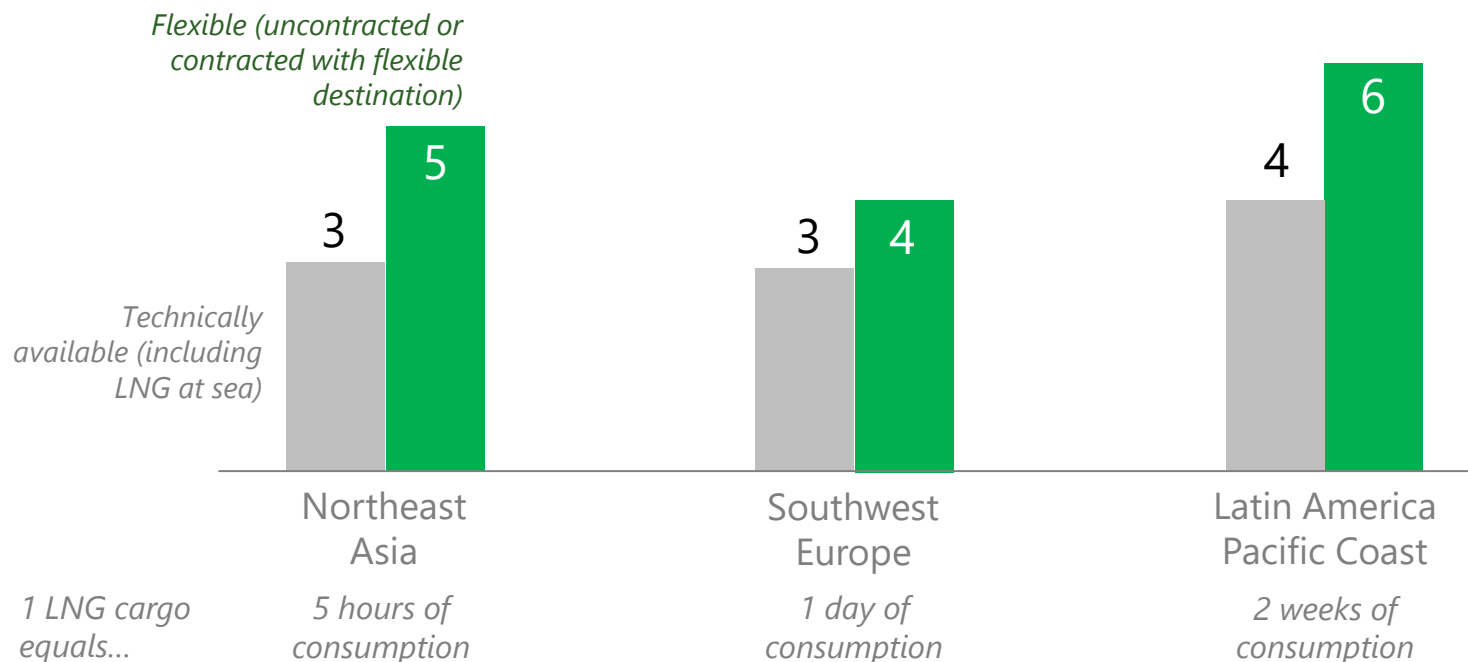
**2017 saw further development from new buyers with a preeminence of time flexibility over destination
This is enabled by the development of flexible primary supply**

Pricing of LNG import term contracts (excluding spot)



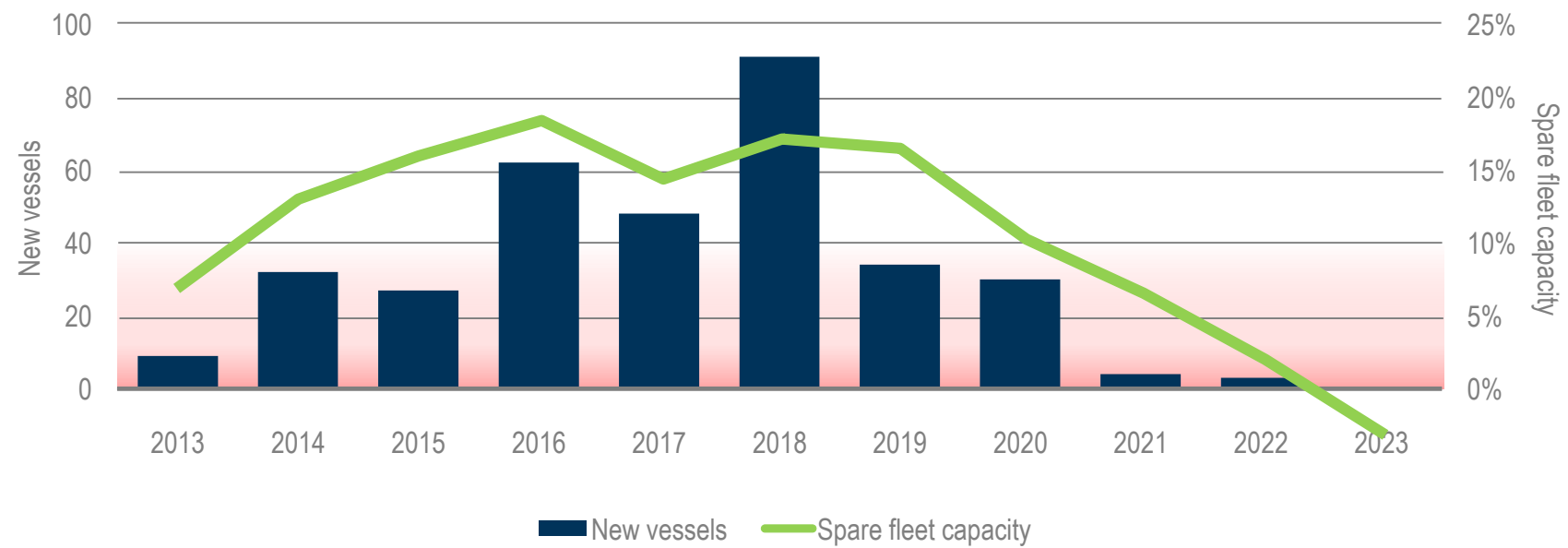
Despite growing share of hub pricing in exports, oil indexation still dominates in import contracts, especially in Asia and Pacific region

Number of days needed to receive and regasify an unplanned additional LNG cargo



Need to complement (upstream) LNG with mid- and downstream mitigation measures

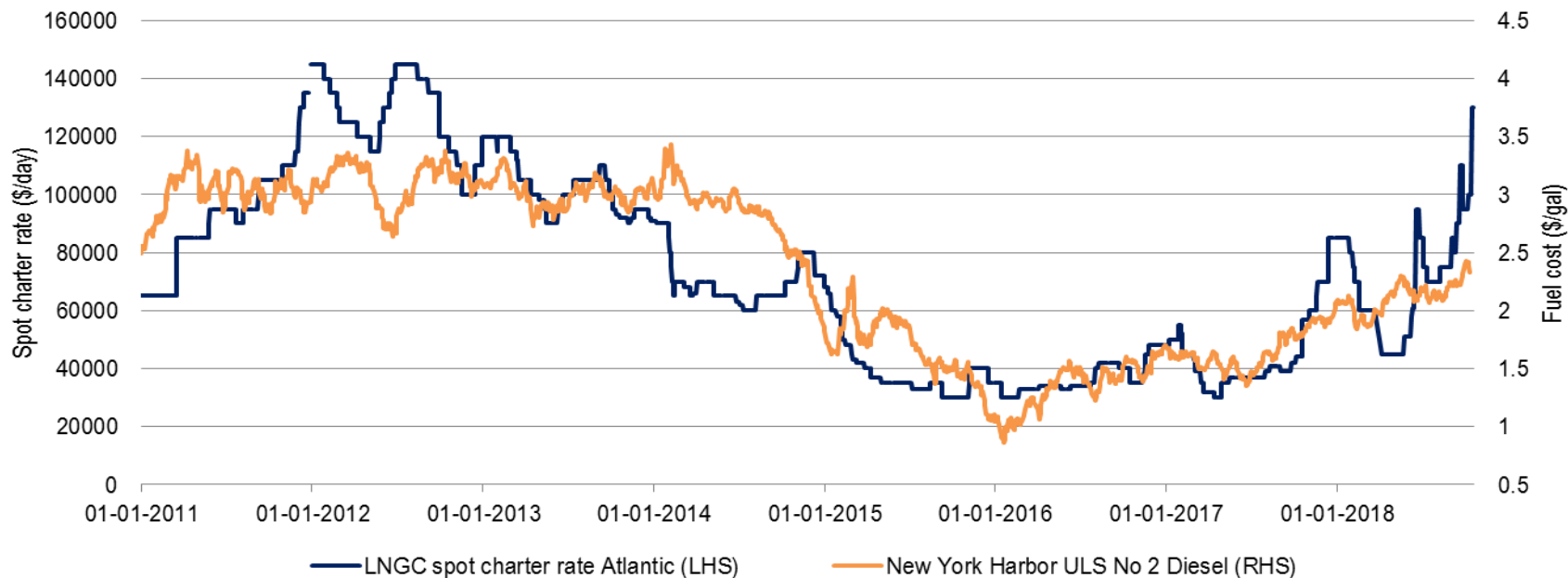
LNG vessels additions and utilisation, 2013-23



Sustainable investment and operating framework for LNG shipping is (part of) the hidden cost of LNG flexibility and trade growth

Towards a tight LNG shipping market?

LNG vessel spot charter rate and fuel cost, 2011-18



Sustainable investment and operating framework for LNG shipping is (part of) the hidden cost of LNG flexibility and trade growth

- Last winter's supply shortfall in China triggered policy and investment decisions, and supply issues in Europe showed success of integration and emergency policy.
- LNG flexibility evolved with the development of secondary markets, emphasizing the role of portfolio players.
- Fixed destination and oil indexation from legacy contracts, however, still remain at large scale.
- Short-term LNG has to be part of a broader range of mitigation tools including network integration, underground storage, demand response, etc.
- Lack of investment in LNG shipping fleet could hamper market development and increase price volatility.



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