

IENE Workshop

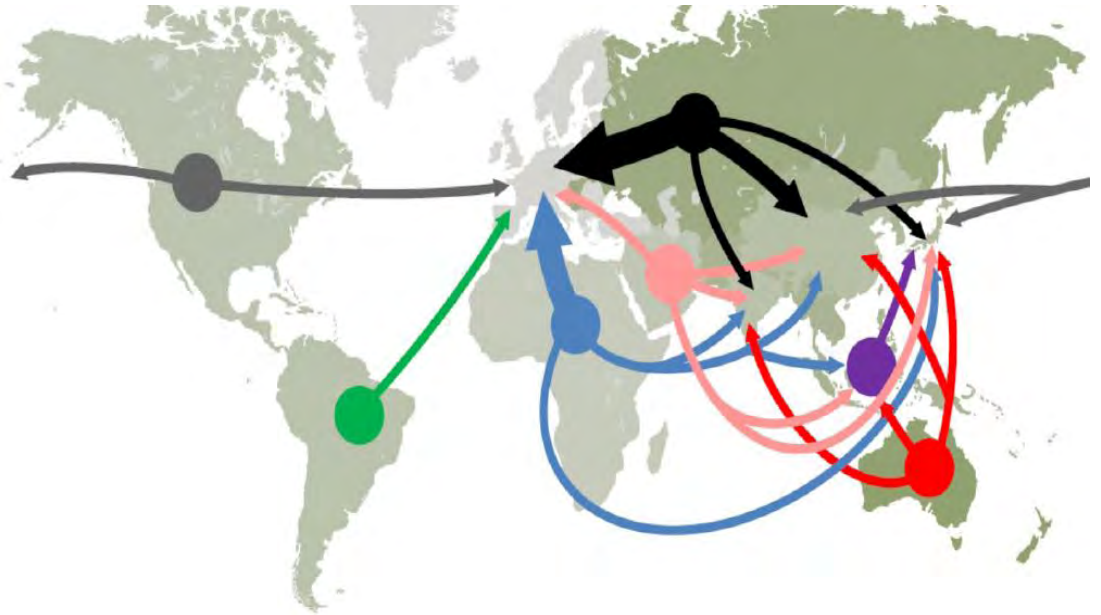
“Energy Security in SE Europe and the Role of LNG”

Athens, 4 & 5 July 2017

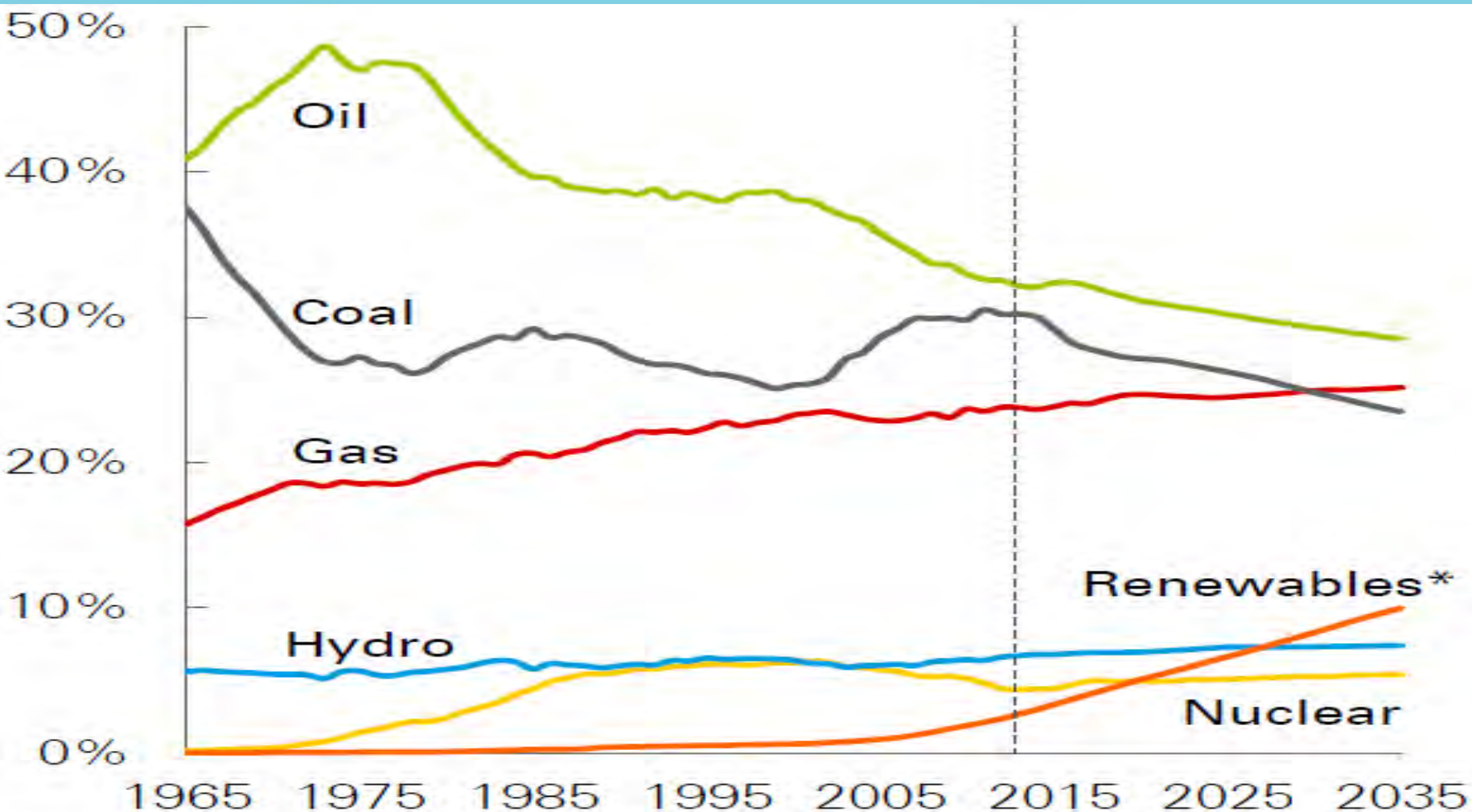
“Global LNG trends and perspectives”

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Ex-CEO DEPA SA

- An introduction
- The dynamic role of LNG in the global gas market
- Liquefaction plants
- LNG re-gas terminals
- LNG fleet
- The new landscape in the global gas/LNG market

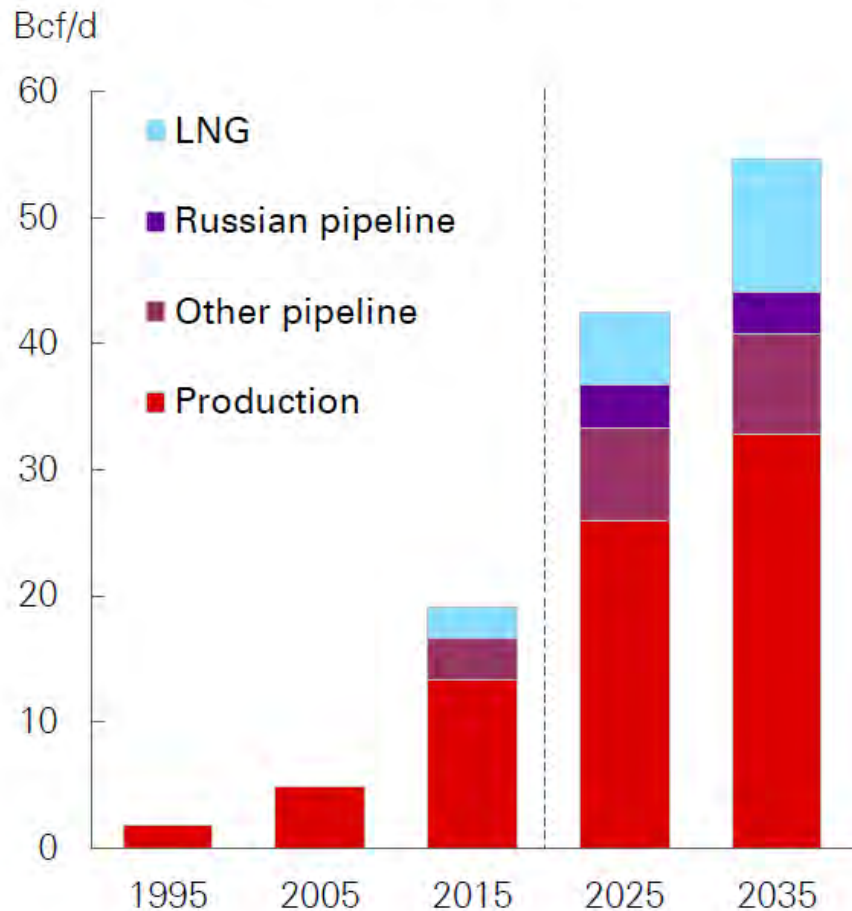


Oil “shocks”, technology and climate change policies have brought serious changes in the global energy mix

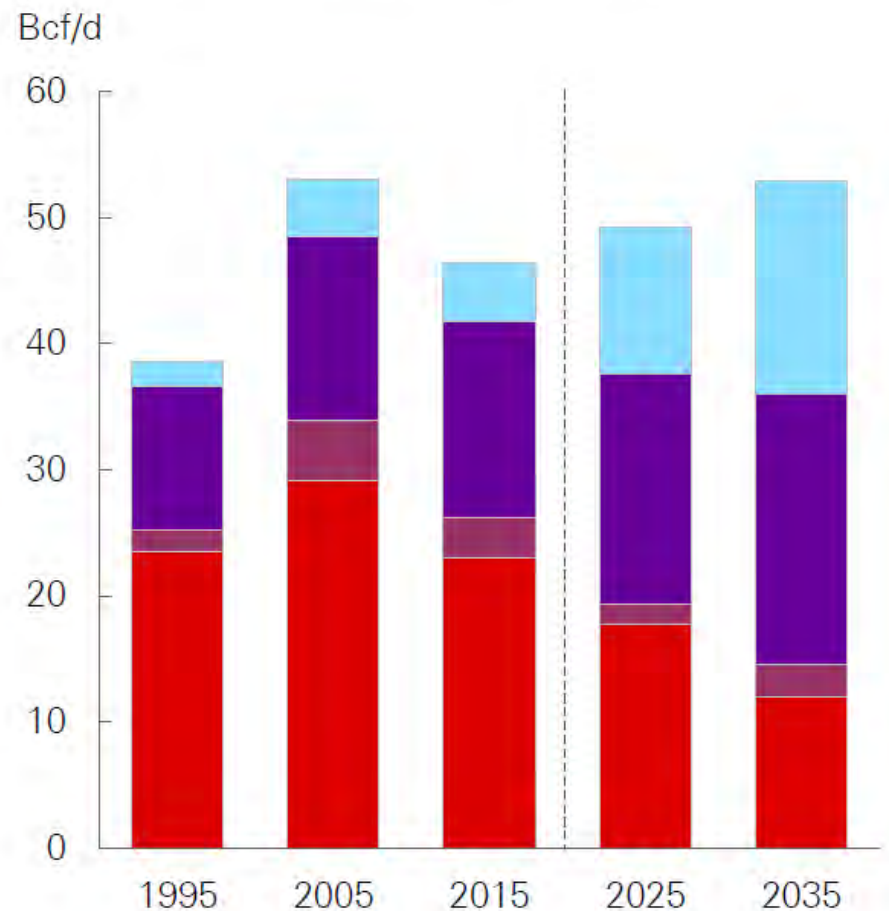


Global gas demand will continue to increase, although with a different growth pattern in each region

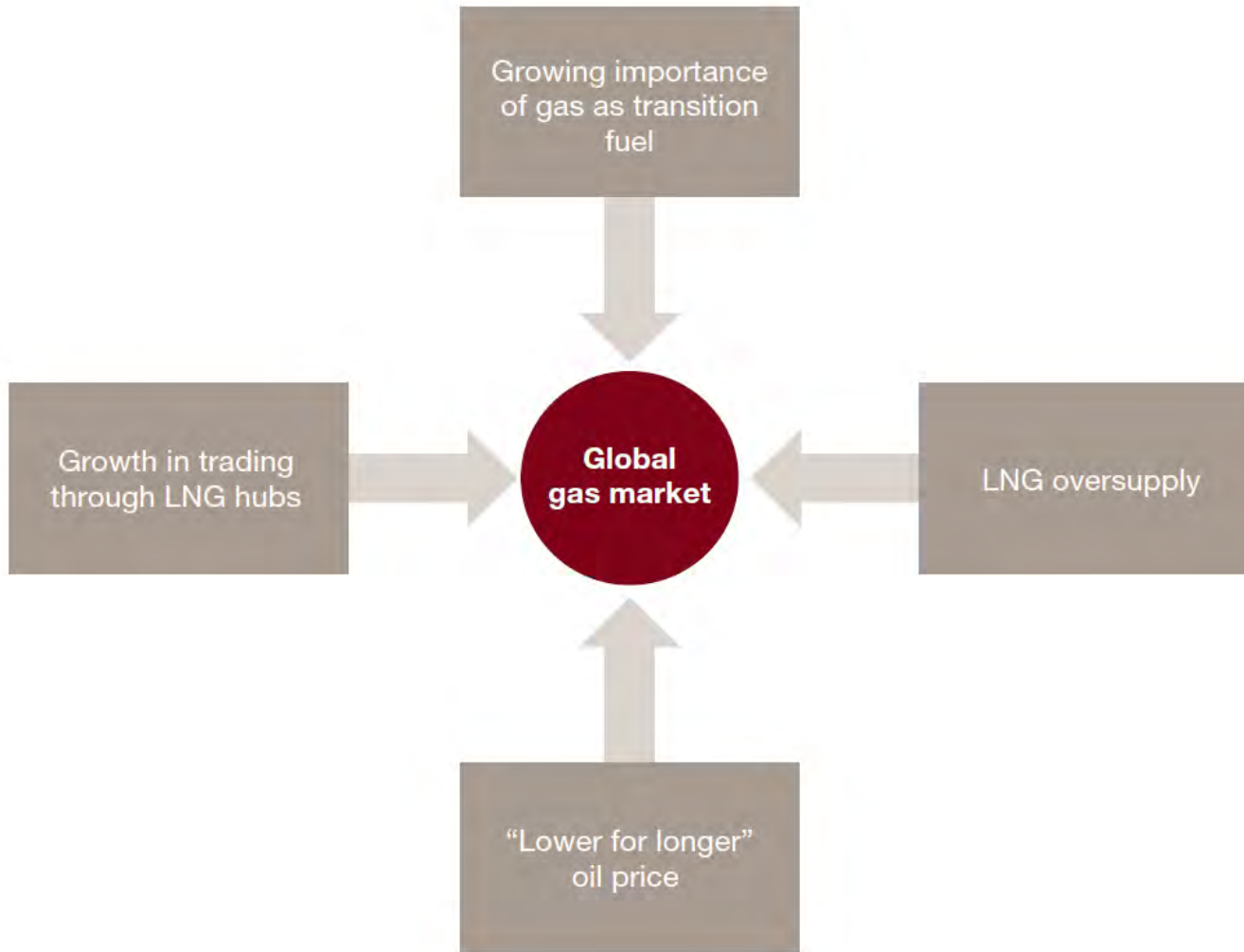
Gas supply to China



Gas supply to Europe



But, neither the industry nor the gas markets will be the same in the years to come



Source: Strategy& analysis

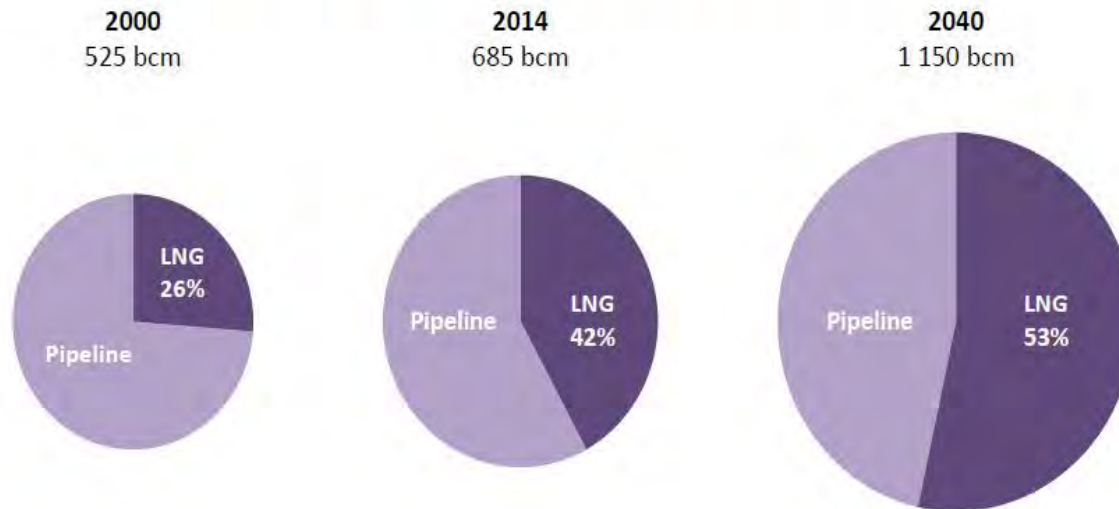
Drivers of change

- Much of the expected demand growth will be covered by LNG, since LNG grows 7 times faster than pipeline gas trade (BP 2017 Energy Outlook)
- This reality has led to an LNG supply glut (mainly came from US and Australia) which is expected to be absorbed only by mid of '20
- LNG oversupply along with structural changes in LNG contracts and trade (resulting in higher flexibility, liquidity and diversity) and the convergence of LNG prices worldwide contribute to the creation of a real global gas market
- Certain technological achievements across the LNG value chain (FLNGs, q-max ships, FSRUs, small-scale LNG applications in transport and bunkering) resulting in further enhancement of the LNG role both in traditional and new markets
- There will be a growing role of gas in the future energy mix as “transition” and “back-up” to RES fuel (at least in Europe) and thus flexible LNG will gain increasingly importance
- Given the climate change policies, all players in the gas industry, from up-streamers to mid-streamers (owners of pipelines, re-gas facilities and UGS) and gas users (power plants etc.) should adopt decarbonization strategies in order to survive in the long-run. The argument that gas has the lower CO₂ emissions among the fossil fuels is no-longer enough

LNG will continue to gain share in global gas trade

A wave of LNG spurs a second natural gas revolution

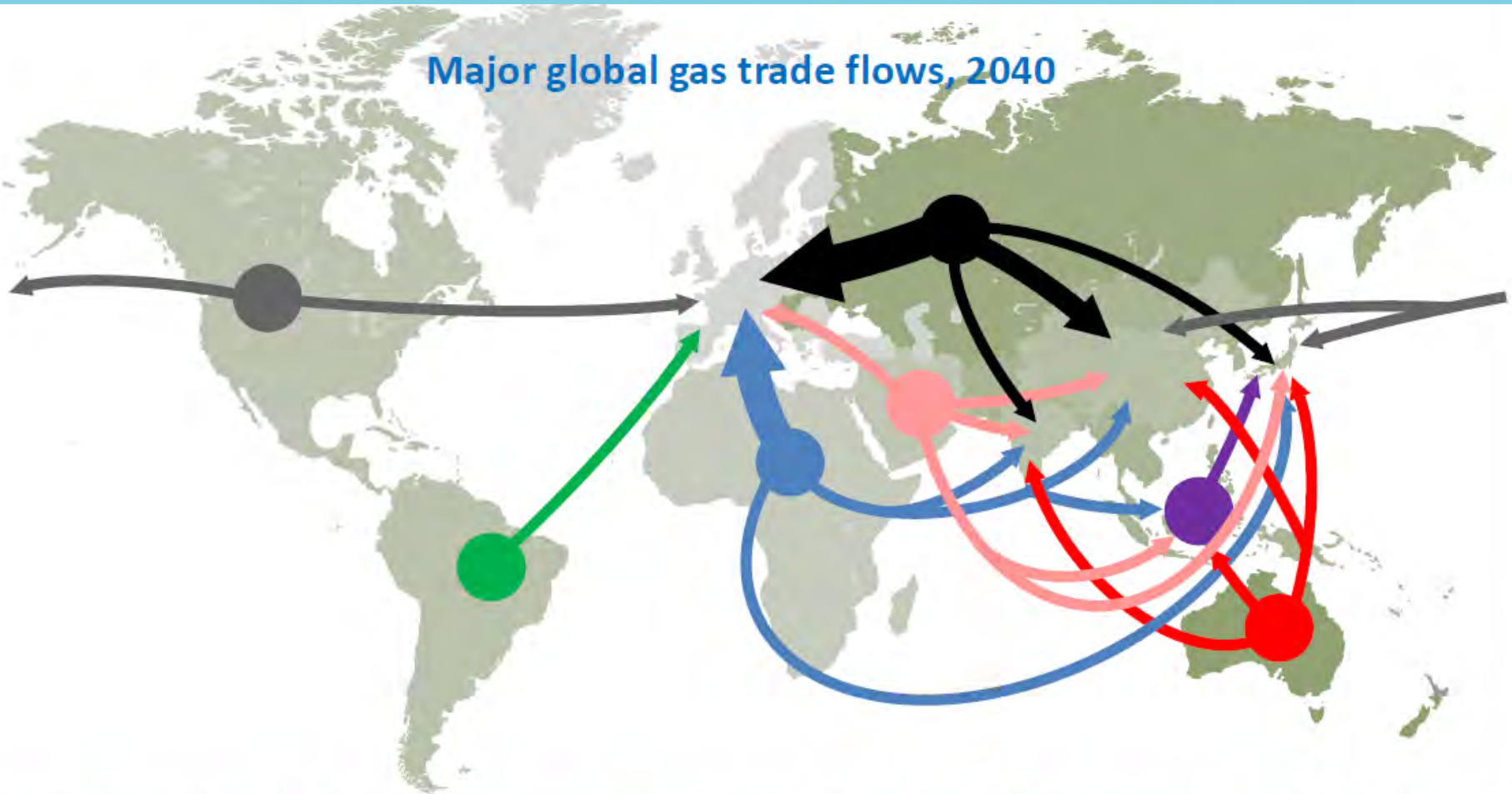
Share of LNG in global long-distance gas trade



Contractual terms and pricing arrangements are all being tested as new LNG from Australia, the US & others collides into an already well-supplied market

...and to contribute in the creation of a real global gas market

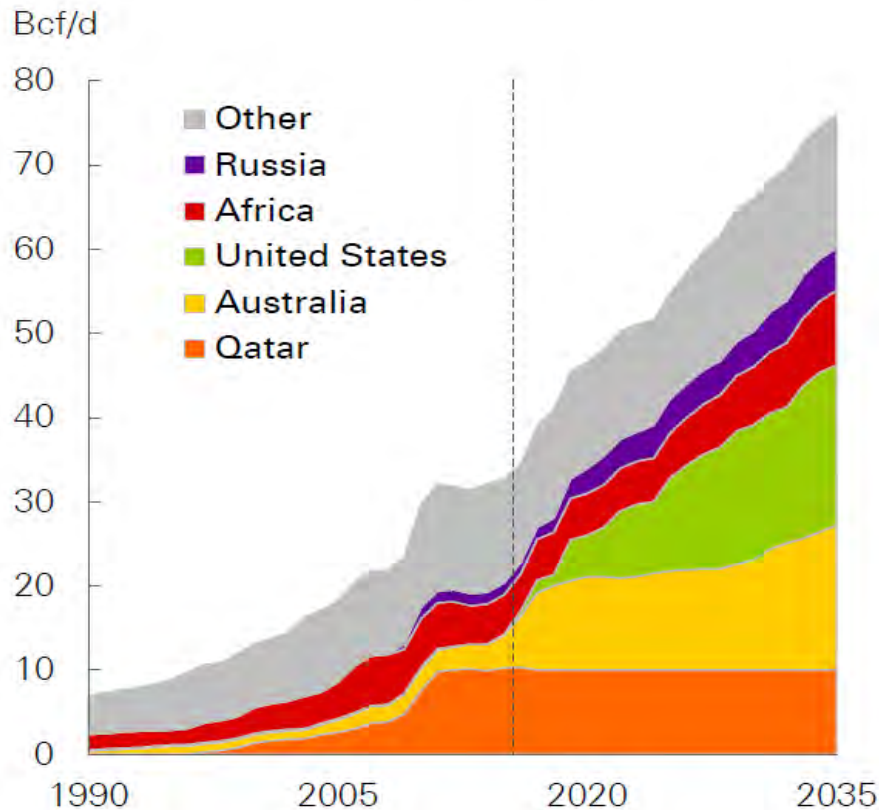
Major global gas trade flows, 2040



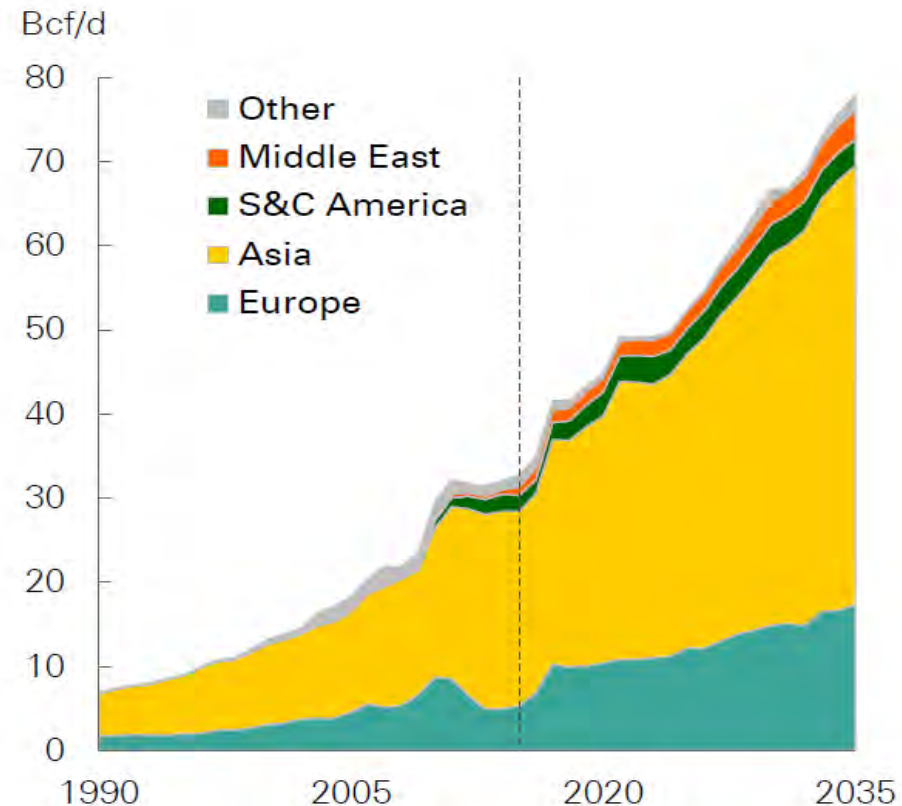
Ample supplies of LNG & low prices are diversifying trade & opening up opportunities for gas, but – by holding back new projects – could bring tighter markets in the 2020s

LNG Supply & demand outlook to 2035

LNG supply

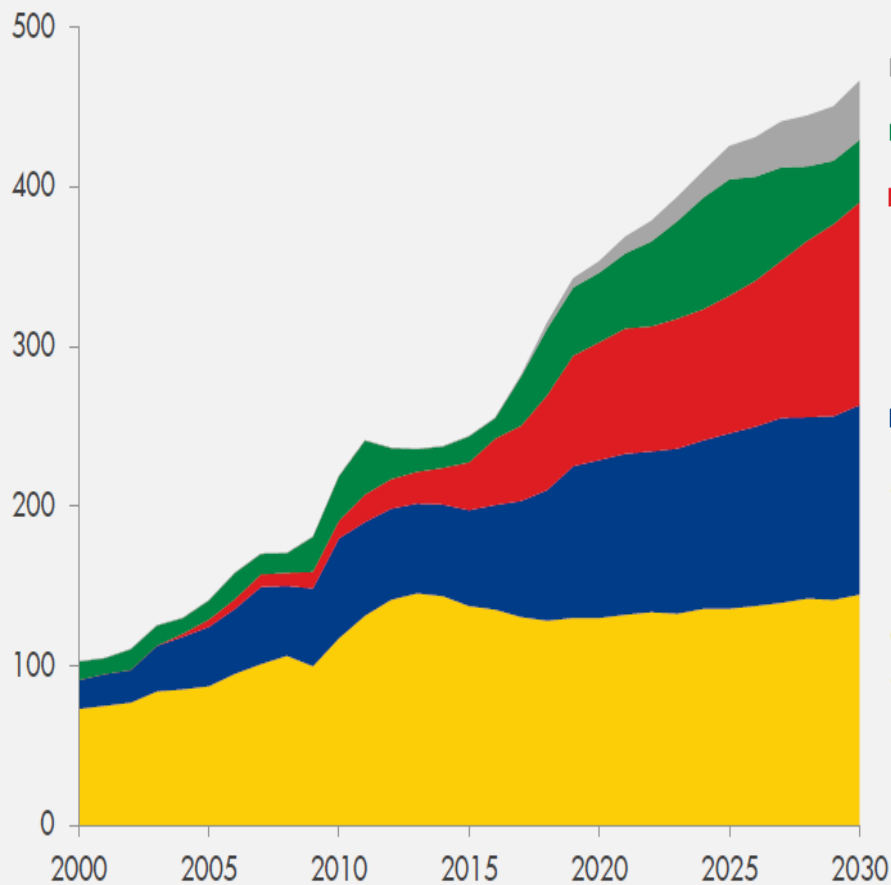


LNG demand



Changing drivers of LNG demand growth

LNG imports by role in meeting gas demand (MTPA)



LNG demand driver Countries/regions

Bunker fuel	■ Atlantic	■ Middle East	■ Pacific
Balances LNG supply	■ Northwest Europe		
LNG replaces declining domestic production into existing demand	■ India	■ Egypt*	■ Bangladesh*
	■ Thailand	■ Kuwait	■ Bahrain*
	■ Indonesia	■ UAE	■ Philippines*
	■ Malaysia	■ Colombia*	■ Vietnam*
	■ Pakistan*		
LNG complements domestic and pipeline supply	■ Southern Cone	■ China	■ Morocco*
	■ Eastern Europe	■ Singapore	■ Jordan*
	■ Southern Europe		■ Israel
	■ North America		
Gas supply solely dependent on LNG	■ Japan	■ Puerto Rico	■ Jamaica*
	■ Korea	■ Dominican Republic	■ Panama*
	■ Taiwan		

Source: Shell interpretation of Wood Mackenzie Q4 2016 data

* Denotes new or emerging LNG importing countries

Key figures of the LNG industry in 2016

263.6 million tons imported
or a **7.5%** increase vs. 2015

74.6 million tons traded on a spot or short
term basis or **28%** of total trade

73% of global LNG demand in Asia

30% of global LNG volumes
supplied from Qatar

45% of global LNG volumes
supplied from the Pacific Basin



39
IMPORTING COUNTRIES

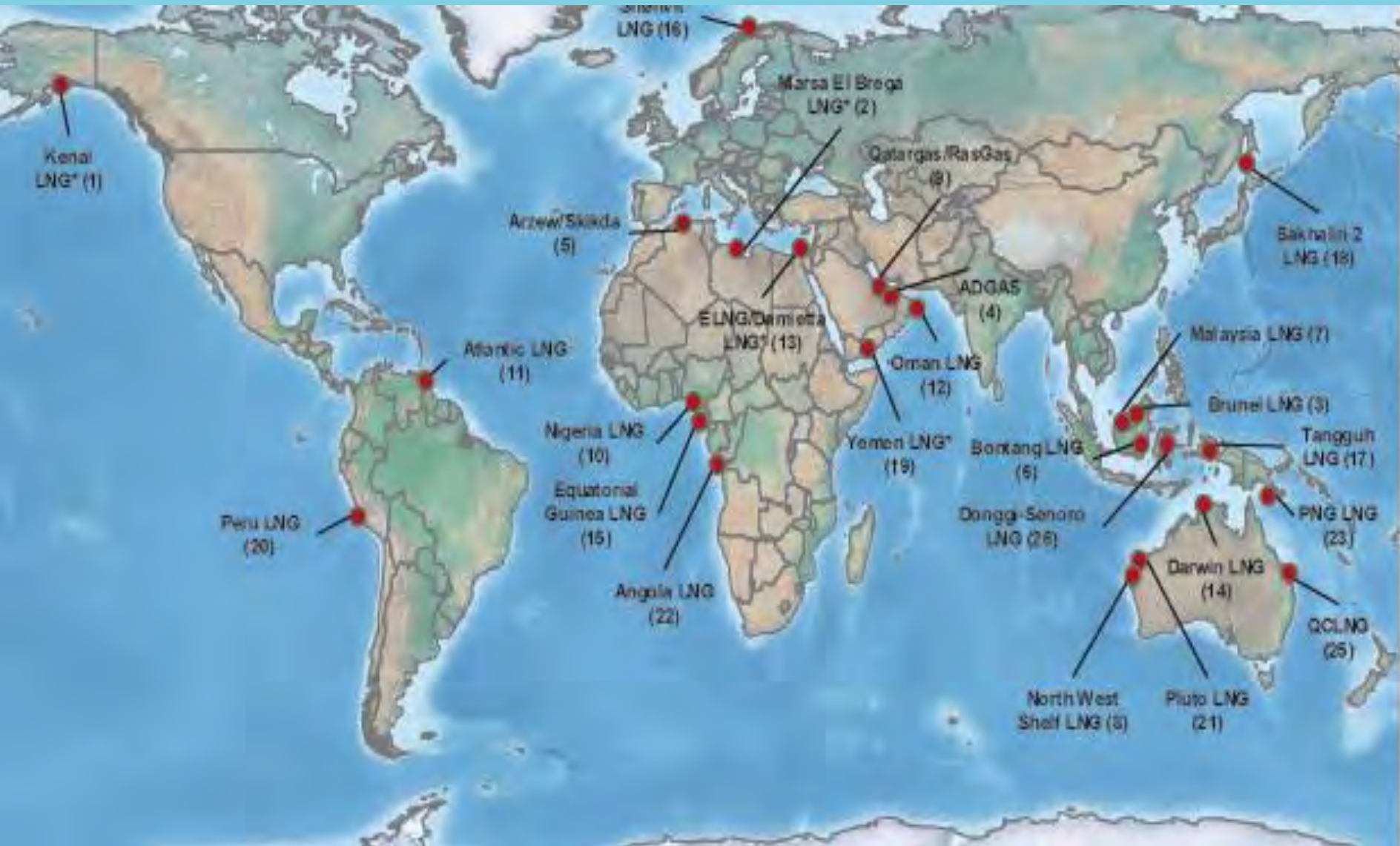
830 MTPA
TOTAL REGASIFICATION CAPACITY

19
EXPORTING COUNTRIES

340 MTPA
TOTAL NAMEPLATE LIQUEFACTION CAPACITY

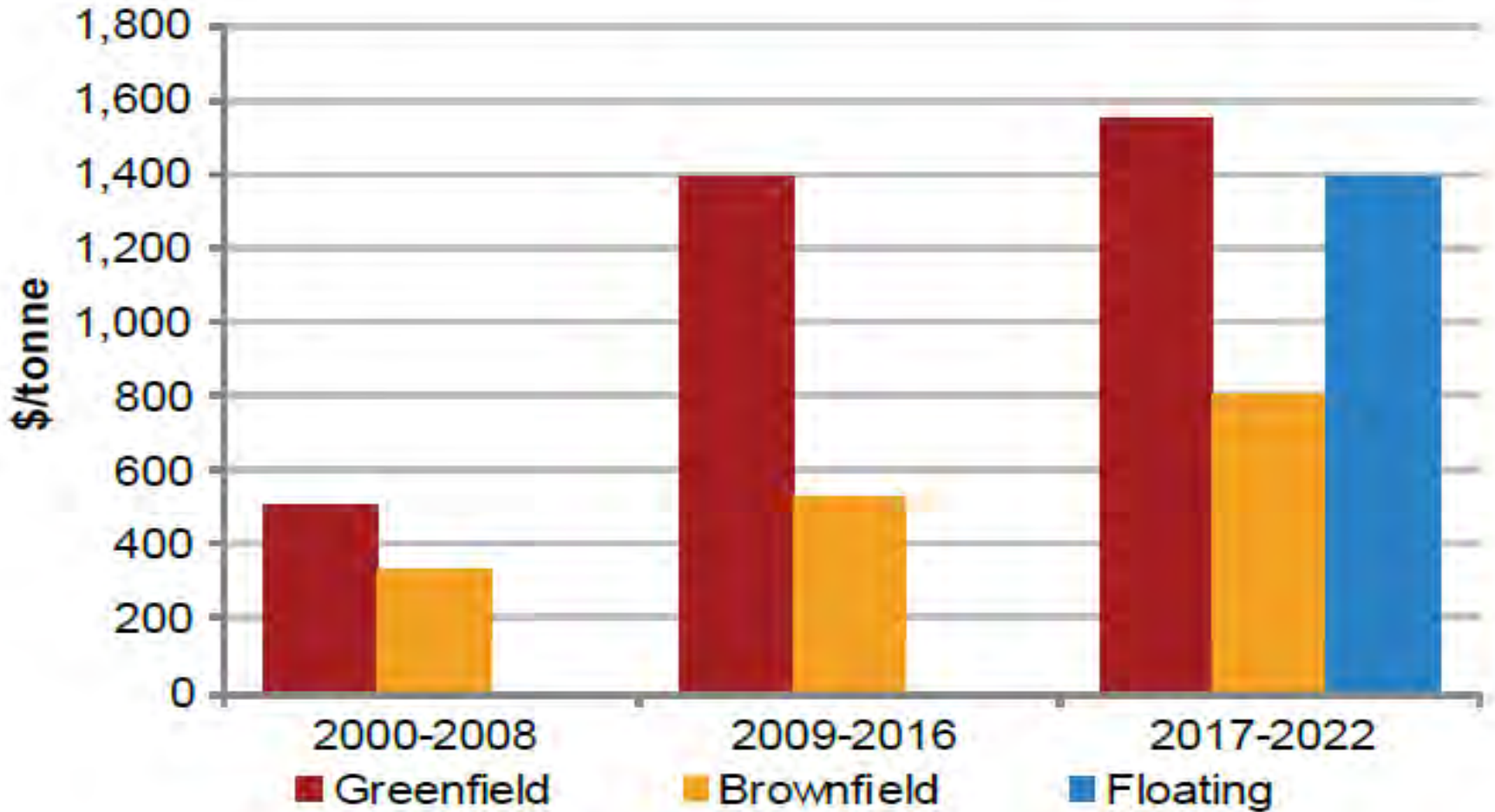
- The total LNG tanker fleet consisted of 478 vessels at the end of 2016
- The total FSRU fleet consisted of 24 units at the end of 2016

World map of NG liquefaction plants (total nameplate capacity 340 mtpa)



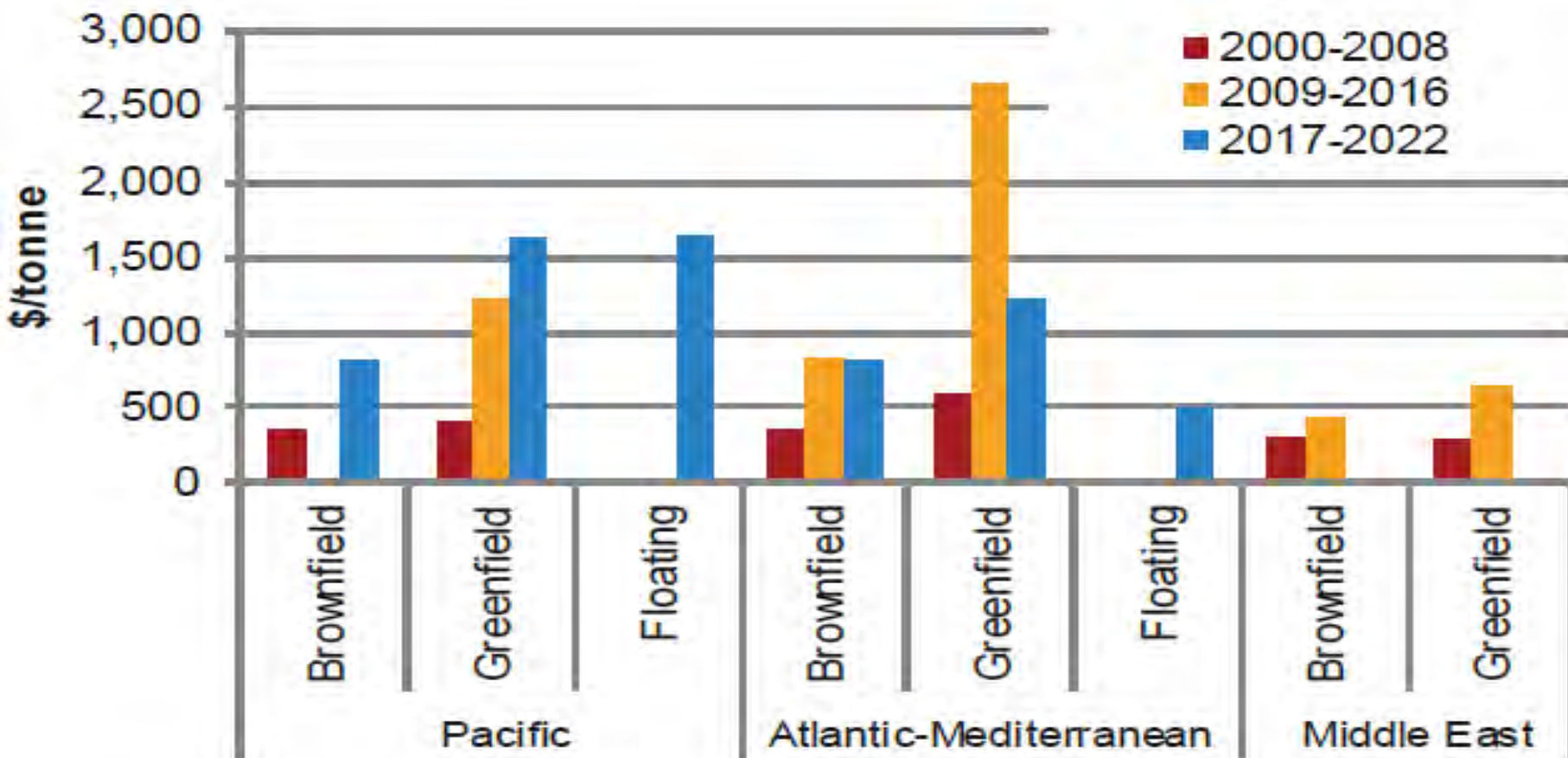


Average Liquefaction Unit Cost (in real 2014 \$/tn)



Source: IGU World LNG Report 2017

Average Liquefaction Unit Costs (in real 2014 \$/tn) by Region and Type of Projects

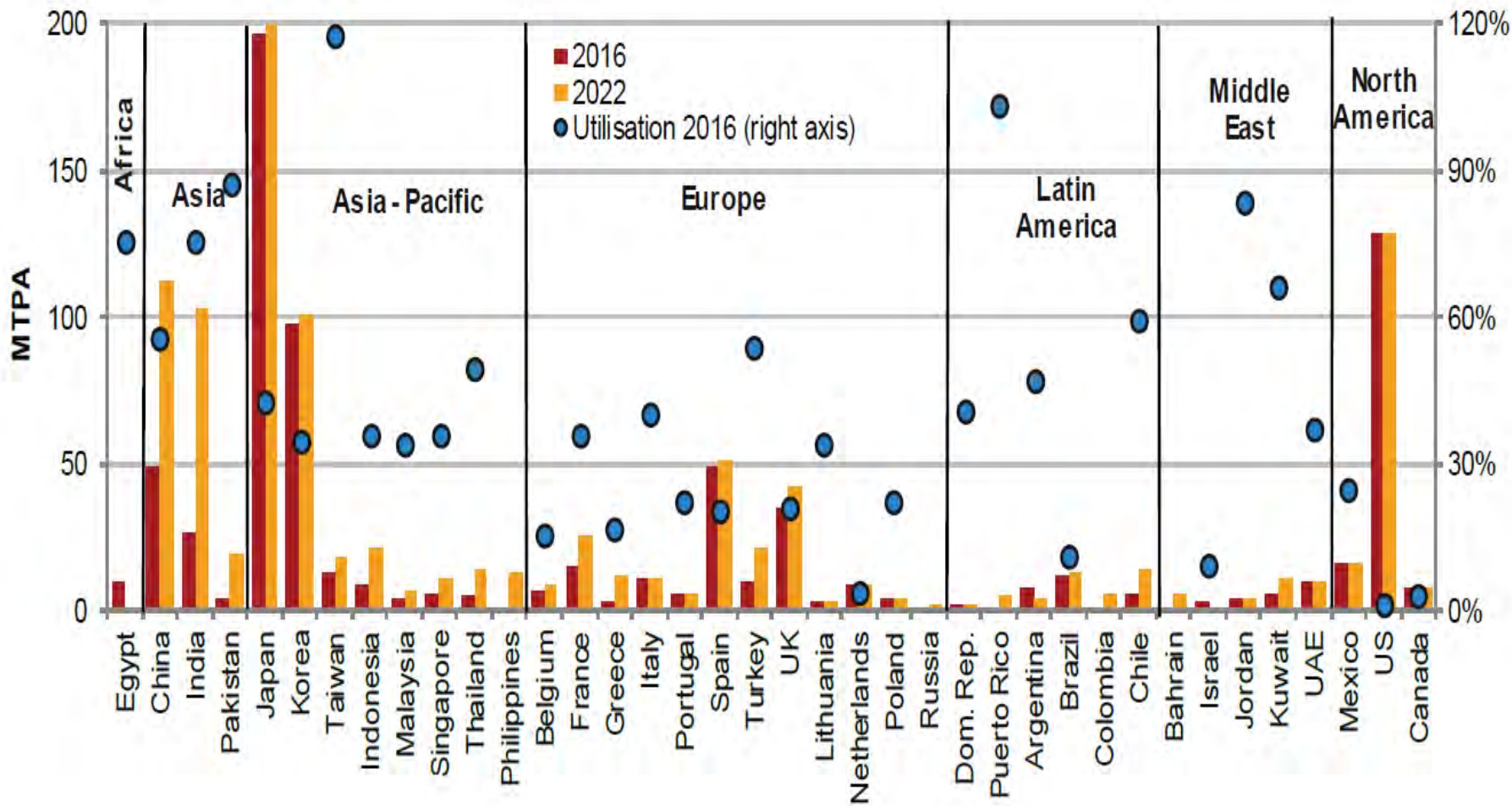


A number of FLNG Projects is under construction



SHELL's Prelude FLNG is the world's largest floating vessel with a capacity 3,6 mtpa/y. Its dimensions are L 488 m x W 75 m x 105 H
Last week started its journey from Samsung shipyard to offshore Prelude gas field, Australia

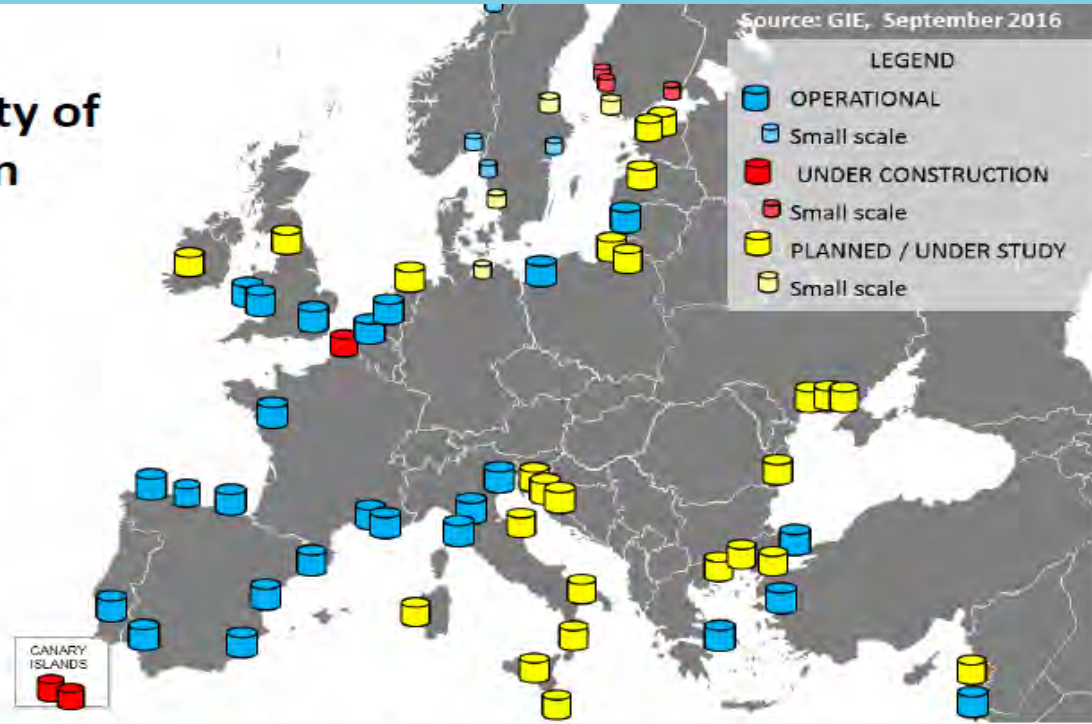
Re-gas terminals import capacity and utilization rate by region/country



LNG regasification terminals in Europe (GLE Map)

Annual regasification capacity of LNG import terminals (billion m³(N)/year)

	EU-28	Europe
operational	197	208
under construction	29	29
planned	127	161



Detailed information on LNG terminals available at www.gie.eu, Maps & Data

Number of LNG import terminals per type

	operational	under construction	planned
Large-scale	24	3	23
incl. FSRUs and others	2	0	11
Small-scale	4	4	4
Total	29	6	27



Hoegh's FSRU Gallant in Ain Sokhna, Egypt

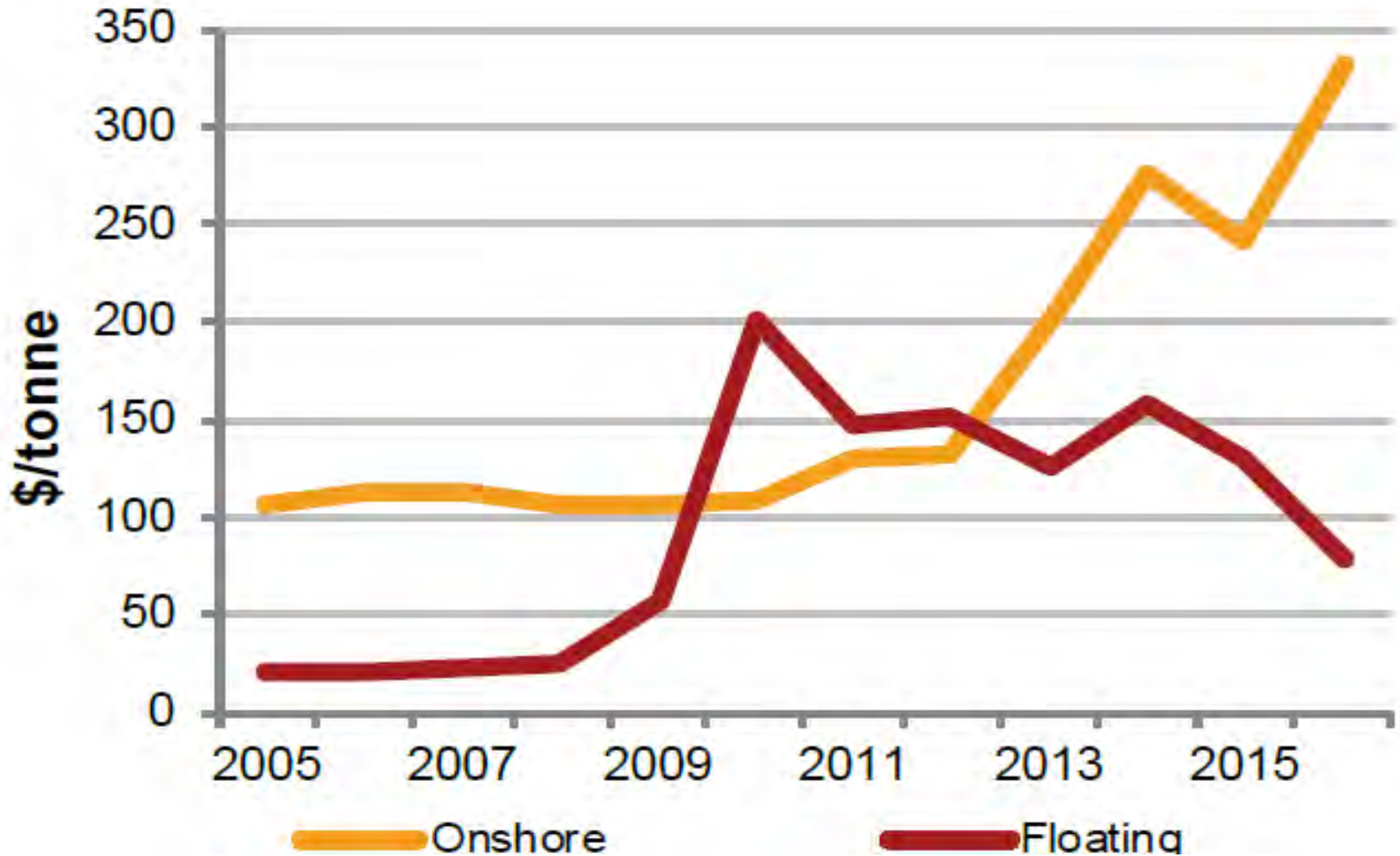


Onshore LNG Terminals vs FSRUs

Onshore Terminals	FSRUs
Provides a more permanent solution	Allows for quicker fuel switching
Offers longer-term supply security	Greater flexibility if there are space constraints or no useable ports
Greater gas storage capacity	Capable of operating further offshore
Generally requires lower operating expenditures (OPEX)	Generally requires less CAPEX
Option for future expansions	Less land regulations

Source: IGU World LNG Report 2017

Onshore Terminals costs vs FSRUs costs (IGU World LNG Report 2017)

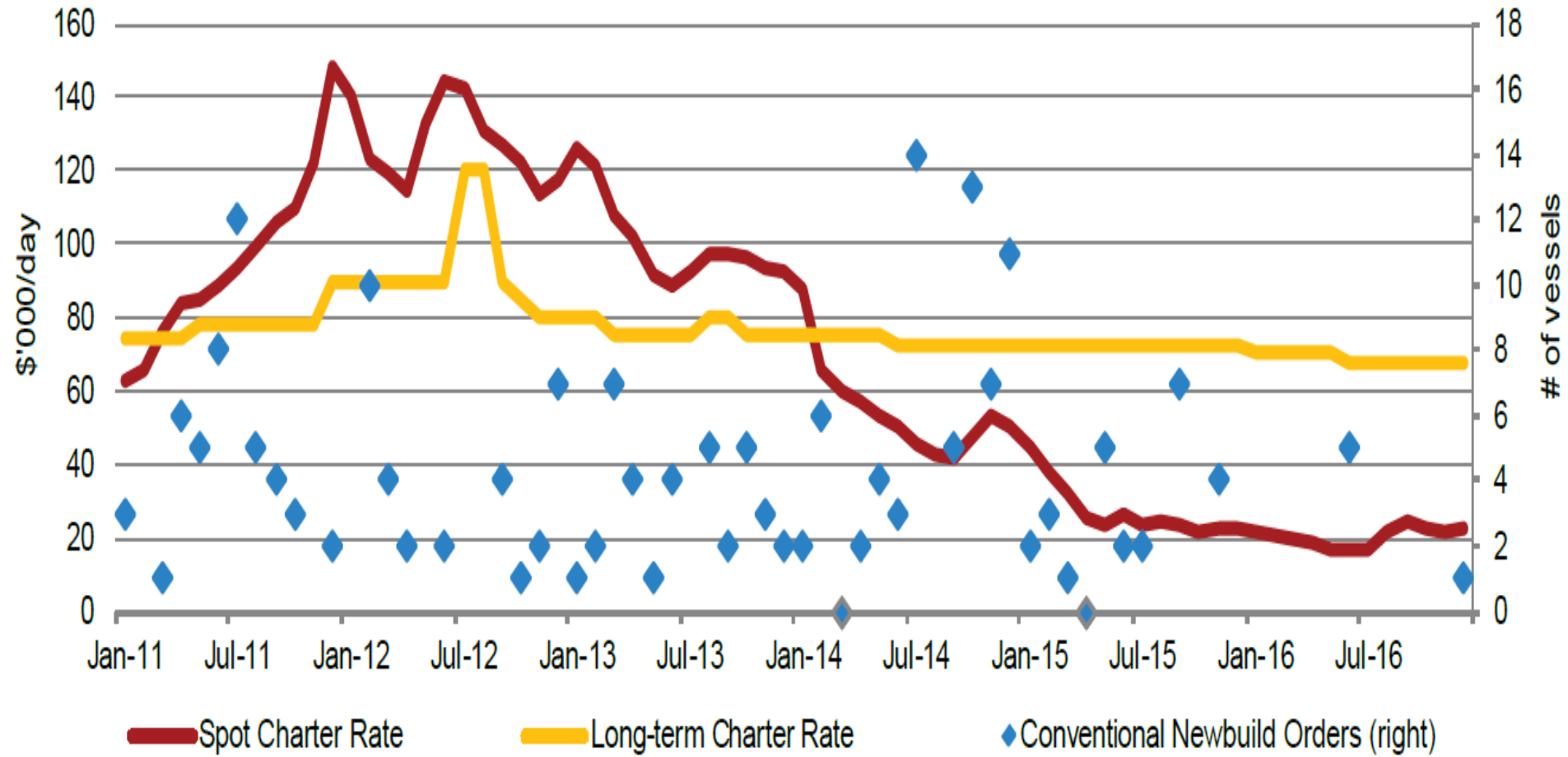


2015-2016 LNG Shipping in Review

<p>Global LNG Fleet</p> <p>+29</p> <p>Conventional carriers added to the global fleet in 2016</p>	<p>Propulsion systems</p> <p>~30%</p> <p>Active vessels with DFDE/TFDE propulsion systems</p>	<p>Charter Market</p> <p>\$20,500</p> <p>TFDE /DFDE \$33,500</p> <p>Spot charter rate per day in 2016</p>	<p>Orderbook Growth</p> <p>+6</p> <p>Conventional carriers ordered in 20156</p>
<p>The active fleet expanded to 439 carriers in 2016</p> <p>The average ship capacity of newbuilds in 2016 increased by 4.5% to 170,660 cm compared to the average in 2015</p> <p>Two vessels – both over 35 years of age – were scrapped in 2016</p>	<p>In 2015, over 72% of the fleet was steam-based; by 2016, DFDE/TFDE ships accounted for over 30% of the fleet</p> <p>The orderbook has a variety of vessels with new propulsion systems including ME-GI, and Steam Reheat designs</p>	<p>The increase in cross-basin trade following the years after the 2011 Fukushima crisis prompted spot charter rates to skyrocket in 2013 to over \$100,000/day</p> <p>Between 2014-16, +90 vessels entered the market during a period of minimal incremental growth in LNG supply, pushing charter rates almost to operating costs</p>	<p>26 newbuild orders were placed during 2015 as buyers continued to secure shipping tonnage for the upcoming growth in LNG supply, primarily from the US; down from the 68 orders in 2014.</p> <p>There were only 6 vessels ordered throughout 2016 as liquefaction project FIDs have been pushed back</p>



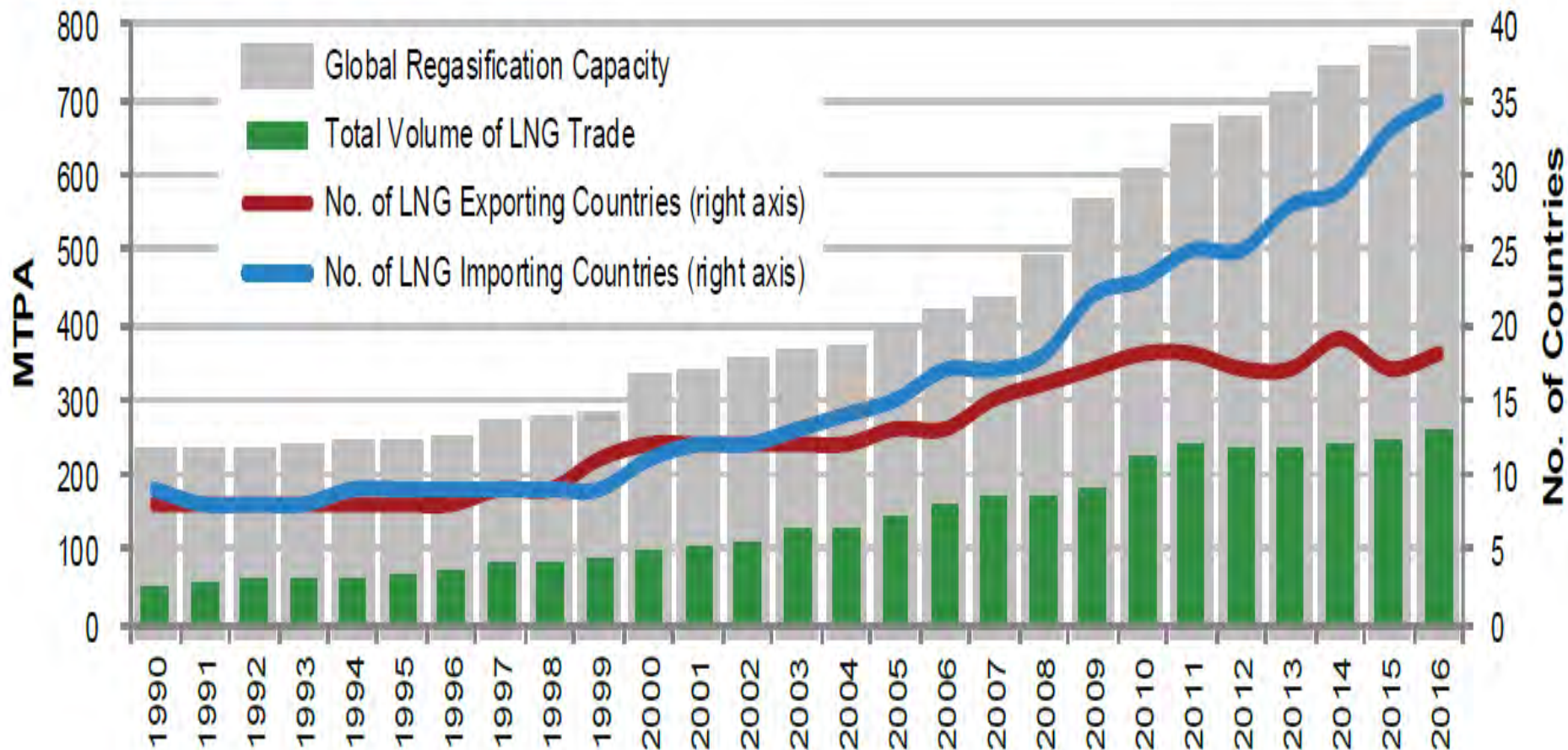
Evolution of Estimated LT and Spot Charter Rates in \$/day



Source: IGU World LNG Report 2017

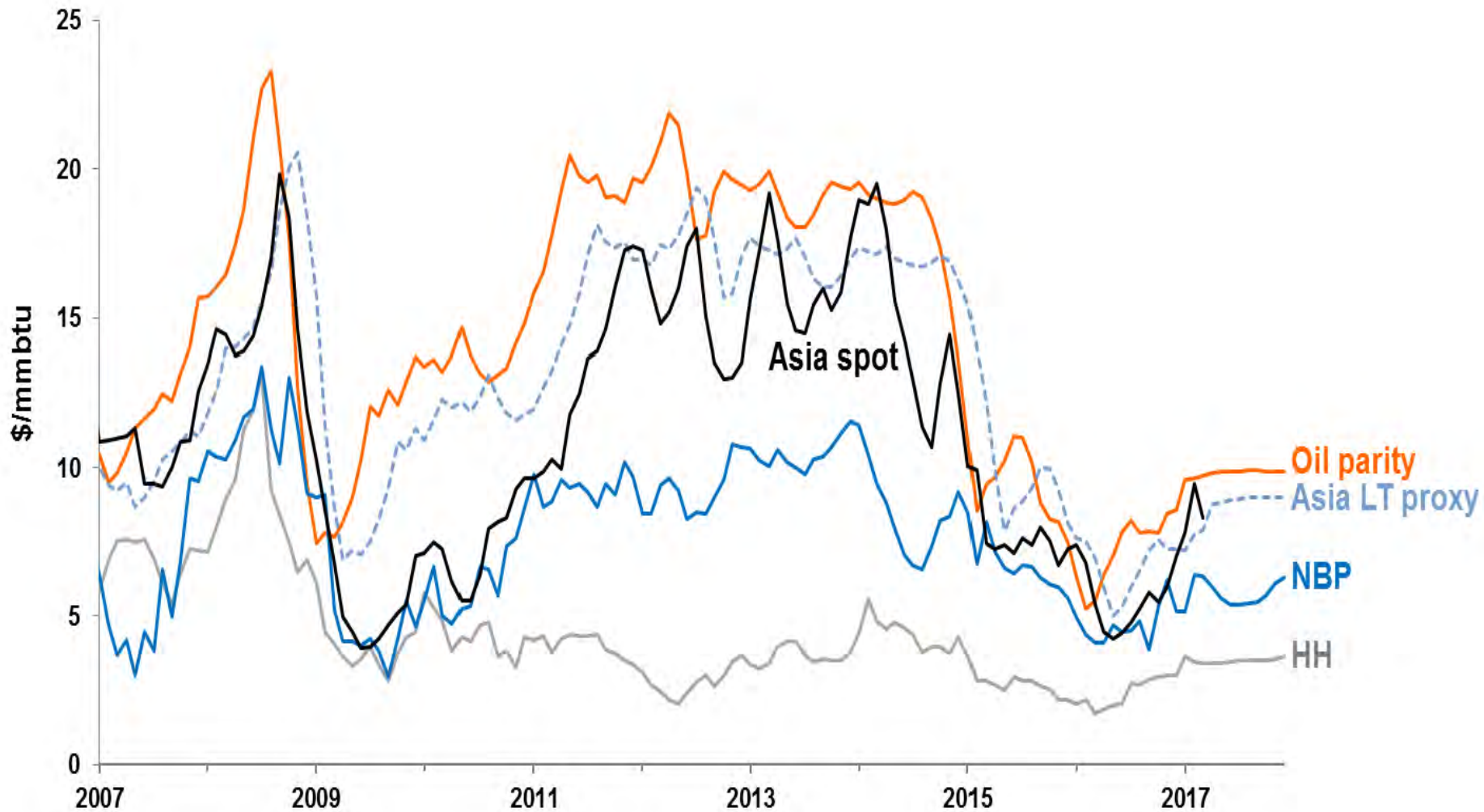
Evolution of LNG trade (1990-2016)

Figure 3.1 LNG Trade Volumes, 1990-2016



Source: IGU World LNG Report 2017

Evolution of gas/LNG prices





Emerging trends/models in LNG Contracts & Trade

- Reduction in average contract length and contract volumes
- Rise of destination free and volume flexible LNG contracts (US LNG)
- Increasing role of LNG 'intermediates' (Portfolio Players and LNG Traders)
- Growing number of LNG contracts with hub indexed price mechanisms
- Due to LNG oversupply, buyer's bargaining power have increased and thus they are gaining influence over certain contractual terms
- Similarly, due to LNG glut, sellers are forced to accept lower buyers' credit quality
- Rising number of transactions on a short-term and/or spot basis

SE Europe (and Greece) is set to become a new gas/LNG entrance to Europe



Greece in particular has certain advantages to host a regional traded gas hub



Thank you for your attention

Questions?

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