



INTERNATIONAL ENERGY FORUM

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# Fifth IEF-IGU Ministerial Gas Forum: Gas for Growth

## Background Paper

New Delhi, December 6<sup>th</sup> 2016



# Introduction

## Current context

- Low gas prices across all markets are a result of low oil prices and the existent oversupply situation in key markets (LNG, US, Europe etc.)
- Natural gas demand could increase due to (1) it becoming more competitive in the current context of low prices, and (2) its lower emissions vs. other fossil fuels
- Nations are committed to arrest global warming; local air quality initiatives are also in play. Gas can support sustainability but global policy is necessary

## Forum objectives

- To discuss the future prospects of natural gas demand
- To review the impact of gas & LNG trade with regards to market integration and regional gas markets
- To explore the impact of policy on the growth of the natural gas sector

**Key Question: *What is the role for gas in an oversupplied market and in a world facing multiple challenges with regards to sustainability?***

# Agenda

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## **Gas/LNG demand growth**

LNG supply as an integrating force

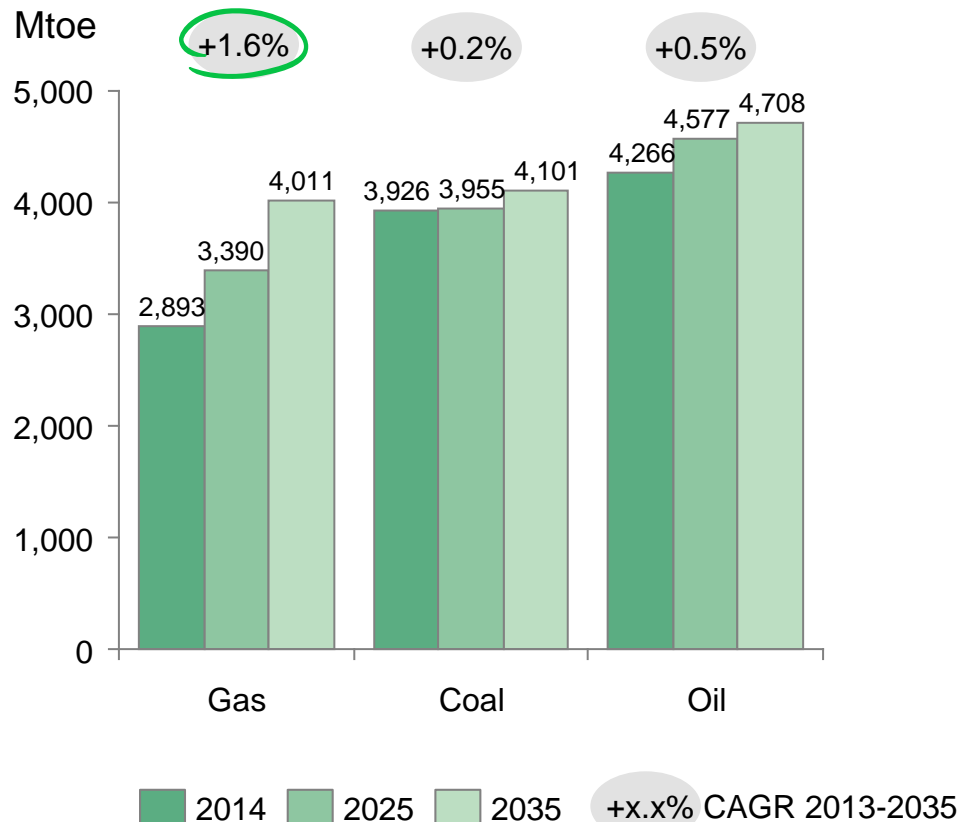
Sustainability needs a mind-shift

Putting it all together – key observations & questions

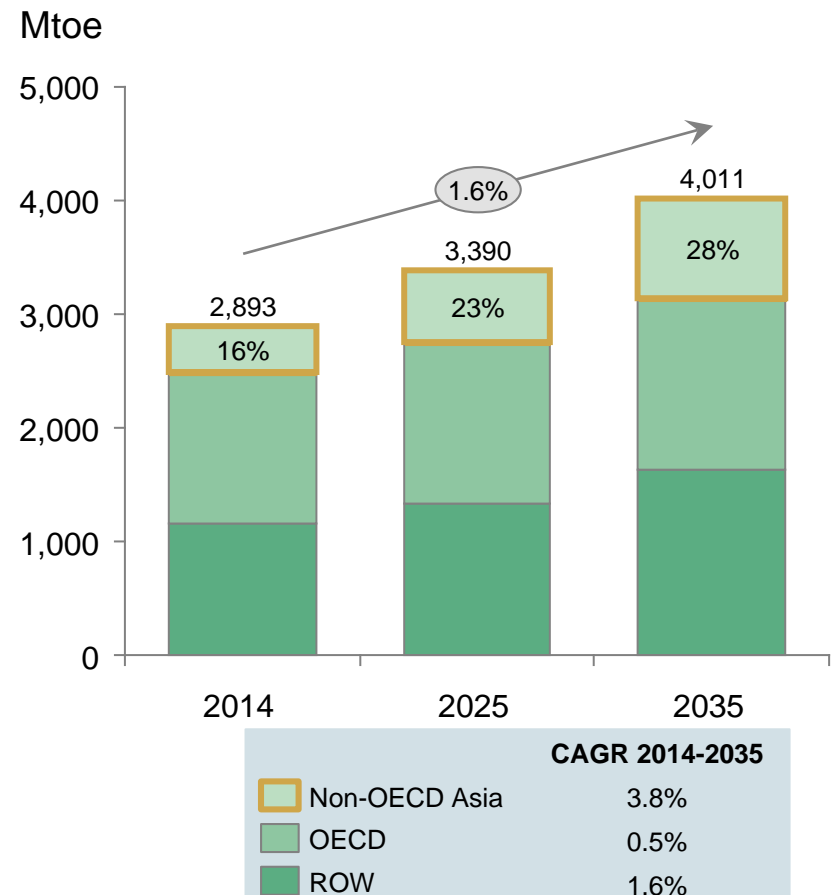
# Natural gas: the greatest growth fossil fuel

Demand expected to be driven by non-OECD Asia

## Predicted demand growth for natural gas leads other primary energy sources<sup>1</sup>



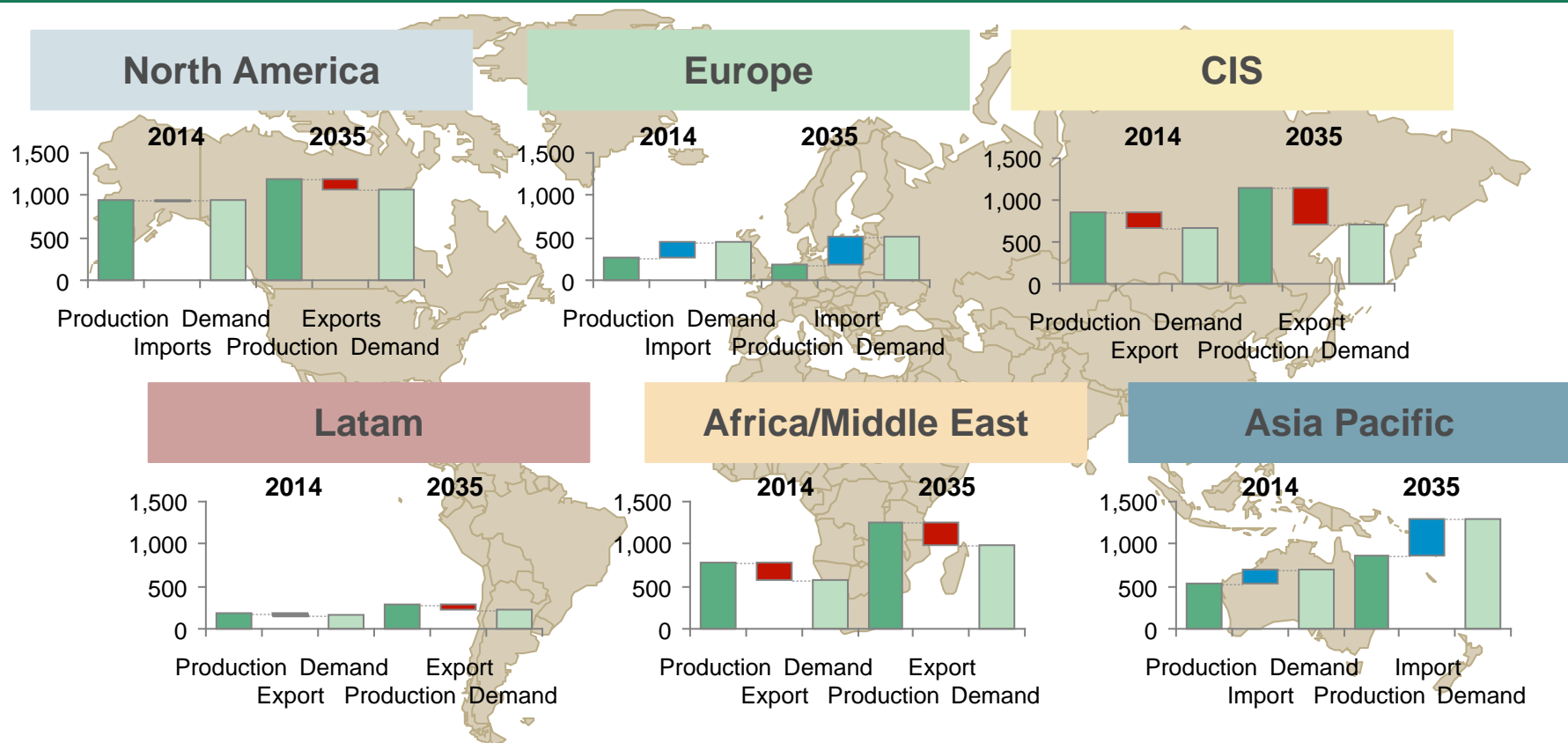
## Growth expected to be driven by non-OECD Asia



1. New Policies Scenario  
Source: IEA, BCG LNG Market Model

# Separation between the major future demand sinks and producing regions will necessitate the increased flow of LNG

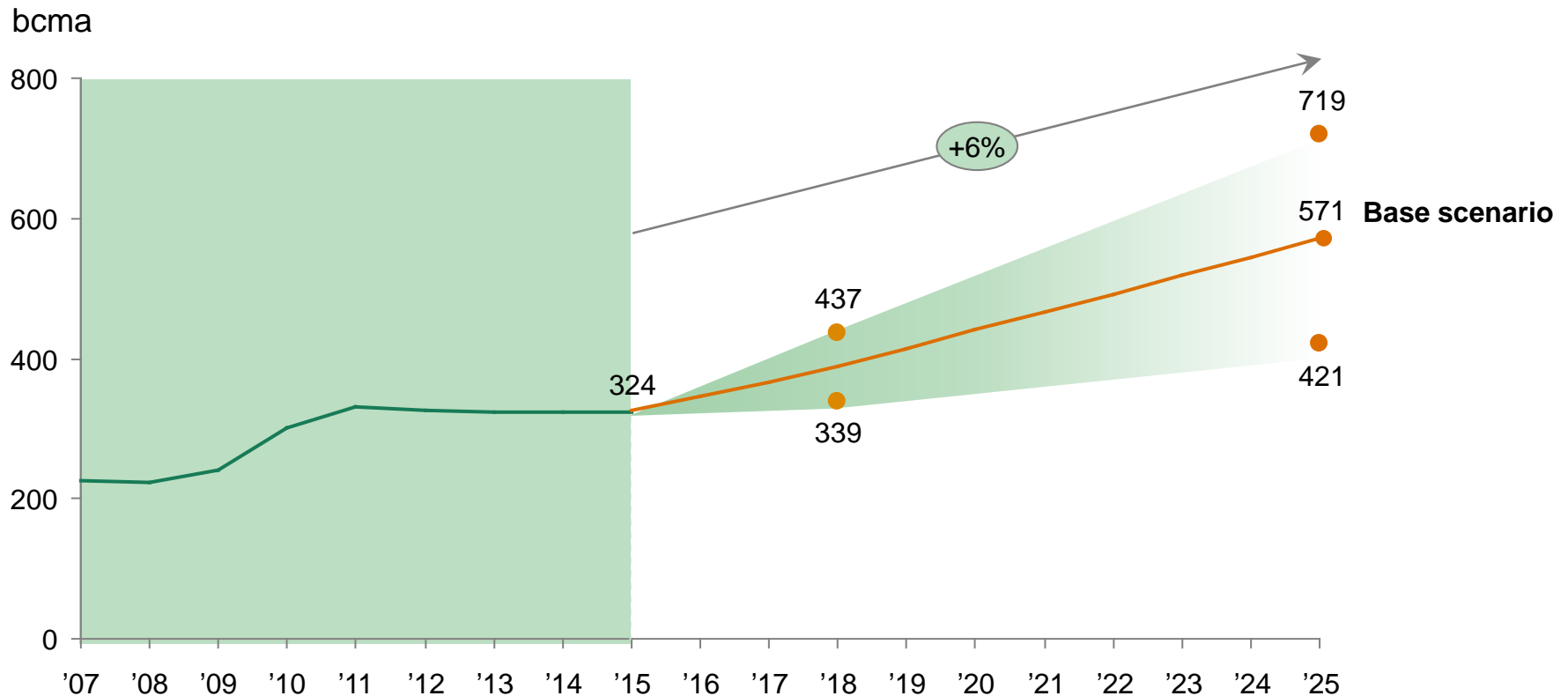
World wide regional Natural gas balance 2014-2035 (Mtoe)



**LNG flow expected to increase from 325Mtpa in 2015 to ~700Mtpa in 2035; gas demand becomes an LNG story**

# LNG demand is expected to grow at 5-6% p.a. between 2015 and 2025 under the base scenario

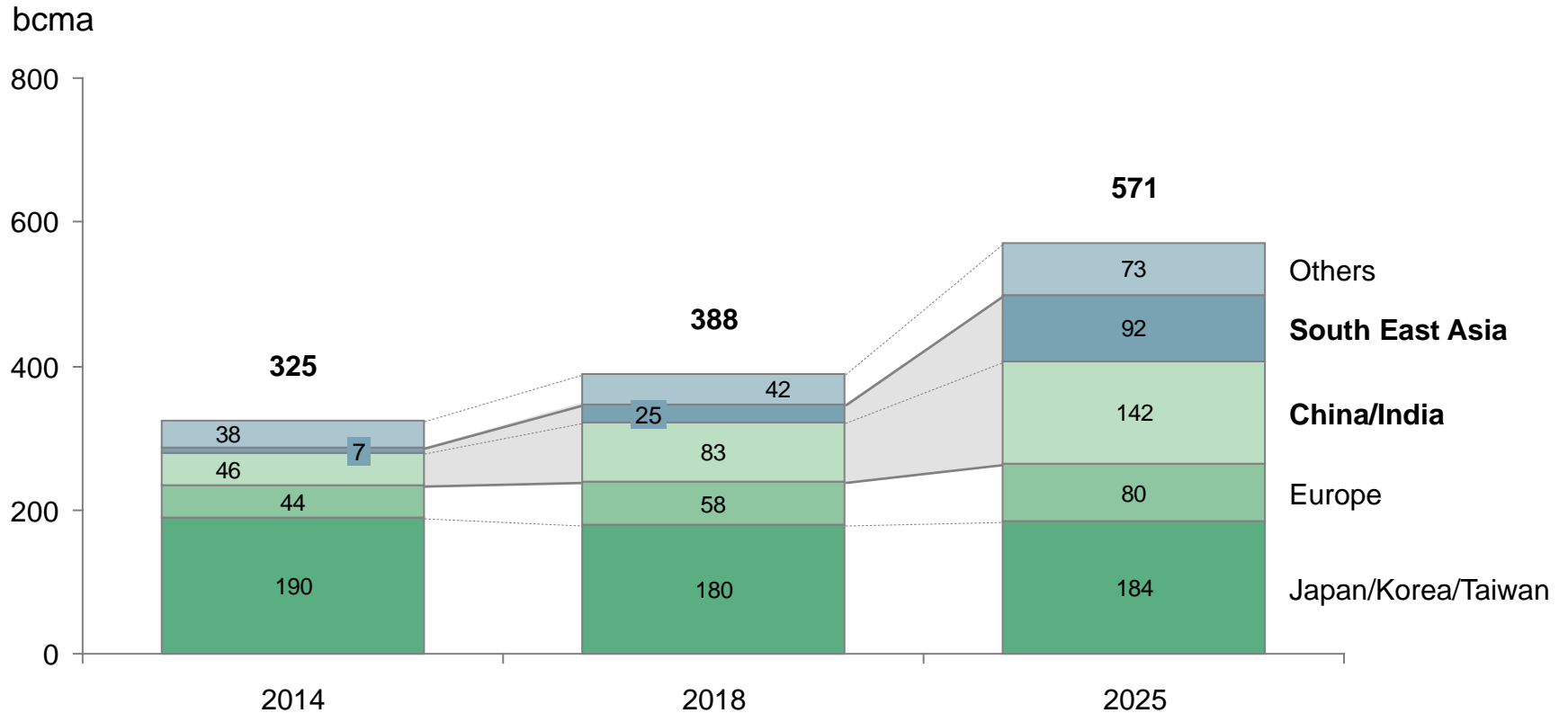
## 2015 Global LNG demand projections between 2015 and 2025



Source: BP Statistical review of world energy, Cedigaz, WoodMackenzie, BCG analysis

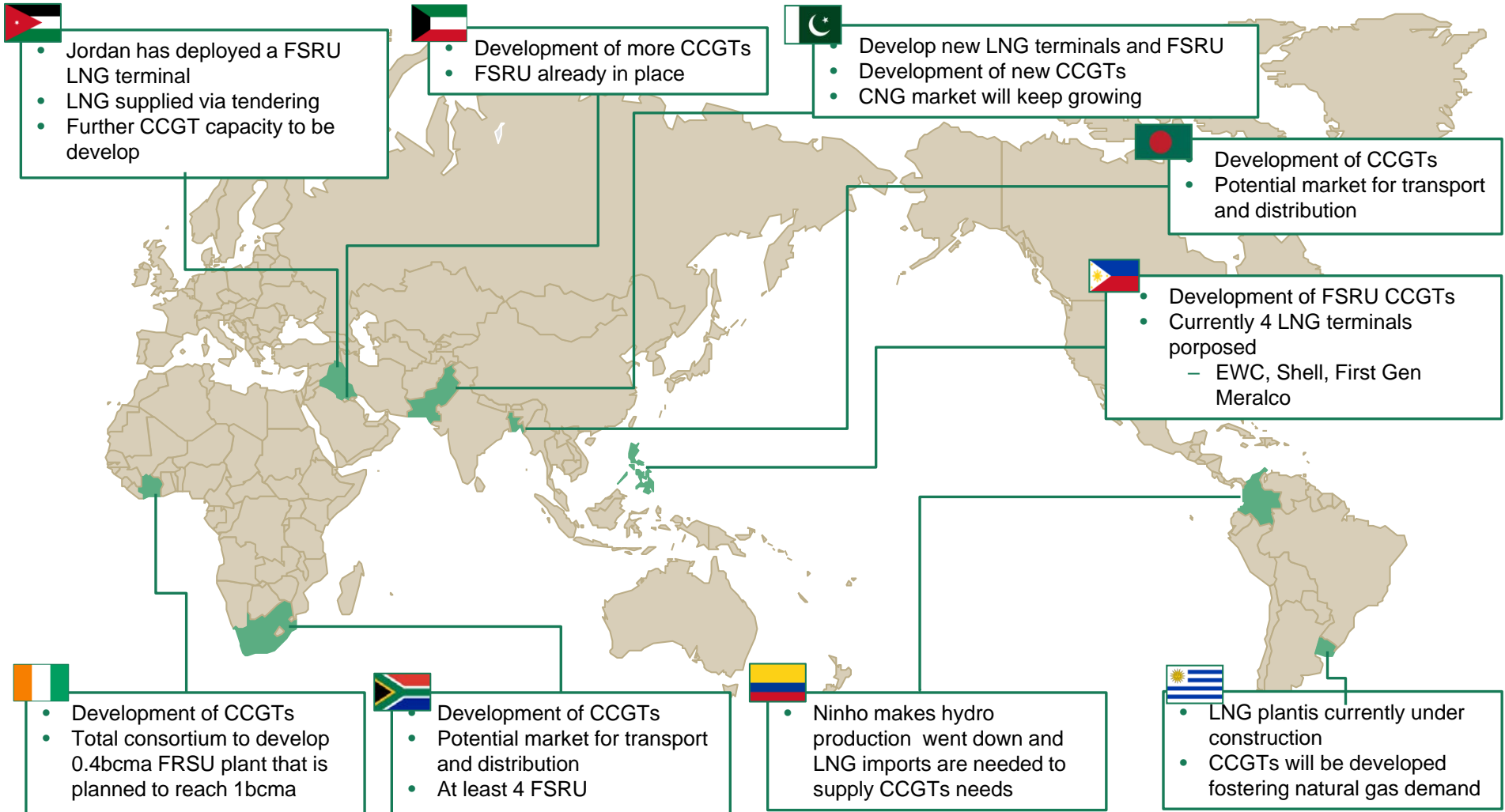
# China, India and Asean countries are the drivers of LNG future demand growth

Global LNG demand base scenario



Source: BCG LNG Market Model

# More countries can join supporting a higher demand growth rate





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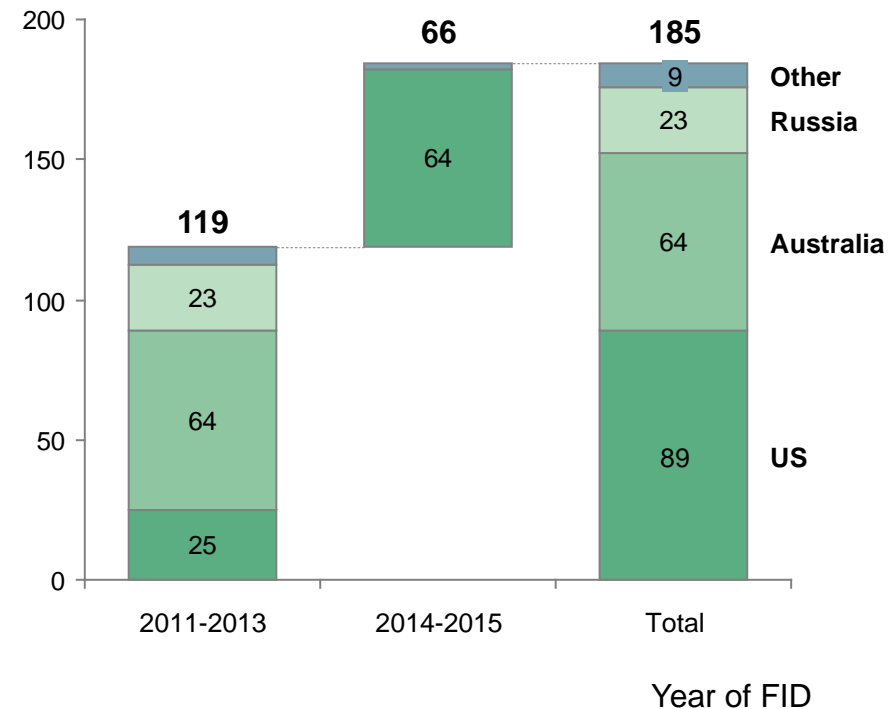
# LNG supply is set to increase with 13 projects becoming operational in the next 3-5 years

## 13 projects with FID to come on line during the next 3-5 years

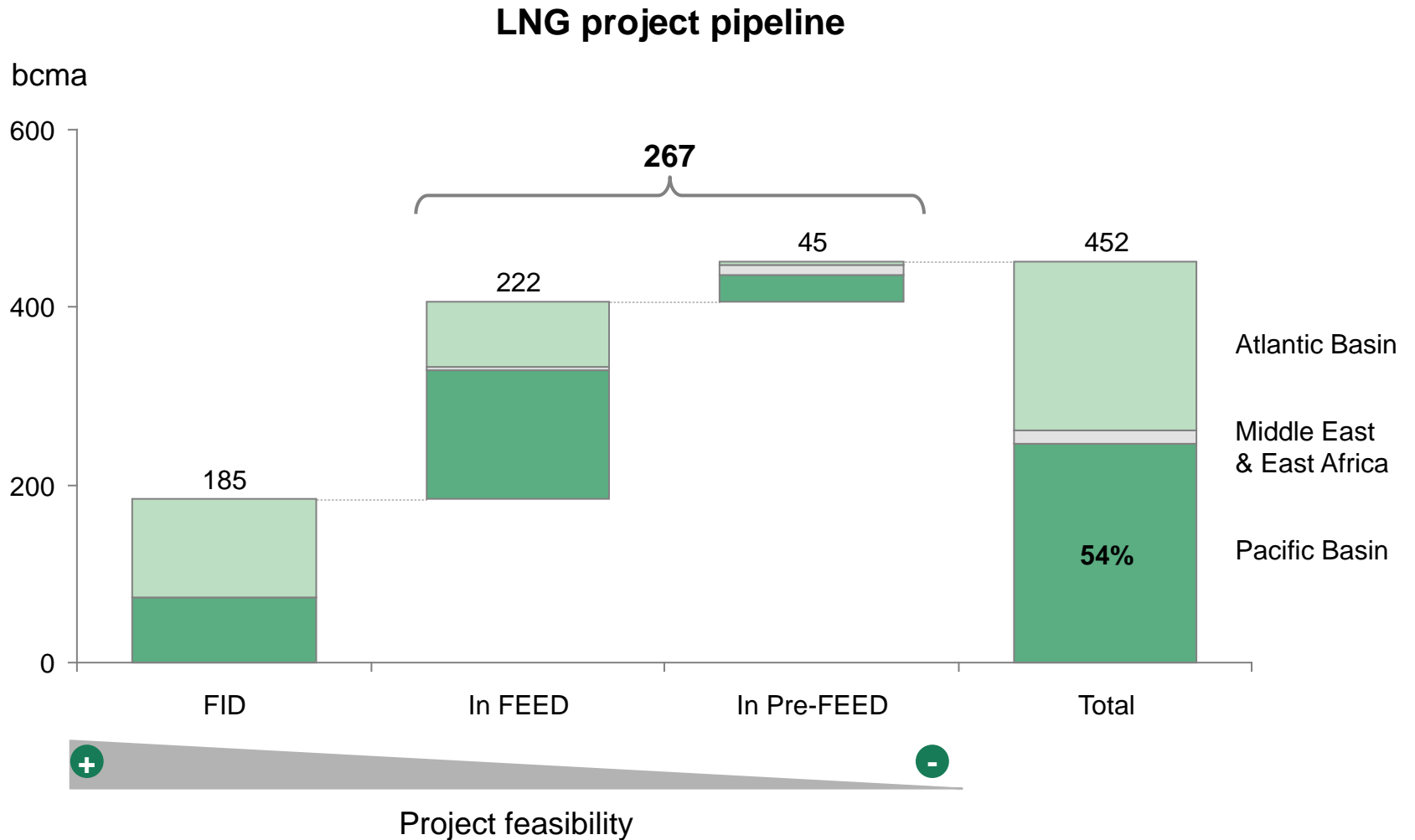
Country	Project	Announced start up	Operator	Capacity (bcma)
Australia	AP LNG T1/T2	2015	Conoco	12.6
US	S. Pass T1-T5	2015-2018	Cheniere	31.5
Australia	Gorgon LNG	2016	Chevron	21.8
Malaysia	MLNG Train 9	2016	MLNG	5.0
Australia	Wheatstone	2016	Chevron	12.6
Malaysia	Kanowit	2016/18 <sup>3</sup>	Petronas	3.8
Australia	Ichthys	2017	Total / Inpex	11.8
Australia	Prelude FLNG	2017	Shell	5.0
Russia	Yamal	2019	Novatek	23.1
US	Freeport T1 -T3	2018	Freeport LNG	18.5
US	Cameron T1-T3	2018	Sempra	18.9
US	Cove Point	2018	Dominion	7.3
US	Corpus Christi LNG T1 T2	2018	Cheniere	12.6

## Recent FID activity has been heavily concentrated in the US

Capacity committed with FID per year bcma

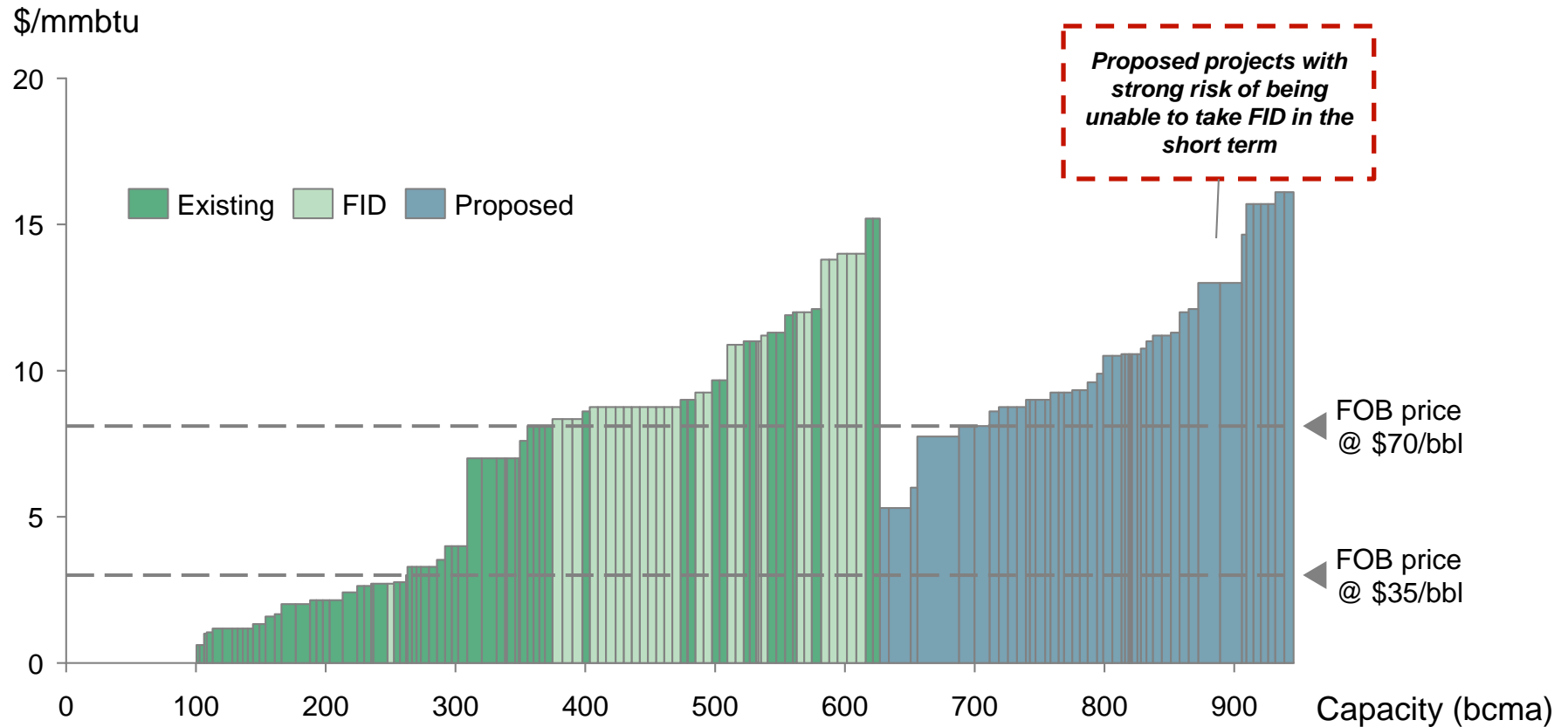


# Substantial additional capacity without FID



# Strong risk of delays on new project developments, given the mismatch between development costs and LNG prices

## Supply cost curve (FOB)

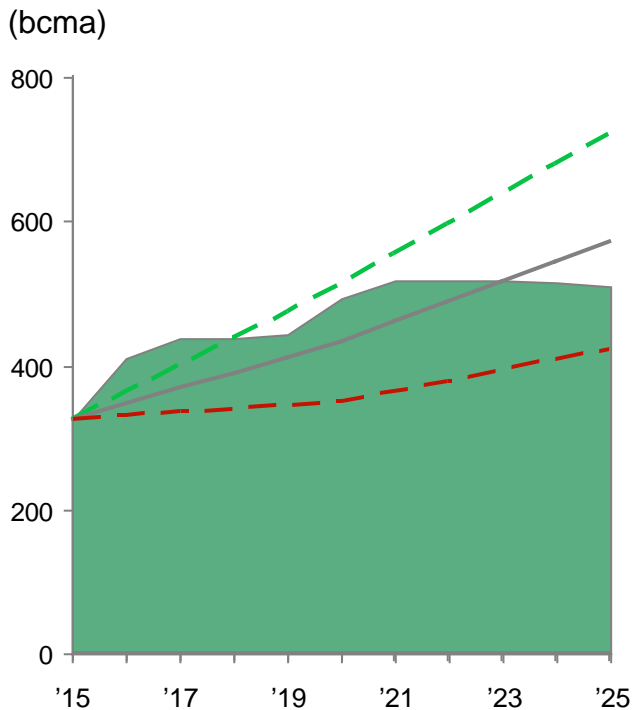


Note: 2\$/mmbtu have been deducted from DES prices in order to make them comparable with FOB prices  
Source: **BCG LNG Market Model**

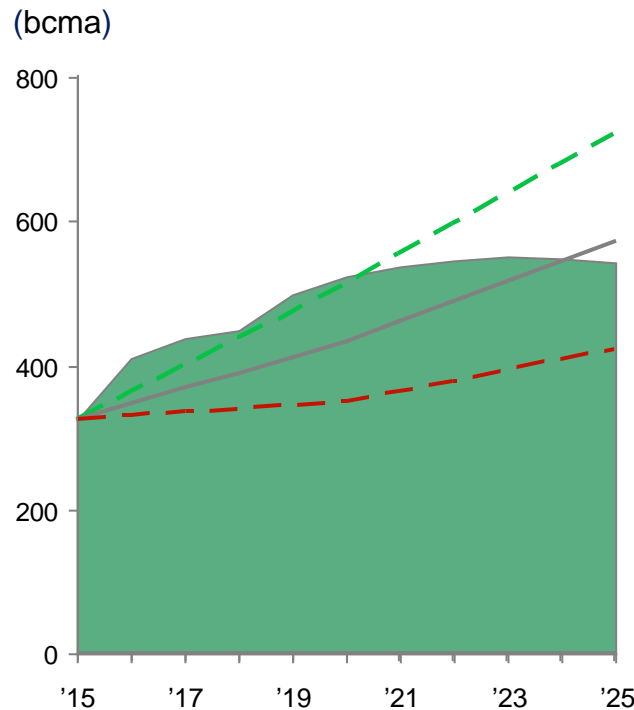
# Substantial oversupply risk in the coming years

Driven by the ca.185 bcma of additional capacity expected to come on line in the next 3-5 years

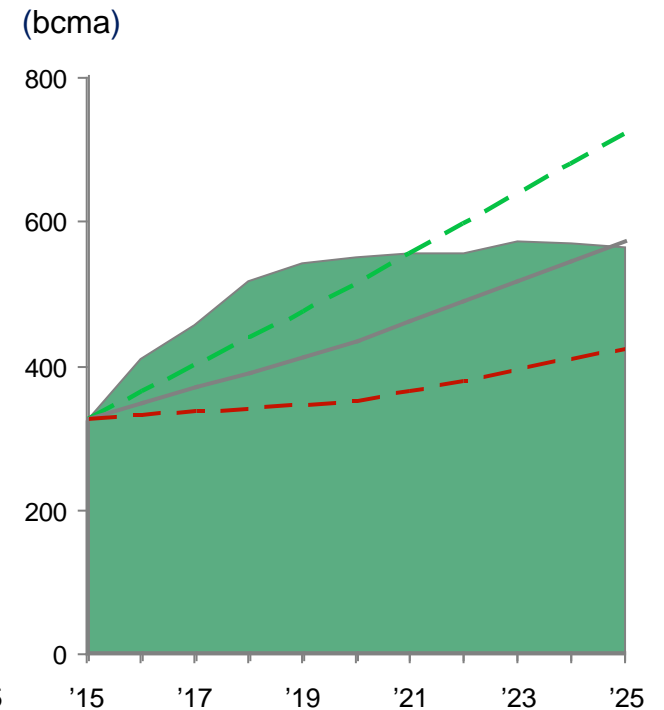
### Low supply scenario



### Base supply scenario

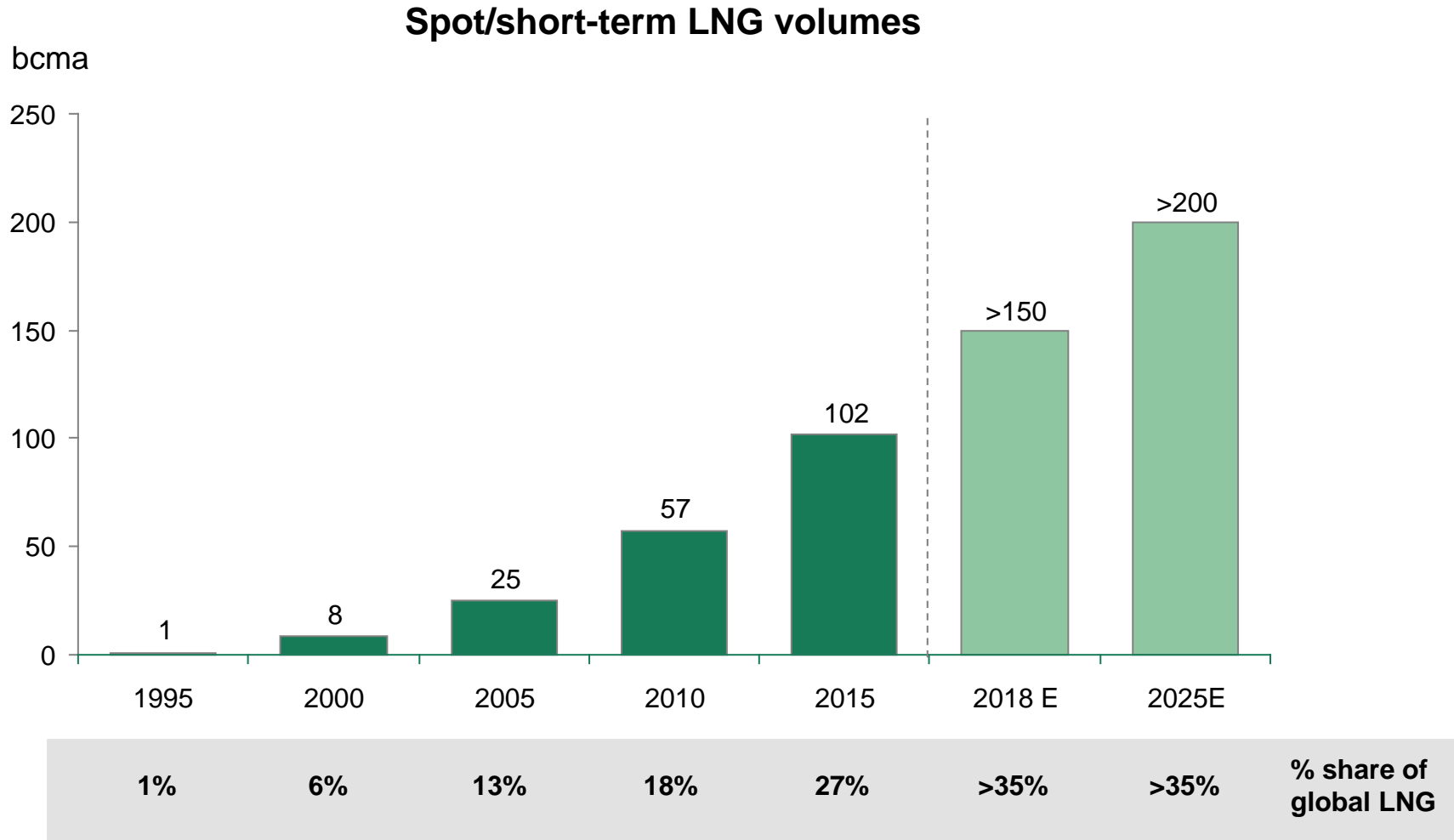


### High supply scenario



- Global LNG demand - High scenario
- Global LNG demand - Base scenario
- Global LNG demand - Low scenario
- Global LNG supply (@ 85% load factor)

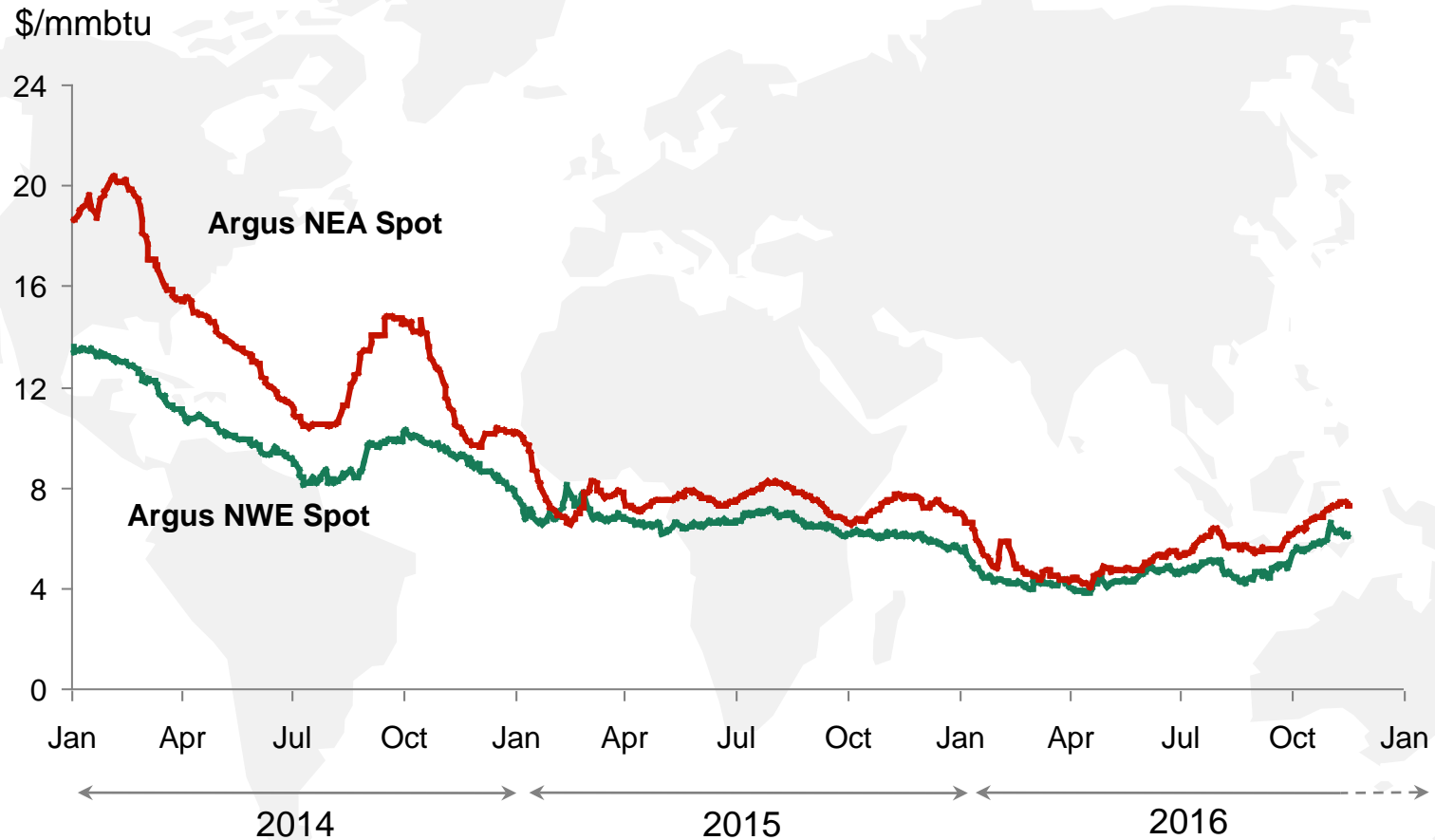
# In a context of increased liquidity in the LNG market



Source: Cedigaz, Waterborne LNG reports, Quant, GIIGNL BCG analysis

# LNG spot prices could continue registering low levels for the coming years

## Argus LNG spot prices June 2014 – November 2016



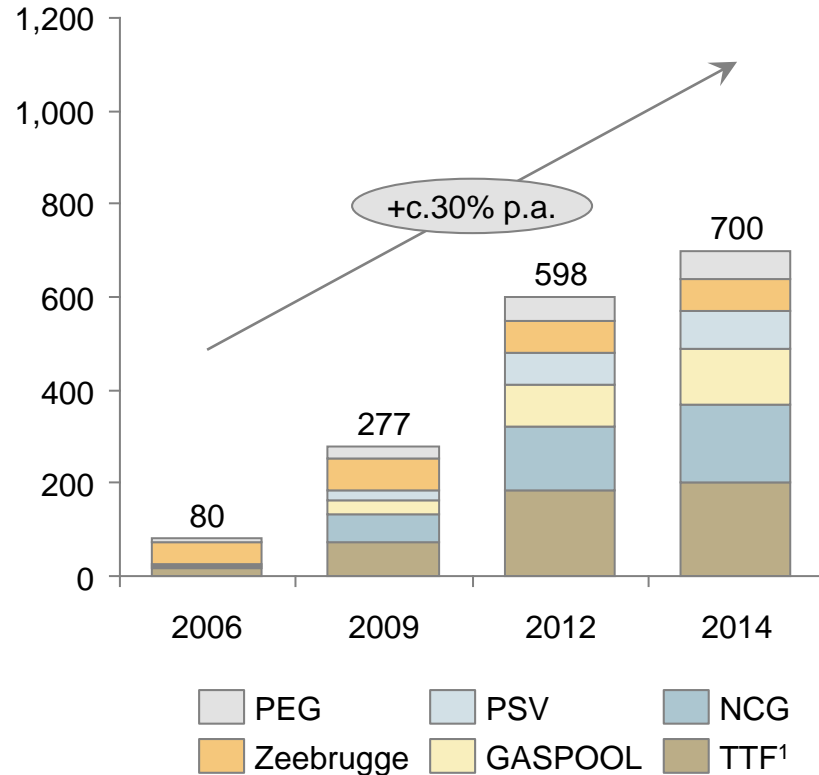
Note: NEA= North East Asia 2. NWE = North West Europe  
Source: Argus LNG

# Western Europe hubs will act as a regulation valve for LNG

Western European markets have become liquid and hubs are the key price reference

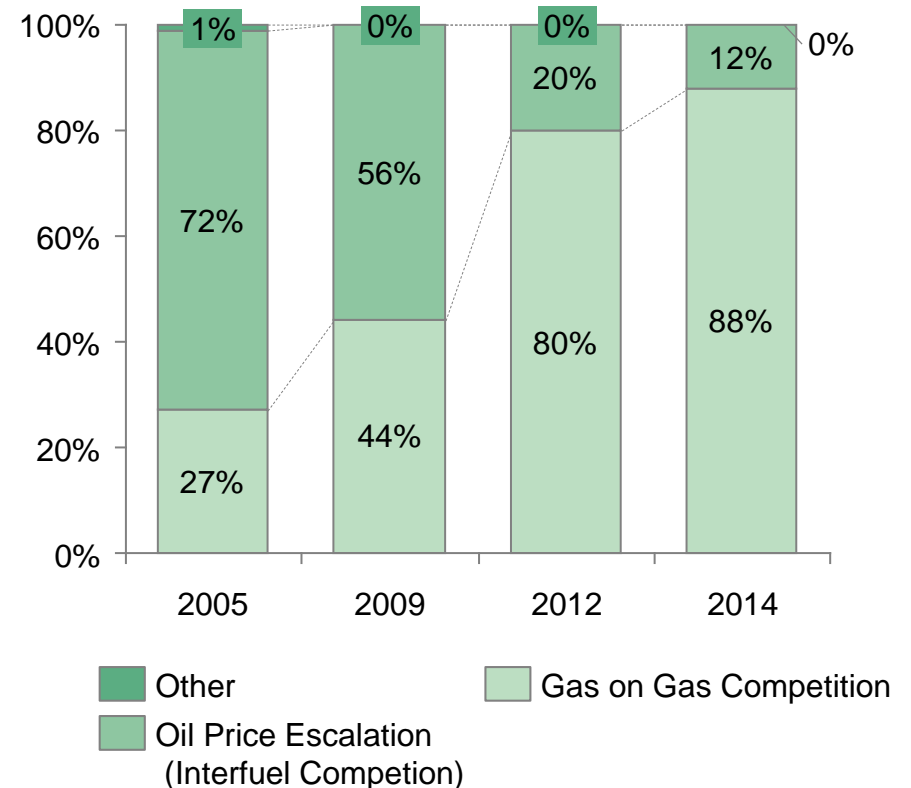
## European hubs are becoming liquid during the last decade

Evolution of traded volumes at the main Continental European hubs (bcm)



## European hubs have become the key reference for gas prices in Europe

Wholesale Gas Price Formation in Northwest Europe (%)



1. Information for 2014 traded volumes at TTF not reported by Prospex: 2014 TTF traded volumes estimated based on delivered volumes at TTF  
Source: Prospex, Gasunie Transport Services, IGU



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**Sustainability needs a mind-shift**

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# COP21 was a step forward towards sustainability and climate change mitigation

## Signed agreement sets ambitious goals...

### Hybrid agreement framed

#### Legally binding

**Transparency and accountability:** Submitting an emissions reduction target (INDCs<sup>1</sup>) and regularly review that goal

**Burden sharing:** Legal obligation on developed countries to continue to provide climate finance to developing countries

- Details about the mechanism moved out of the legally binding agreement

#### Not legally binding

**Emissions reduction:** no formal enforcement mechanism at global level

**Financing mechanism:** further negotiations required

- Countries should agree a “new collective quantified goal” from the floor of \$100bn per year

## ... benefitting all key parties involved

#### Governments

- The Paris Agreement was adopted; it has legal force
- Other bilateral financial agreements were also made during the conference, including pledges to the Green Climate Fund

#### Investors & companies

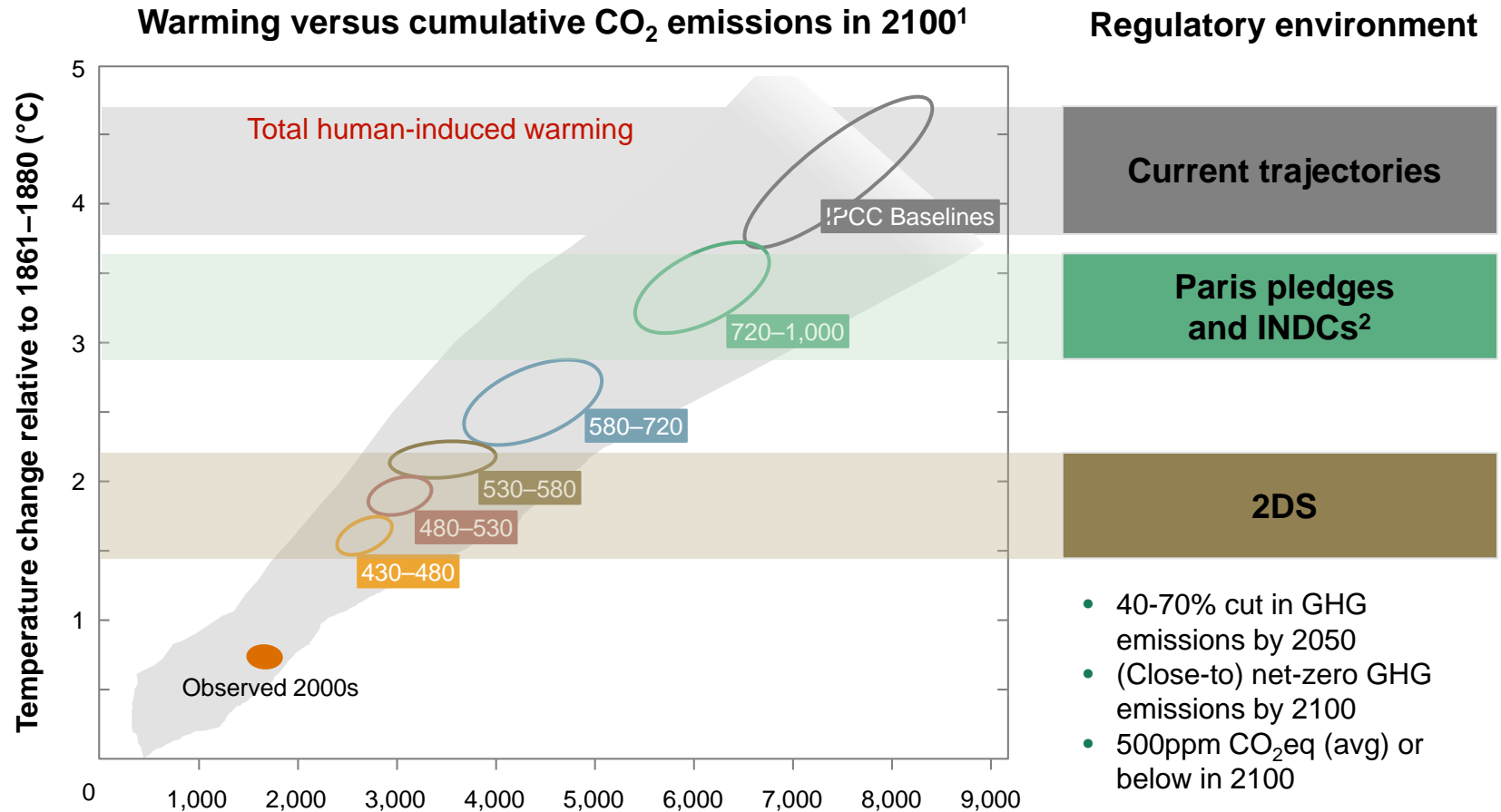
- Climate commitment by over 2,000 companies and 400 investors
- Long-term and more stable framework for investors; clear signal sent that the transition to a low-carbon economy is underway, and that governments intend on supporting the process

#### NGOs & civil society

- Mention of a 1.5°C goal has been unexpected
- There were also mentions of food security, humanitarian concerns and “ratcheting up”

# Current pledges are far off reaching 2°Celsius Scenario (2DS)

2DS requires GHG concentrations below 500ppm (450 is widely used as target)



xxx Ranges of GHG CO<sub>2</sub>eq concentrations in 2100

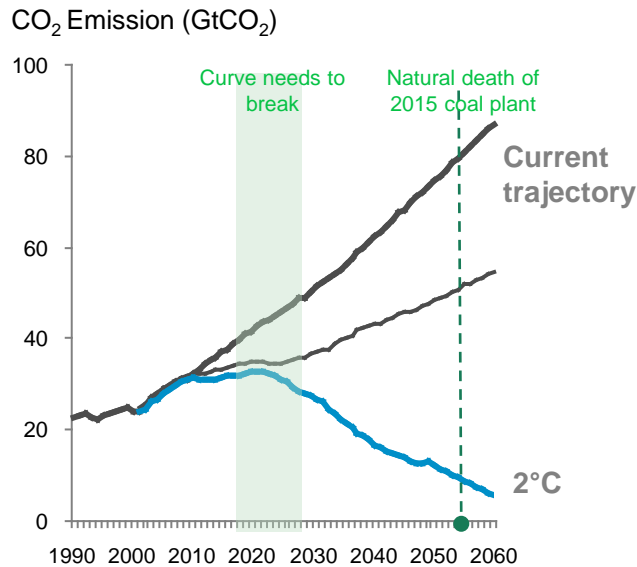
1. Analysis based on 300 baseline and 900 mitigation scenarios in the literature 2. Climate action tracker provides 2.7 °C as median value while Climate Interactive 3.5°C as of April 2016  
 Note: Unlike other short-lived species of GHG for which stable concentrations are associated with stable emissions, stable concentrations of CO<sub>2</sub> in the long-term require net emissions to decline to zero. Hence, a key metric to consider in evaluating potential future global warming is cumulative CO<sub>2</sub> emissions.  
 Source: BCG analysis; IPCC AR5 2014; Climate action tracker; Climate interactive

# Action needs to be fast, global and radical

## Fast

Asset base will last long

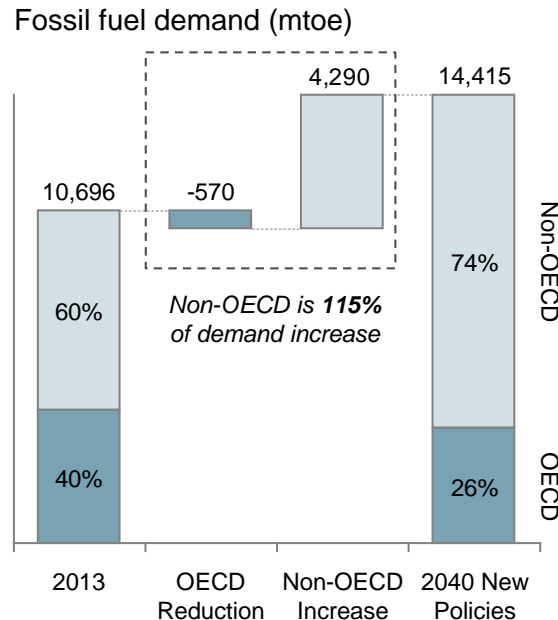
*We need results by 2030, but assets lifetime and deployment are long, driving inertia*



## Global

Difficult non-OECD action

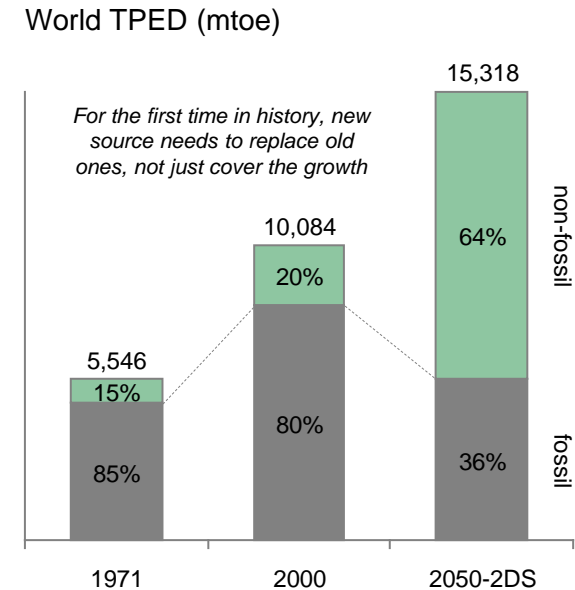
*Change in emerging economies is necessary, and at odds with current economic development model*



## Radical

Regulatory action needed

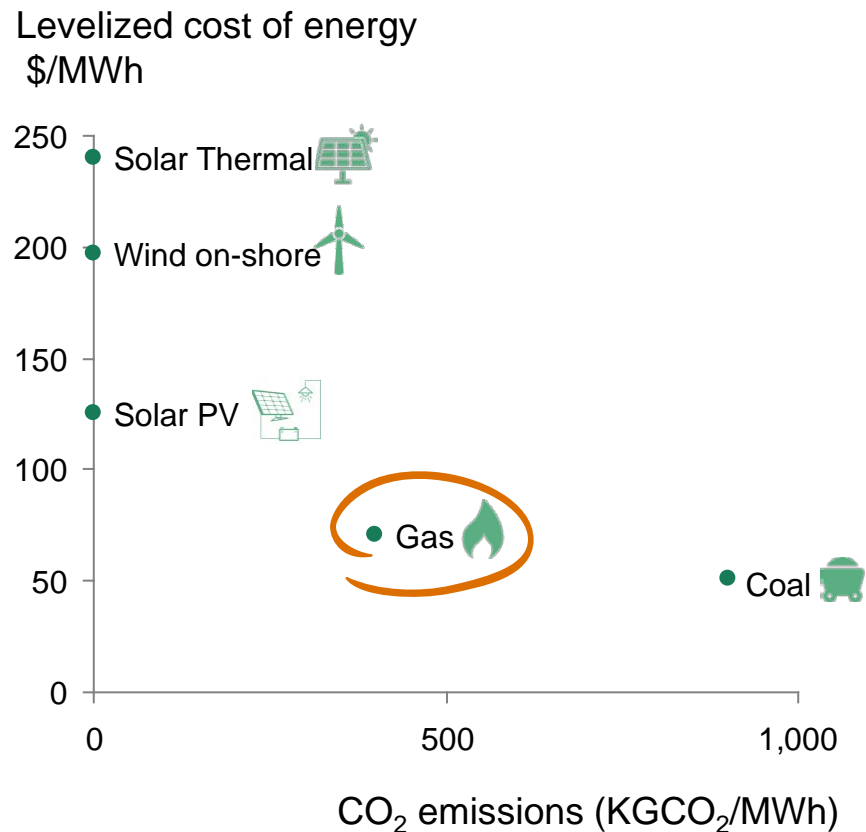
*Energy transition must accelerate, cannot rely on natural technology cycle only – regulation has to be part of it*



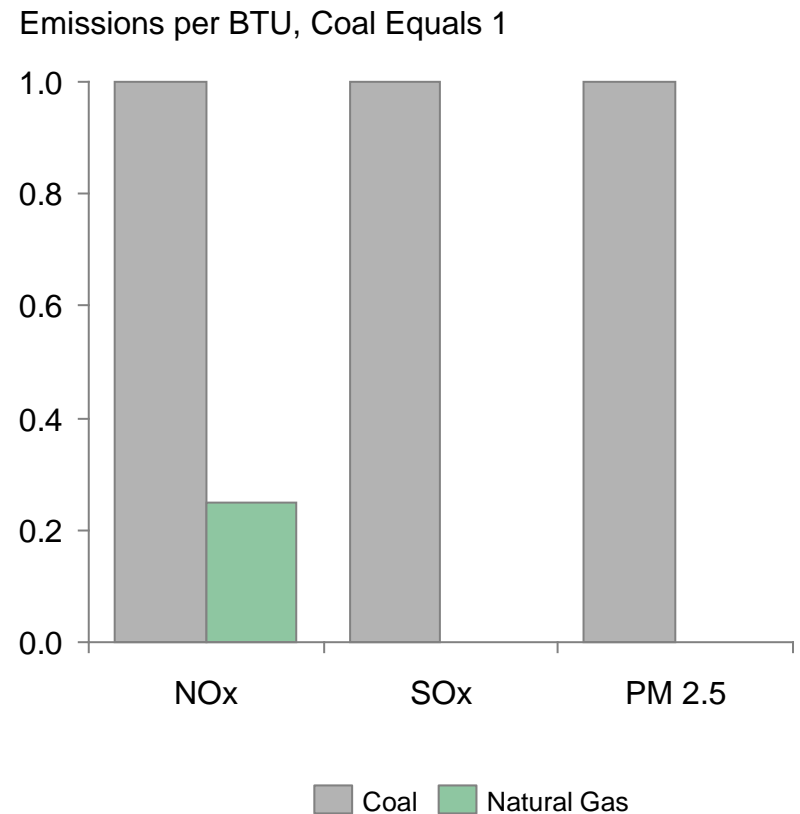
Note: asset lifetimes are subject to substantial longevity differences depending on region, specs, and economics. Lifetimes can be prolonged or shortened depending on commodity economics  
 Source: Velocity suite, British Hydro, Shell, Rystad, Lazard, BCG nuclear database, Morgan Stanley, Wind Energy Update, US government, press search, IEA WEO, BCG

# Natural gas is the ideal bridge fossil fuel to support sustainability initiatives

## Economic attractiveness and less than half the CO<sub>2</sub> of Coal



## In addition, natural gas is clean burning and will improve local air quality



# A tale of two cities: natural gas' positive impact on air quality



## Dublin's successful efforts to eliminate severe winter smog

### Concrete action taken

- "Smoky Coal Ban" in 1990
  - Prohibited sale, marketing & distribution of bituminous coal
  - Drove NG in home heating, commercial and transportation use
- NG now >75% of energy share in residential with ~67% of households in Dublin using NG



### Tangible results

- Reduction in CO, SO<sub>x</sub>, Benzene
- Smog eliminated
- PM concentrations fell between 80-90% from 1990 to 2014



## Berlin's strides in improving air quality since reunification

### Concrete action taken

- NG primary energy share increased from 17% (1990) to 41% (2010); coal fell 37% to 17%
- NG share in power increased to 37% and in district heating increased to 45% (2012)
- Lignite burning within coal mix reduced by ¾
- Coal furnaces for heating in commercial and residential sector dropped (400,000 to 40,000)










### Tangible results

- From 1989 to 2015
  - SO<sub>x</sub> dropped by 95%
  - NO<sub>x</sub> decreased by 76%
  - PM<sub>10</sub> reduced by 83%

# Despite these advantages, left to its own devices non-OECD Asia will gravitate to coal

*The average power generation cost of coal/gas fired power plants (including capex & opex) (US cents/kWh)*

Country	Gas	Coal	Trend
China 	13.9	5.9	<b>Cost advantage for coal, new build focused on inland areas</b> <ul style="list-style-type: none"> <li>Closure of old coal city plants, growth in transmission ('coal by wire')</li> </ul>
India 	7.3	5.9	<b>Coal to remain dominant</b> <ul style="list-style-type: none"> <li>Focus on coal fired generation given concern on gas supply security</li> </ul>
Indonesia 	7.2	8.9	<b>Both coal and gas to gain share in power mix, coal to remain dominant</b> <ul style="list-style-type: none"> <li>Govt. promoting coal to reduce use of oil fuels, and gas shortage concerns</li> </ul>
Thailand 	7.5	6.2	<b>Share of coal in power mix to increase</b> <ul style="list-style-type: none"> <li>Govt. promoting coal – concern on gas supply security and higher gas prices</li> </ul>
Malaysia 	4.4	6.9	<b>Gas price reforms and coal supply security to decide share in power</b> <ul style="list-style-type: none"> <li>Gas plant cost advantage dependent on gas price reforms by Govt.</li> </ul>
Vietnam 	6.1	6.8	<b>Gas &amp; coal import prices to decide share in power, coal likely to dominate</b> <ul style="list-style-type: none"> <li>Currently 13 GW of coal plants being built, and only one gas plant (750 MW)</li> </ul>
Philippines 	8.4	8.4	<b>Share of coal in power mix to increase</b> <ul style="list-style-type: none"> <li>Coal based plants likely to have cost advantage as gas prices expected to rise</li> </ul>

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**Putting it all together – key observations & questions**



# Key observations

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## **Natural gas is expected to experience the greatest growth among fossil fuels**

- Growth is expected to be centered in Non-OECD Asia as well as niche markets (ME & South America)
- LNG to continue to gain dominance given future demand sinks located far from production sources

## **LNG expected to become more of an integrator of disparate markets**

- LNG as a commodity is becoming more liquid
- Cross market flows are increasing (especially out-flows from HH)
- European market now liquid enough to act as a balancing mechanism for global LNG
- Increasing supply will further depress prices and increase liquidity

## **Sustainability issues becoming more prominent**

- Both global climate change as well as local air quality issues are gaining importance
- Although the world is starting to recognize these issues, the current pace of change is not adequate

## **Natural gas is the ideal bridge fuel**

- Due to its reduced emissions (CO<sub>2</sub> and others) vs. other fossil fuels, together with its competitiveness
- However, despite this and the current favorable market environment, non-OECD Asia will gravitate to coal

# Key questions

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- **Will lower prices stimulate demand as envisioned a decade ago?**
- **Will non OECD Asia deliver as per expectations?**
- **What consequences will the expected LNG oversupply have in the different regional markets?**
- **What will be the appropriate method for pricing gas?**
- **Will increased LNG market liquidity eventually result in prices linked across all regions (US-Asia-Europe)?**
- **With the backdrop of global sustainability, how can governments/ industry come together to catalyze the transfer of resources and technology to the non-OECD world in short order?**
- **What role does natural gas have to play in this sustainability journey?**
- **How can industry & governments move towards making natural gas a more favorable fuel of choice for non-OECD Asia?**

