BCG ENERGY

Foment del Treball Nacional

The Global Gas Sector: Disruptions and Implications

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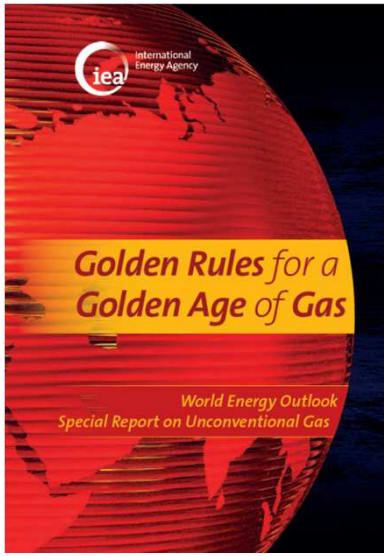
Global Leader, Energy Practice

April 30, 2015

THE BOSTON CONSULTING GROUP

Gas has become a hot issue



"After years of talking about it, ***we are finally poised to control our own energy future. We produce more natural gas than ever before*** *– and nearly everyone's energy bill is lower because of it. …* ***The natural gas boom has led to cleaner power and greater energy independence****."*

Barak Obama. State of the Union address, 2013

"The issue of air pollution has aroused heated discussion this year*... Similar problems occurred in developed countries in the past, and* ***raising natural gas's share*** *of the energy mix, in some cases making it the primary part of it,* ***was a key solution****"*

Zhou Jiping (CNPC general manager)
National Committee of the Chinese People's Political Consultative Conference for the 12th Five-Year Plan

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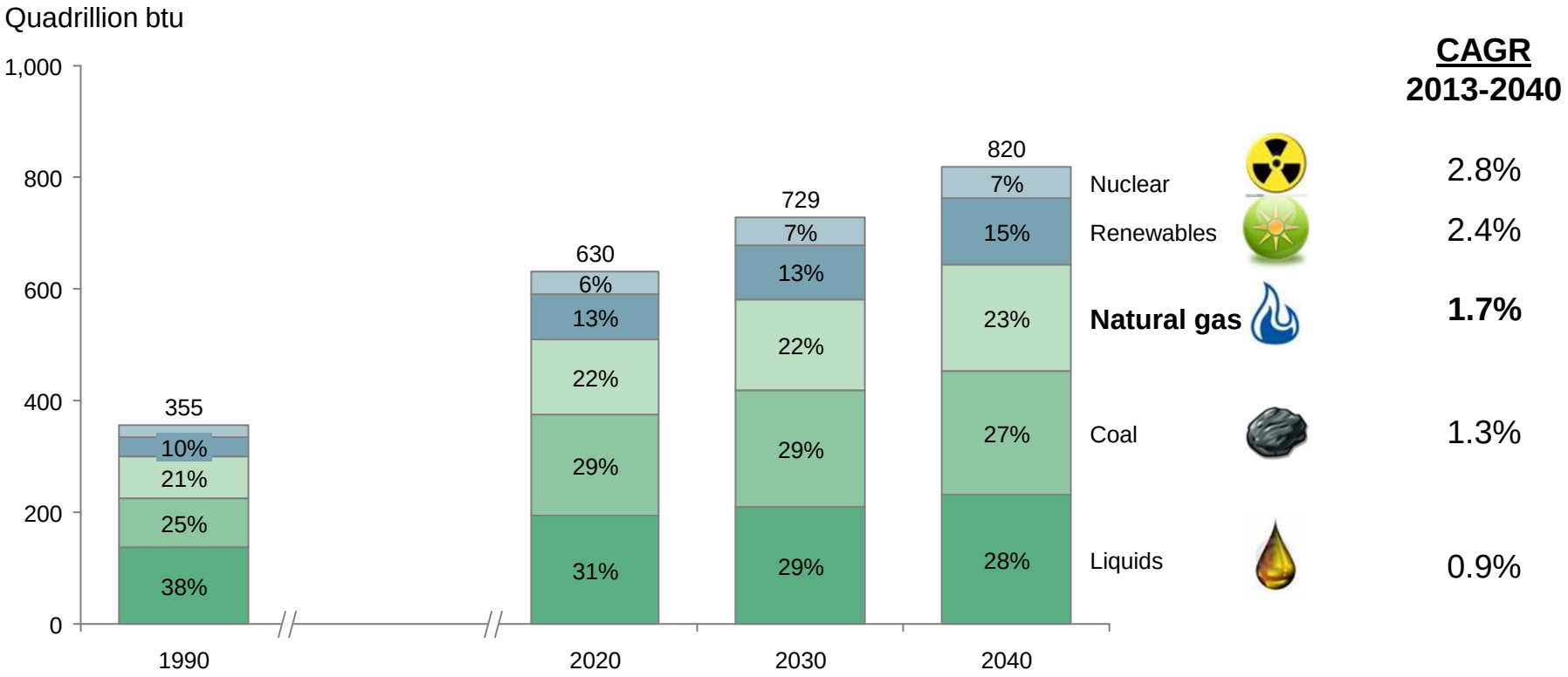
We live in a fossil fuel based society

World Total Energy Consumption 1990–2040



Source: EIA, International Energy Outlook, 2013

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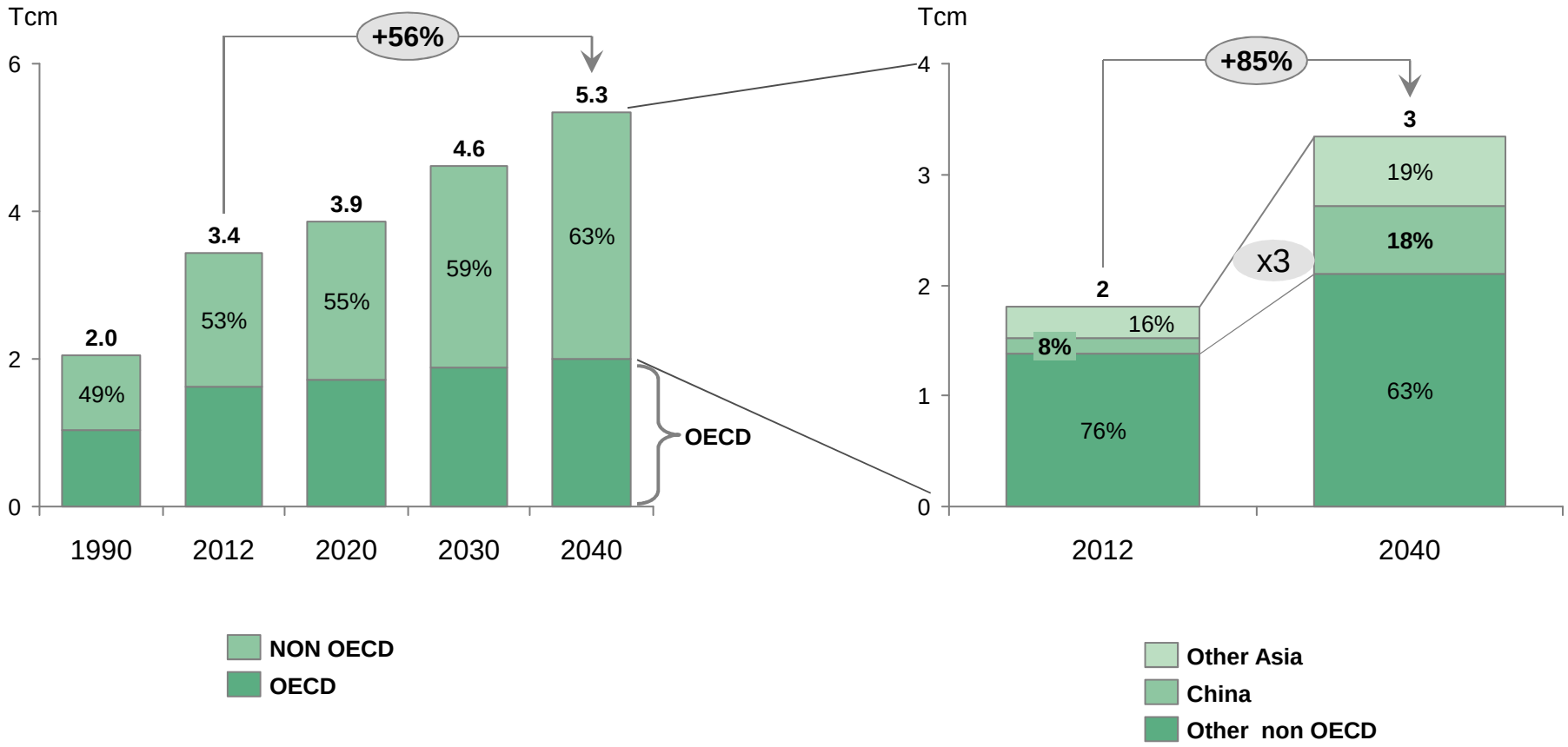
Natural gas demand will grow fast

Global demand will rise 56% to 2040

Non-OECD demand will rise 85% to 2040, driven by Asia



1. Tcm: Trllion Cubic Meters
Source: IEA WEO 2014 – New Policies Scenario

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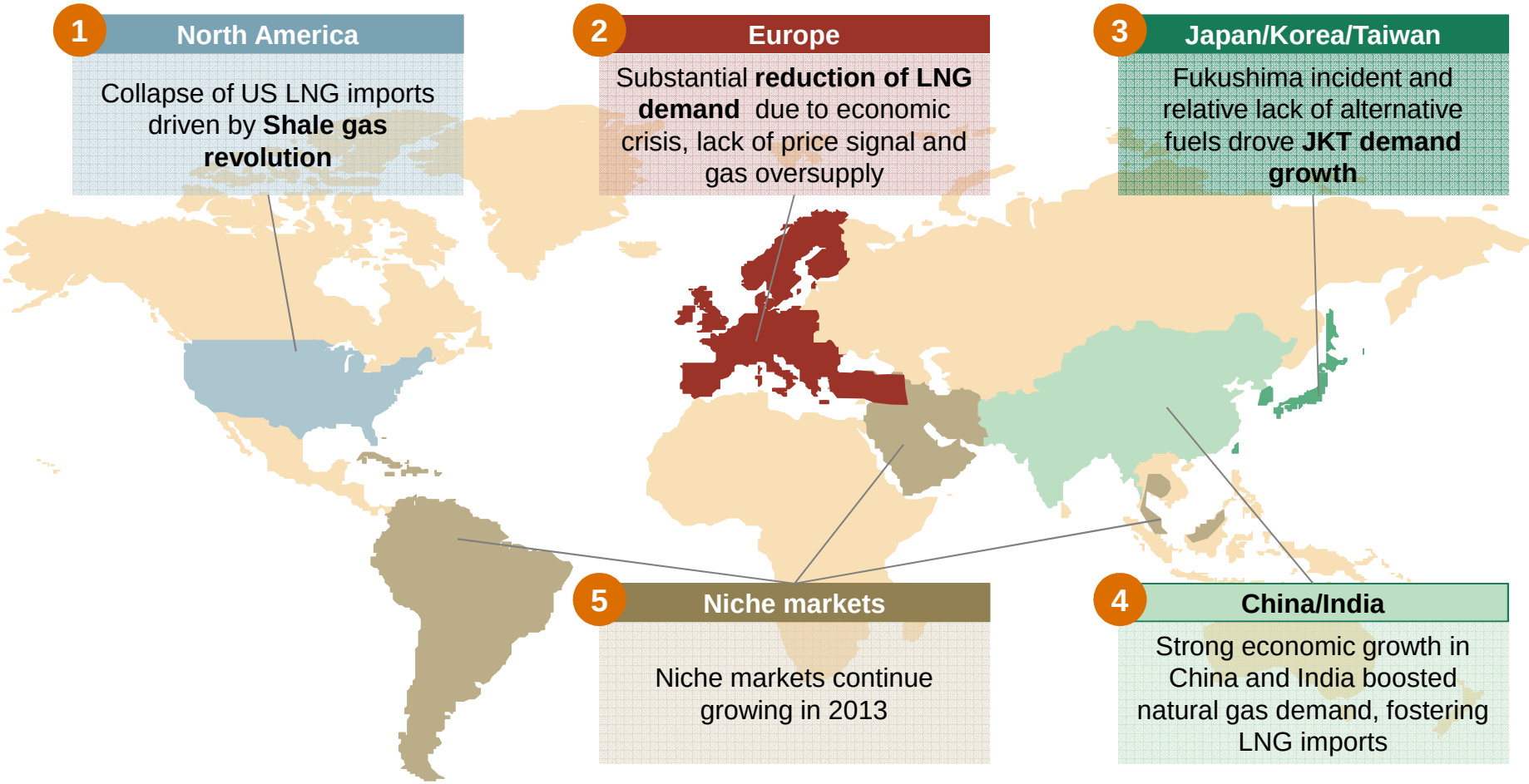
Major events affecting global LNG demand growth structure



Source: Cedigaz; BCG analysis

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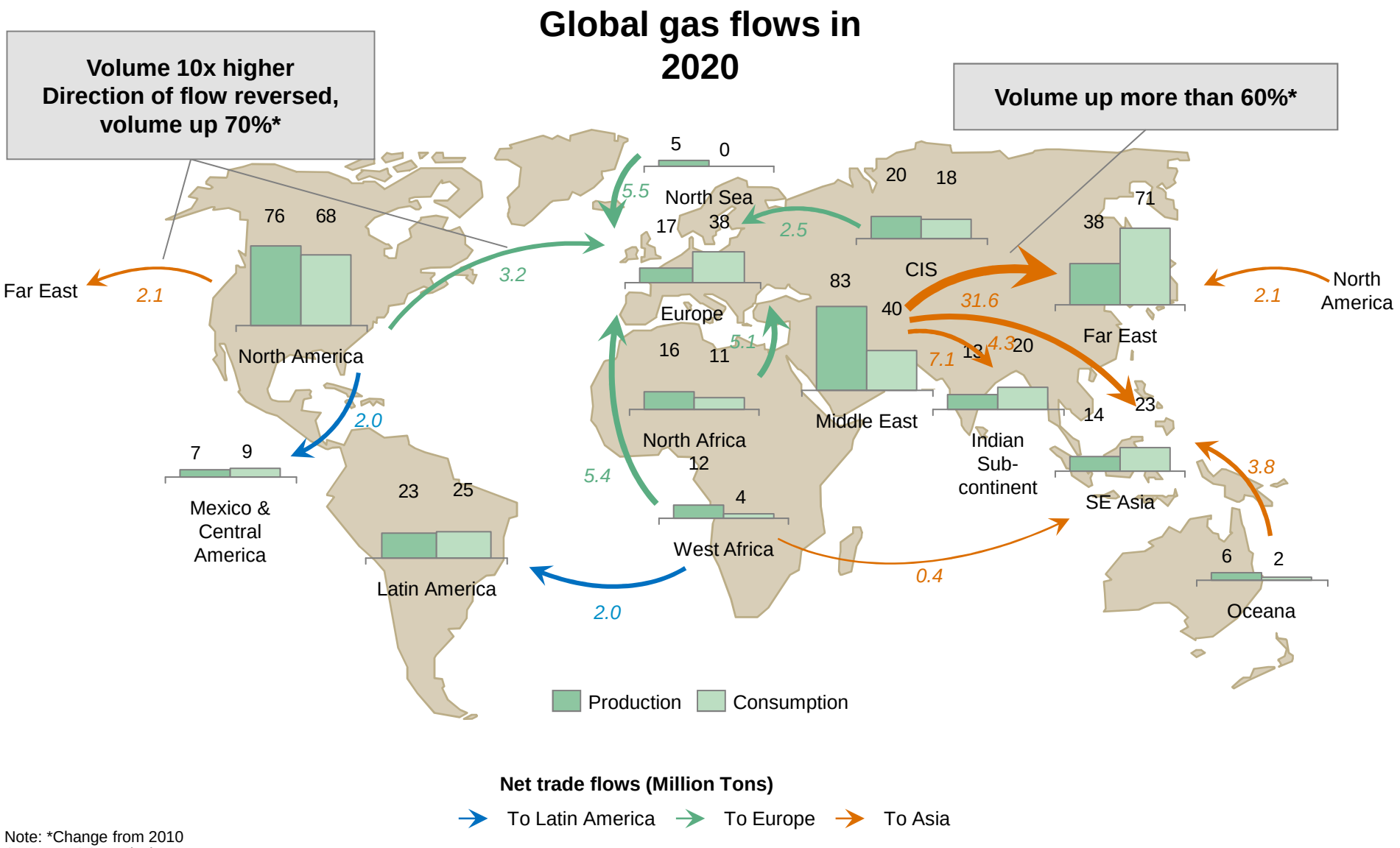
As a result trade flows are changing

Asia and LatAm becoming biggest importers, US becoming a LNG exporter



Note: *Change from 2010
Source: BCG Analysis

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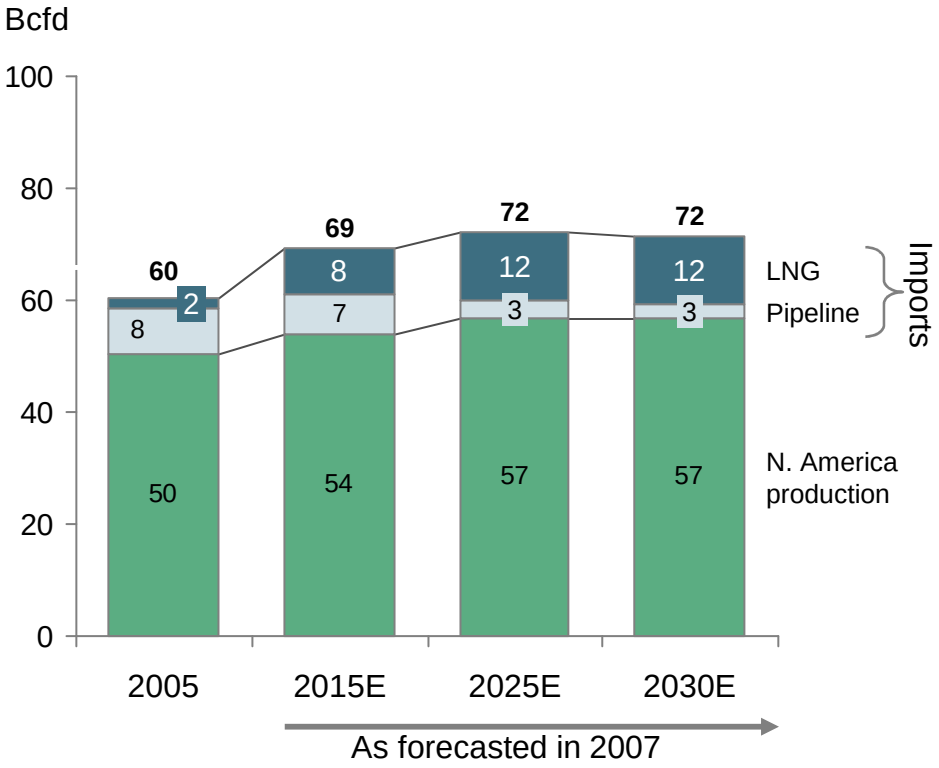
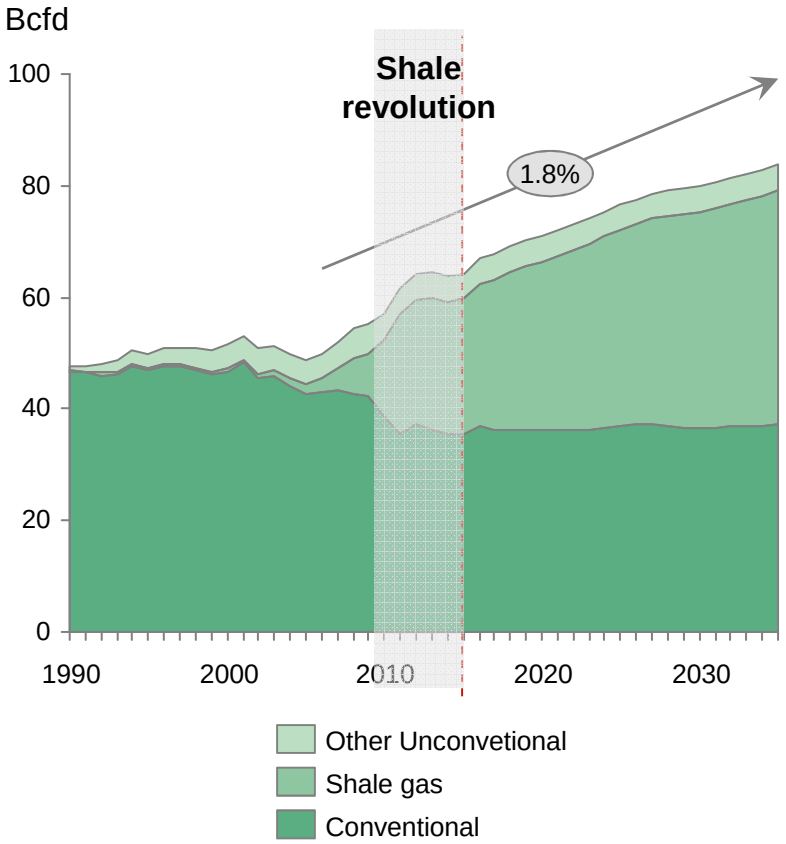
The energy sector is very difficult to predict

US shale gas revolution is a clear example

2007 forecasts anticipated the US would need LNG imports



Current expected US production will make US a net Exporter



Note: Tight Oil is oil embedded in low-permeable sandstone, carbonate, and shale rock
Source: EIA, Annual Energy Outlook 2011, IEA quarterly energy price and tax statistics, EIA Natural Gas Monthly

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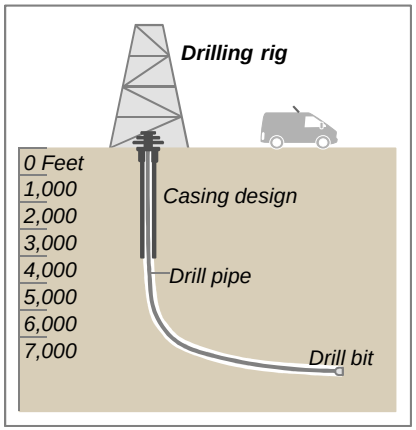
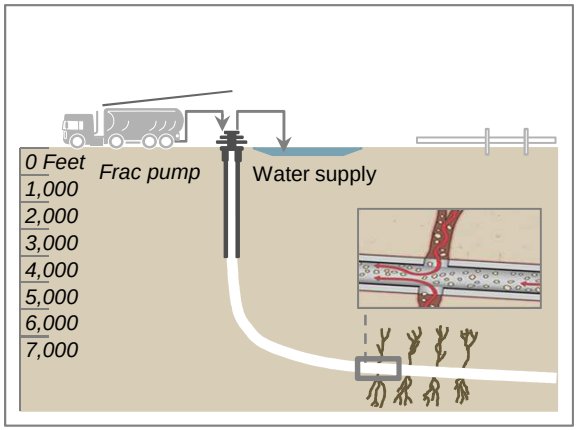
Technology has a huge impact in oil & gas

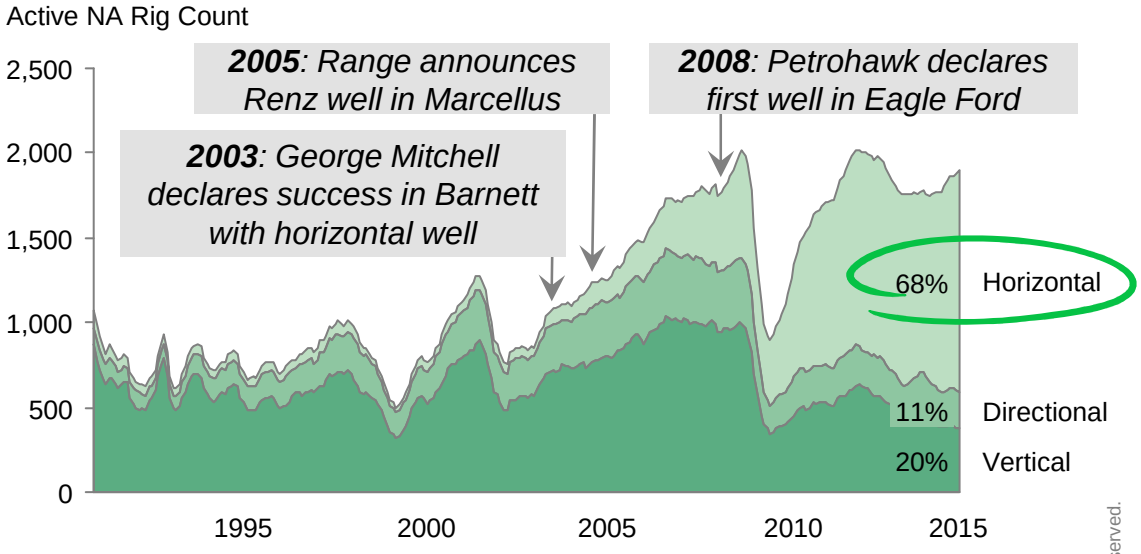
Horizontal drilling and hydraulic fracturing

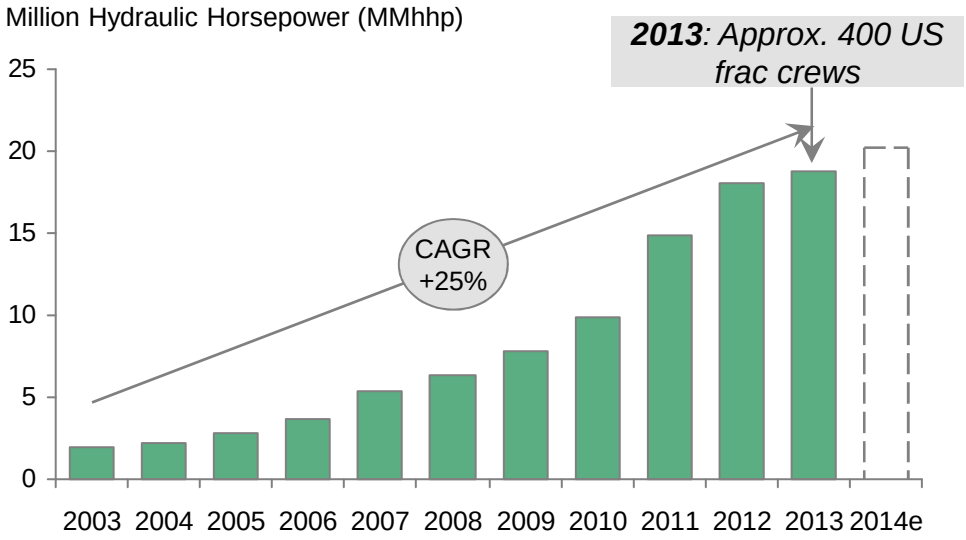
Horizontal well drilling



Hydraulic fracturing well completion







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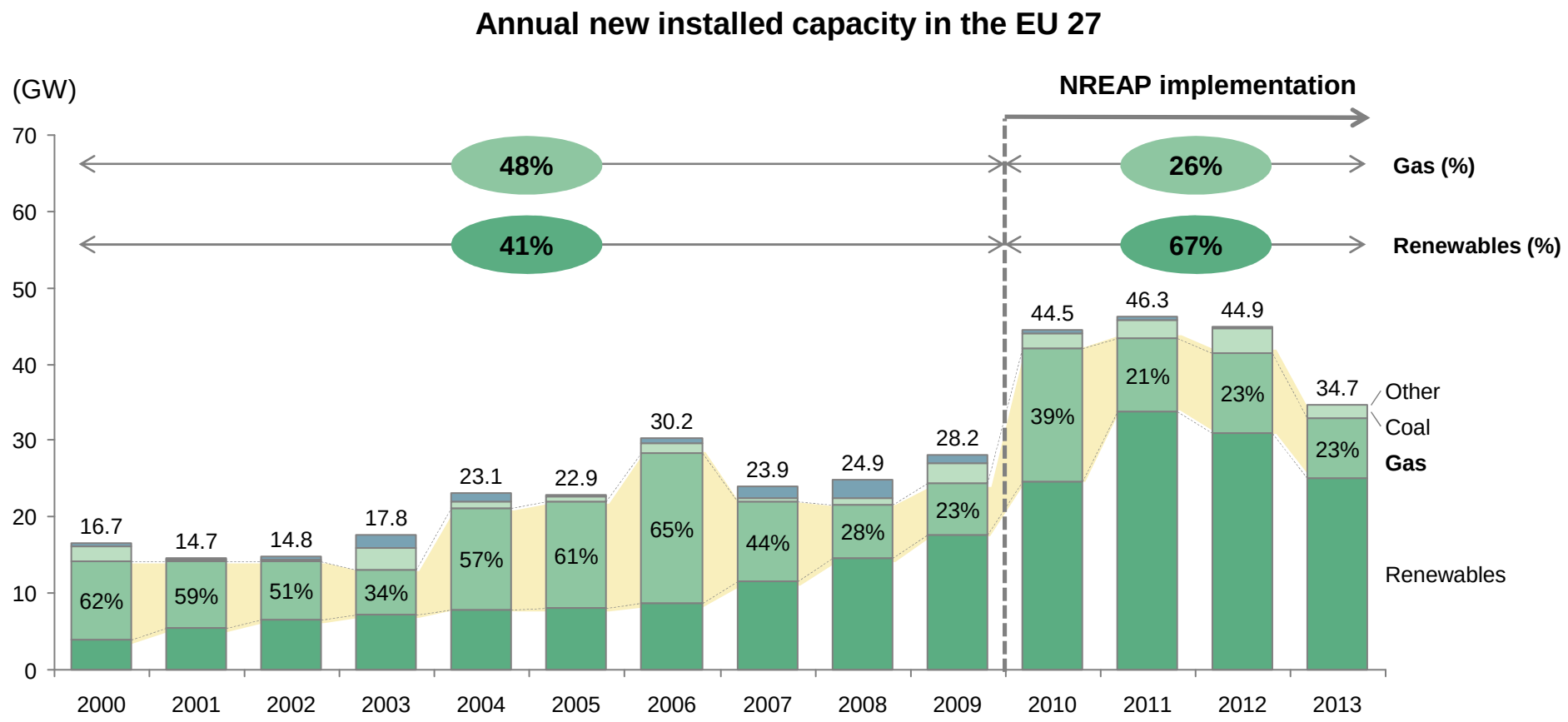
Natural gas installed capacity in the EU has been impacted by renewable



NREAP: National renewable energy action plan
Source: EWEA

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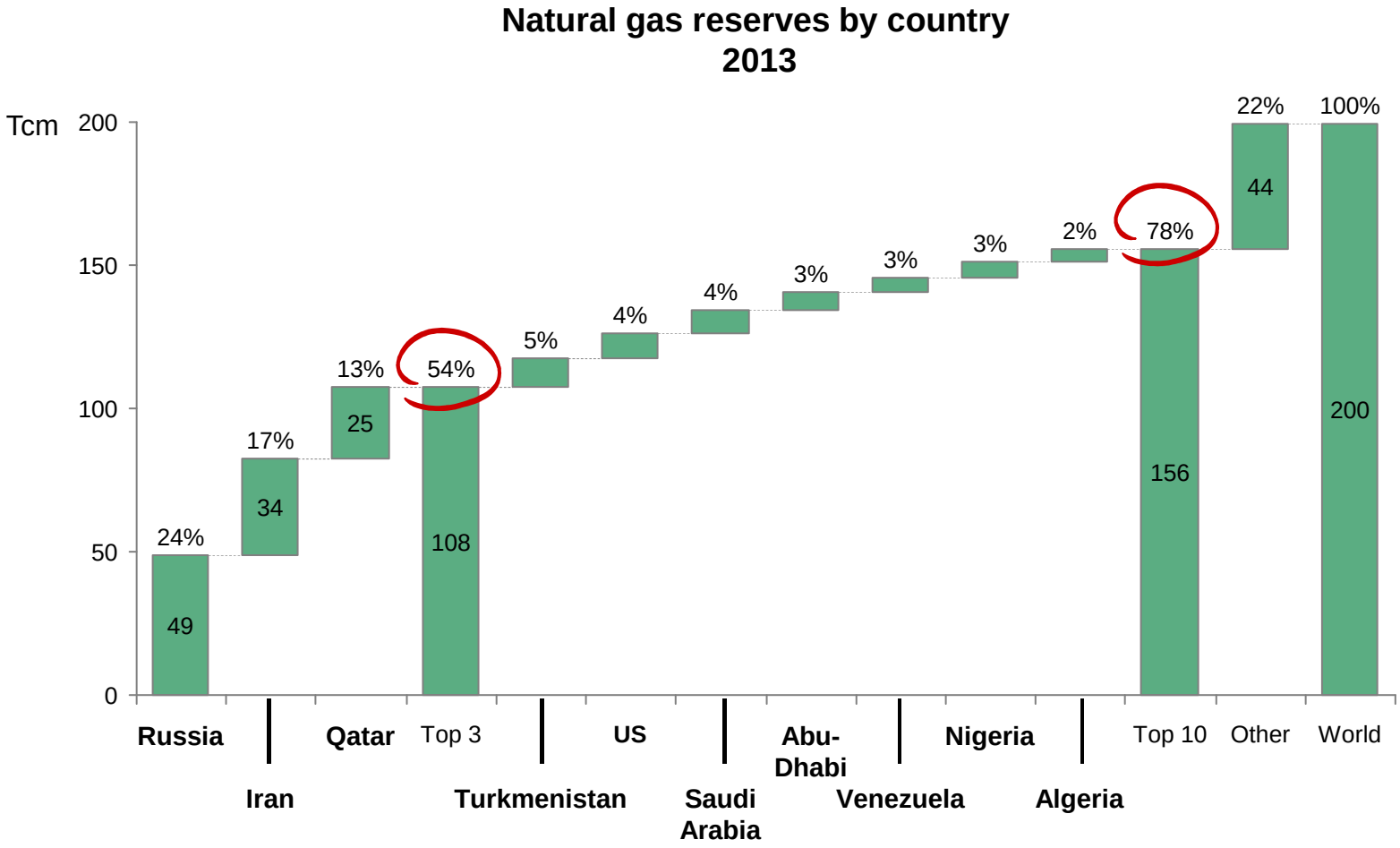
Natural gas reserves are highly concentrated

10 countries concentrate 78% of total natural gas reserves and only 3 countries concentrate a 54%



Source: Cedigaz

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The Gas ecosystem is extremely fragile


Russian Gas Crisis


The Gulf Disaster


Fukushima


Arab Spring


Ukraine Crisis


Iran Oil & Gas Embargo

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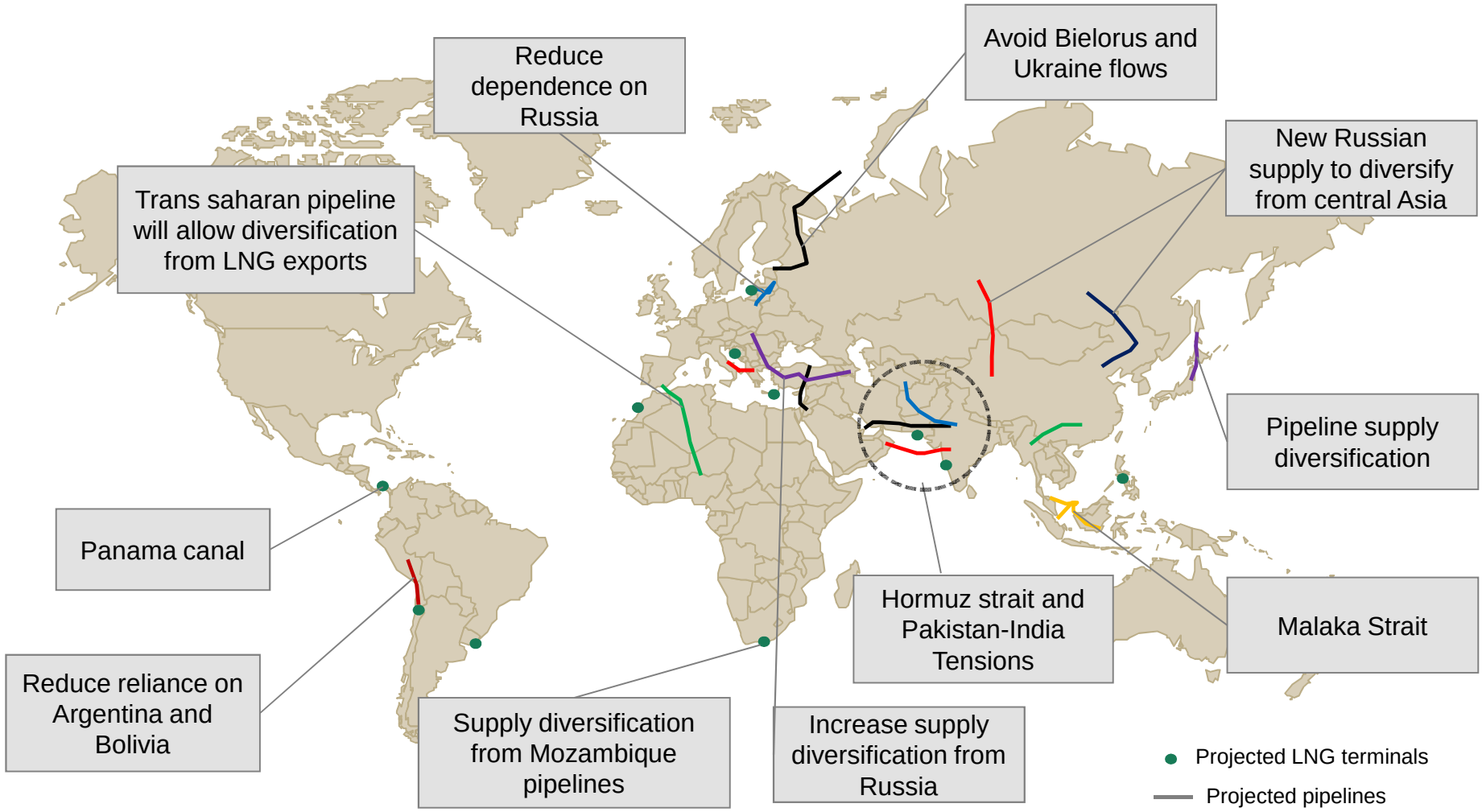
Several pipelines and LNG terminals being developed to avoid chokepoints and conflicts

Selected projects to improve security of supply



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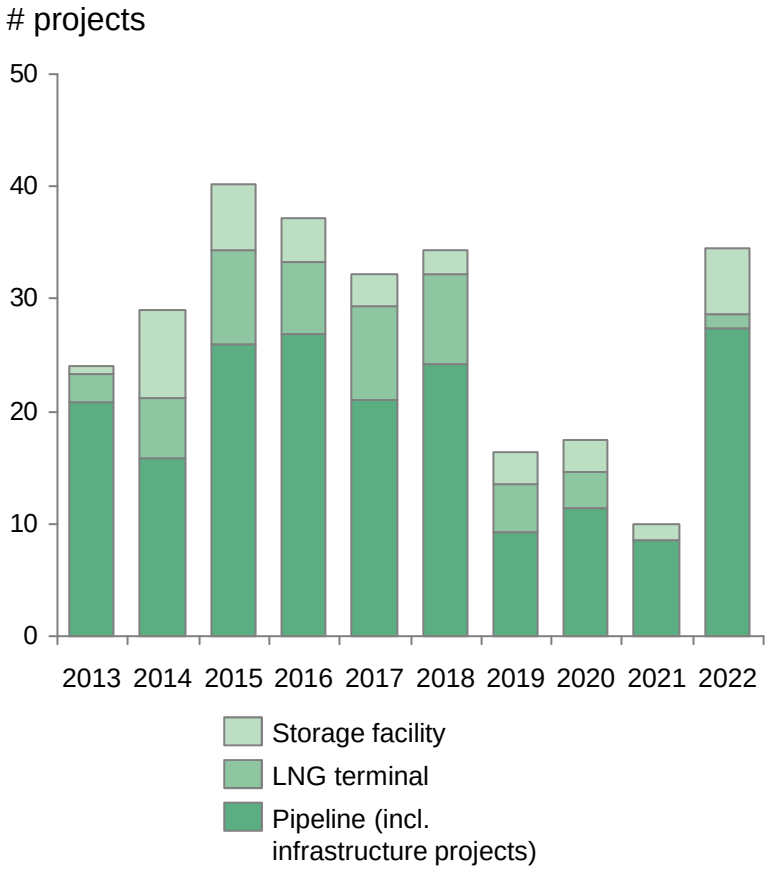
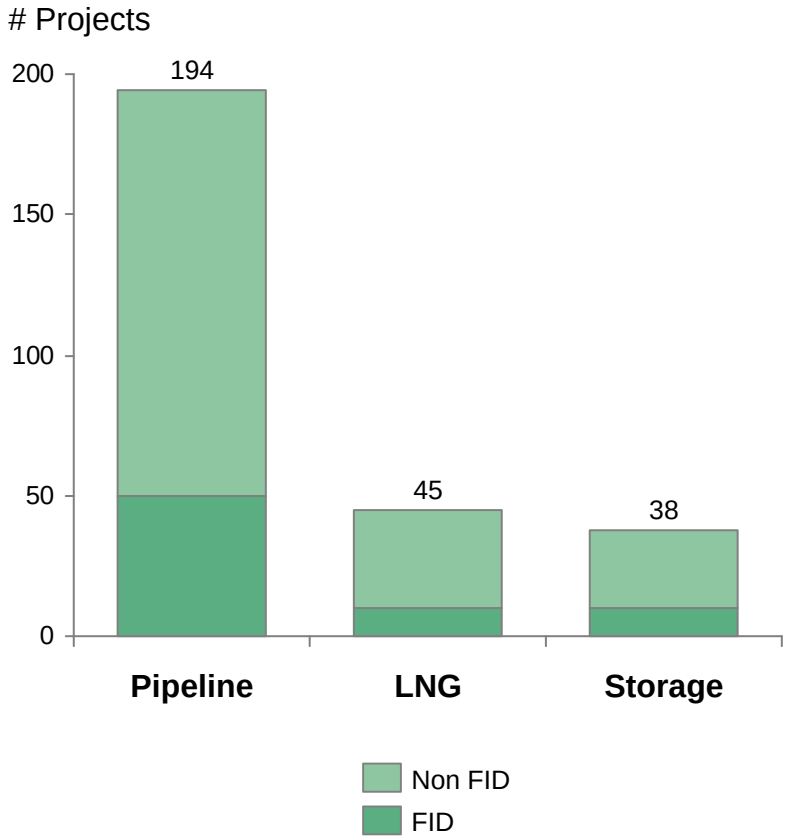
EU planning strong investments to improve natural gas security of supply and market integration

Project by commissioning date



Project by type and FID



Source: Entsog

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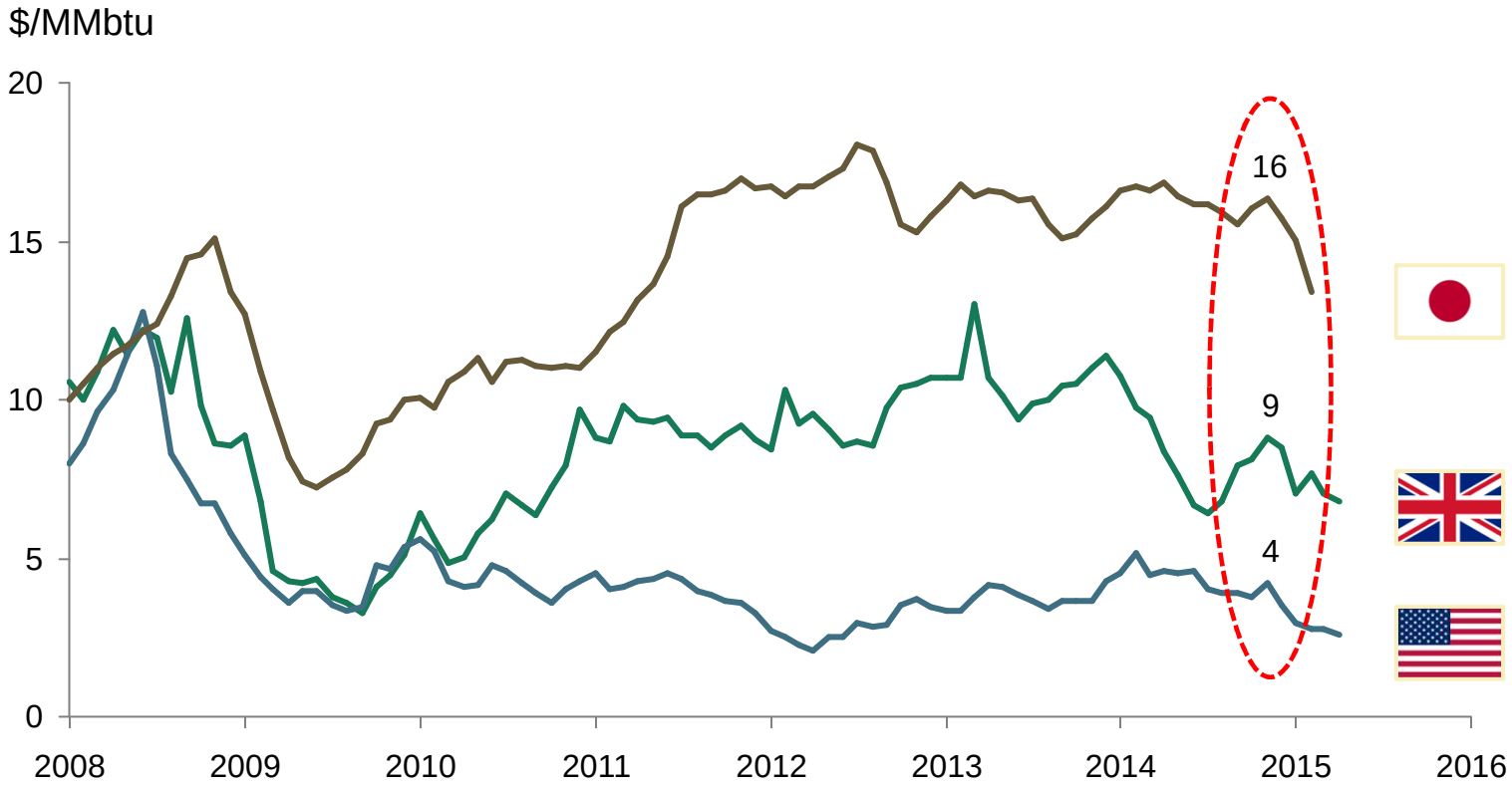
Gas prices are far from convergence

World wide natural gas hubs price reference recent evolution (2008-2015)



Source: Bloomberg

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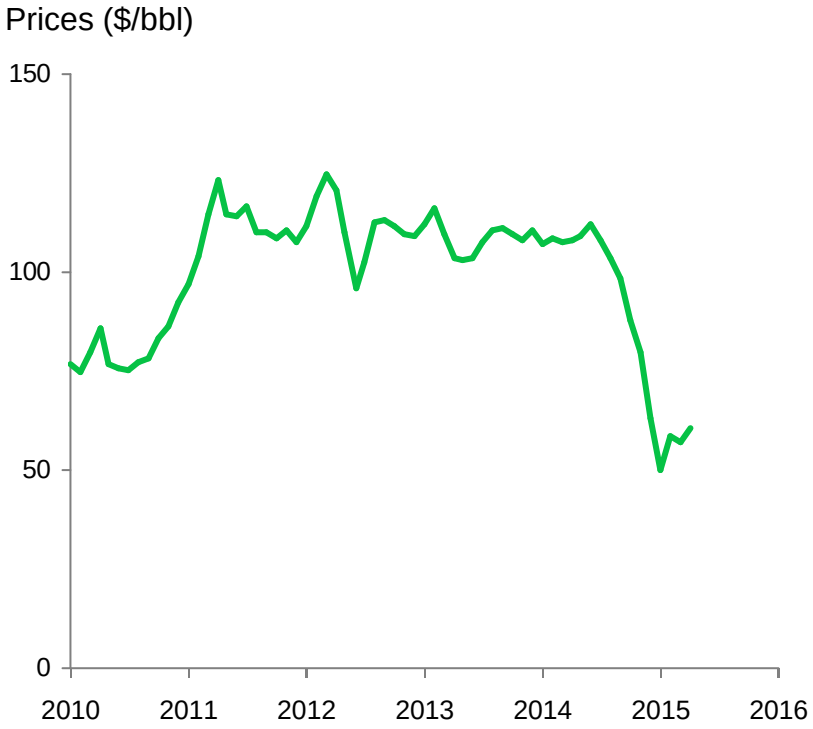
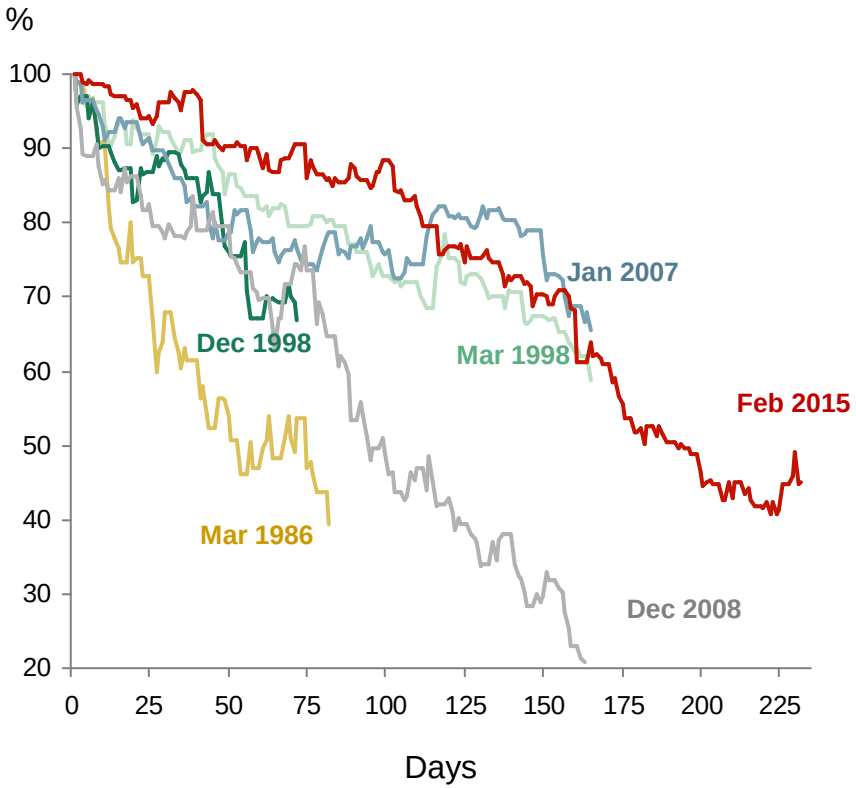
Oil prices have dramatically dropped in 2014

Strong uncertainty over future oil prices

Oil prices evolution



Strong uncertainty over future oil prices



Note: Slide updated 21st April 2015
1. In the July 2008 cycle, prices did not recover to their pre-decline peak of $145.16
Note: Price data plotted every 7 days meaning that some daily troughs may not be fully graphically visible
Source: EIA, BCG Analysis Blkoomberg

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Oil prices drop has significant implications on global gas and LNG markets

Impact on the LNG industry

1 LNG supply

- **Delays on new project given reduction of economic attractiveness**
  - Strong pressure to reduce costs

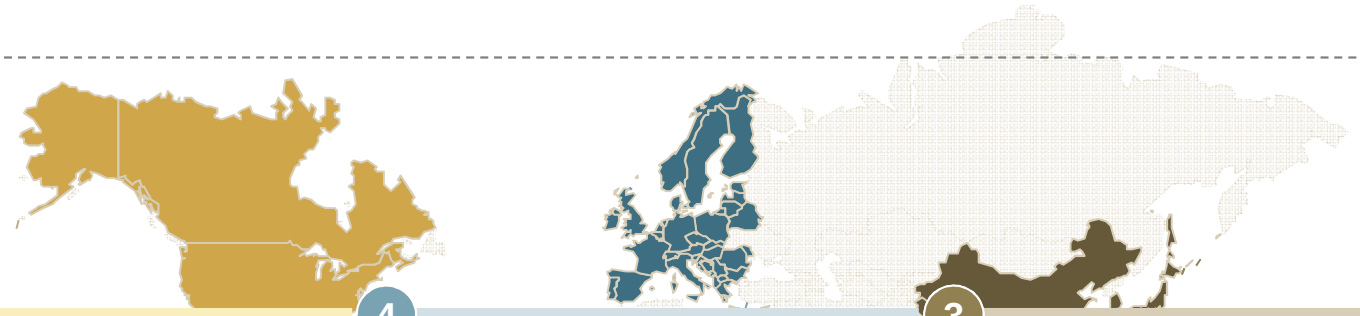
2 LNG demand

- **Demand growth could be delayed**
  - Pressure to substitute oil products by gas dramatically reduced

3 LNG Supply-Demand balance

- **LNG market balance could relax for two-three years if oil prices remain at current level**

Impact on regional markets



5 US:

- Delay of US LNG projects
- Uncertainty over the impact on HH, but possible price increase

4 Europe:

- Uncertainty over the impact on hub prices
- Downward pressure more probable (Europe as a sink for global LNG

3 Asia:

- Asian buyers have less interest to renegotiate contracts and/or get contracts indexed to natural gas hubs

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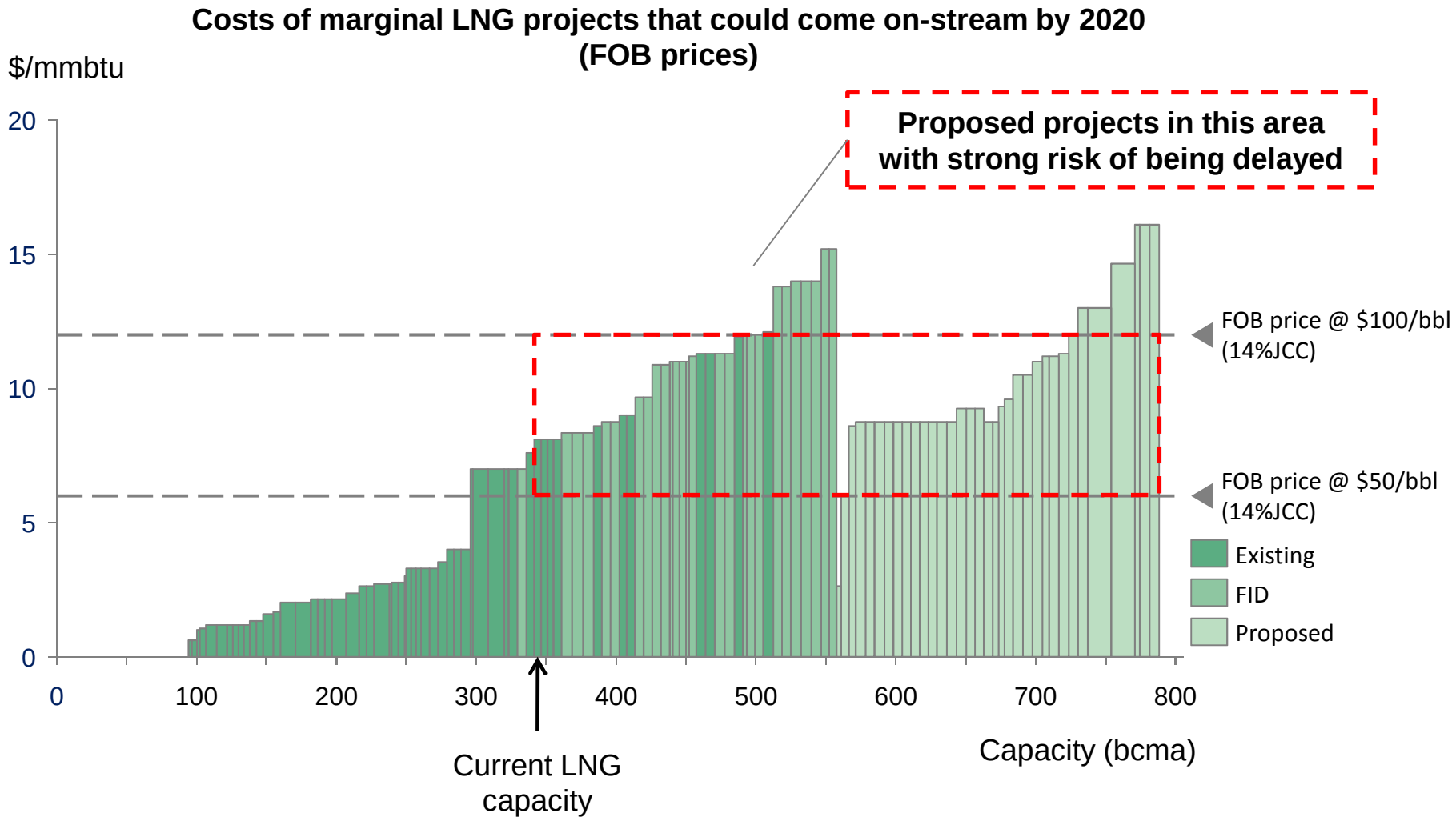
Potential delays on new project developments

Given the mismatch in place between development costs and LNG prices



Source: BCG Market Model

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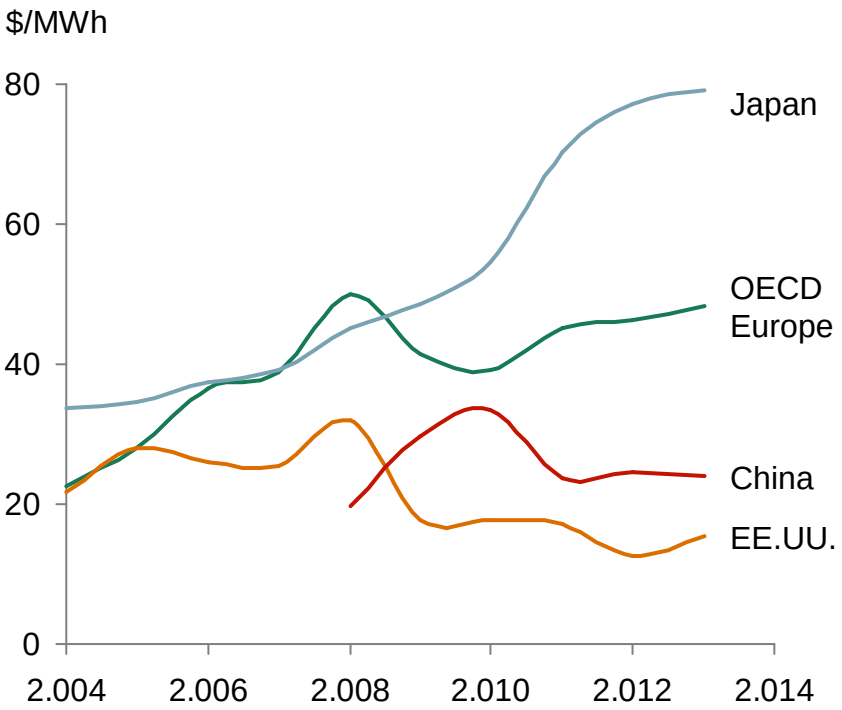
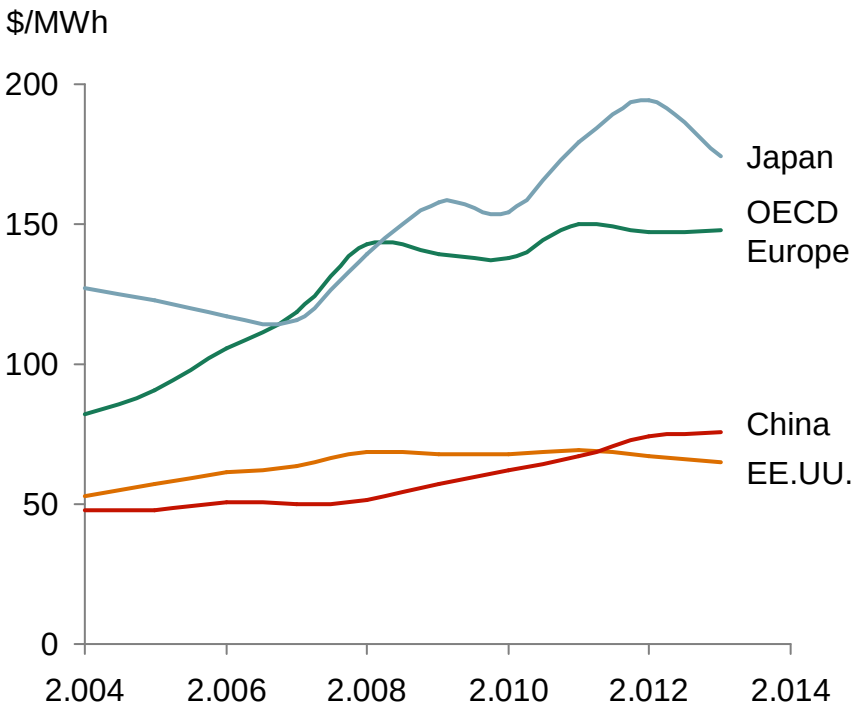
Different agendas on energy policies and availability of resources are impacting end-user prices

End- user Industrial prices evolution by region

Natural Gas



Power



Fuente: IEA

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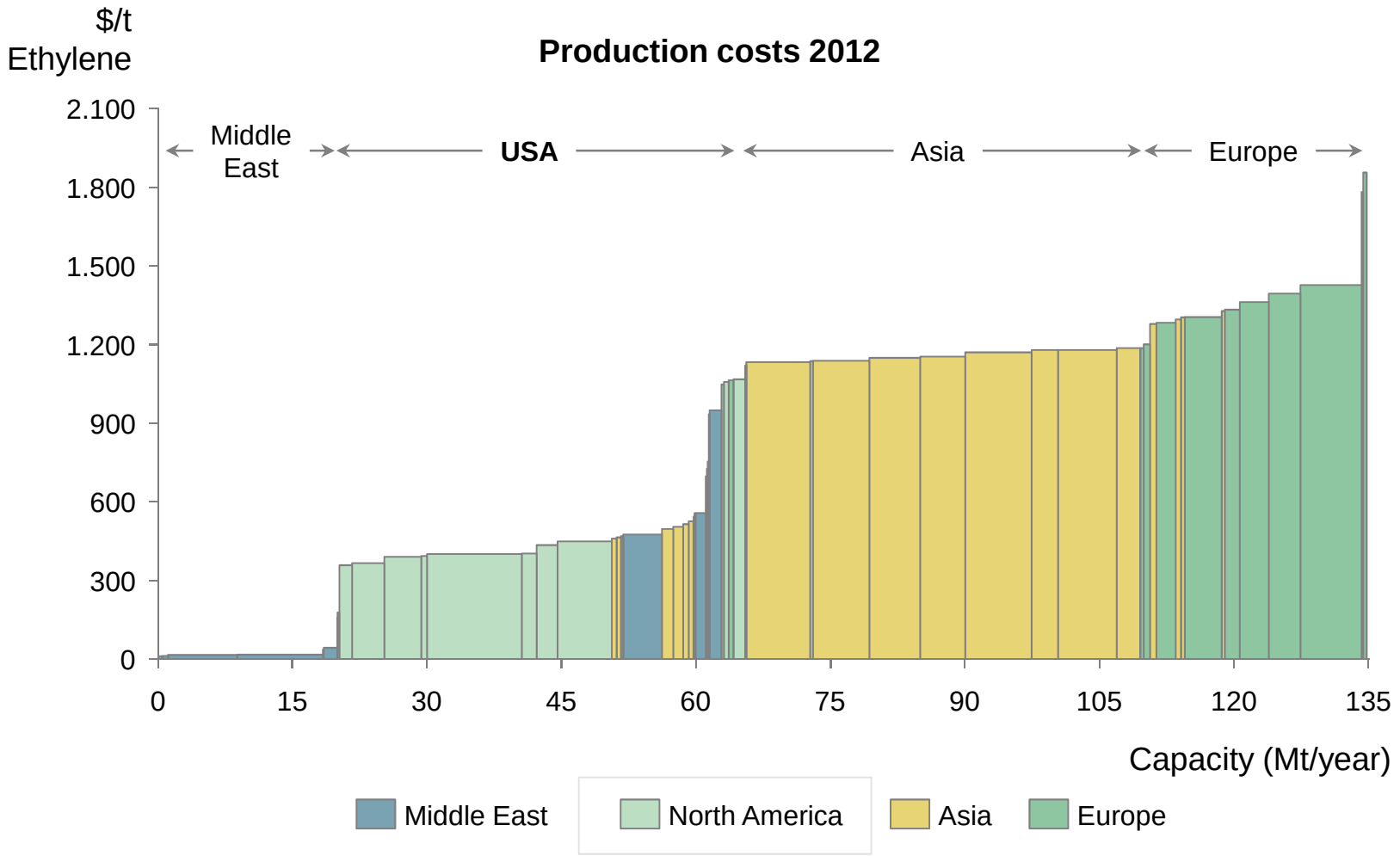
US Petchem Industry competitiveness has increased sustantially



Source: Nexant; BCG analysis

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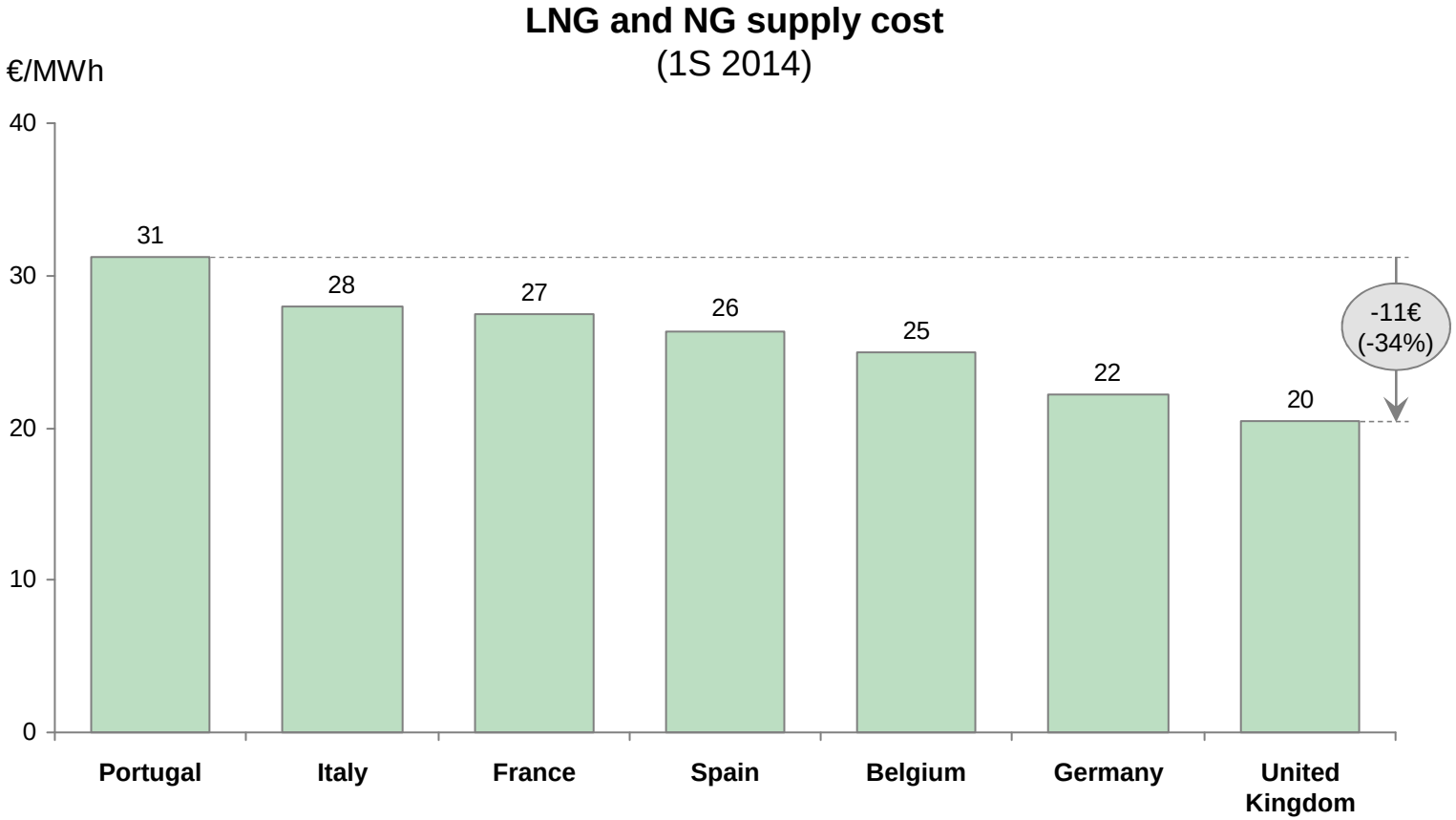
Inside Europe natural gas supply costs are quite different



Note: Weighted average supply cost
Source: AEAT, Eurostat, BAFA, BOE, Elengy, ERSE, Fluxys, AEEG, análisis BCG

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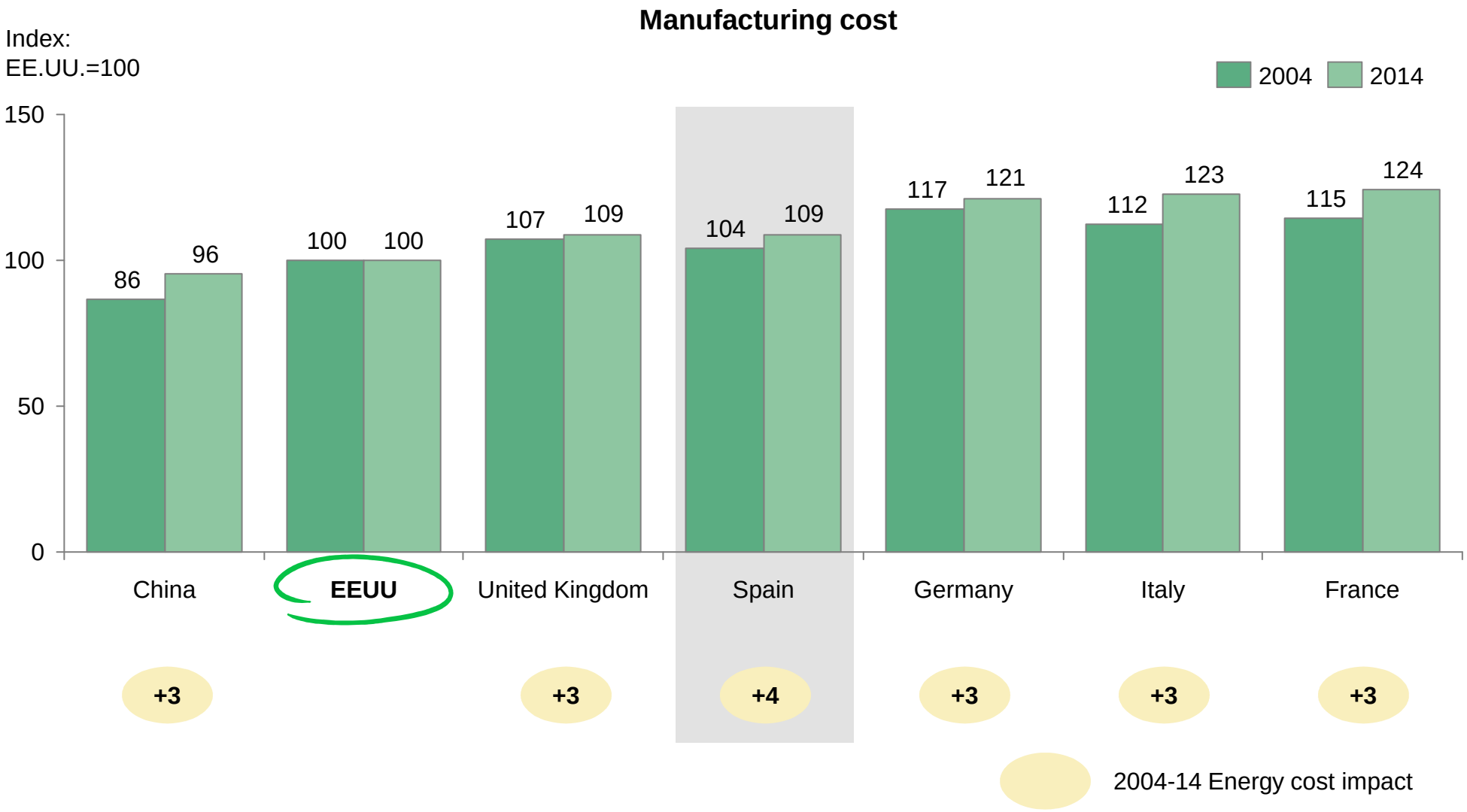
US industrial sector has gained competitiveness due to lower energy costs



Source:BCG Analysis

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Two very different situations: US vs. Germany

	US	vs.	Germany
Power generation mix			
• Coal	42%		46%
• Natural gas	26%		12%
• Nuclear	19%		16%
• Renovable (ex. hydro)	7%		20%
Energy independence	83%		35%
CO_2 emissions per capita (2004-2012 evolution)	-17%		-6%
Natural gas price for the industry	$16 /MWh		$/50MWh
Power price for the industry	$67 /MWh		$149 /MWh
Manufacturing cost (Index)	100		121

Note: Data 2012; Energy independence: primary energy production/ Primary energy consumption
Source: EIA,; BCG analysis

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The Global gas sector: Disruptions and Implications

1. We live in a fossil fuel based society, where gas plays an important role
2. Natural gas demand has grown and will grow fast
3. The gas sector is changing and is difficult to predict
4. Technology has a huge impact on gas production
5. The gas ecosystem is fragile
6. Oil prices are impacting Gas/LNG market
7. US lower gas/prices prices affecting EU competitiveness

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The Global Gas Sector: Disruptions and Implications

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April 30, 2015

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