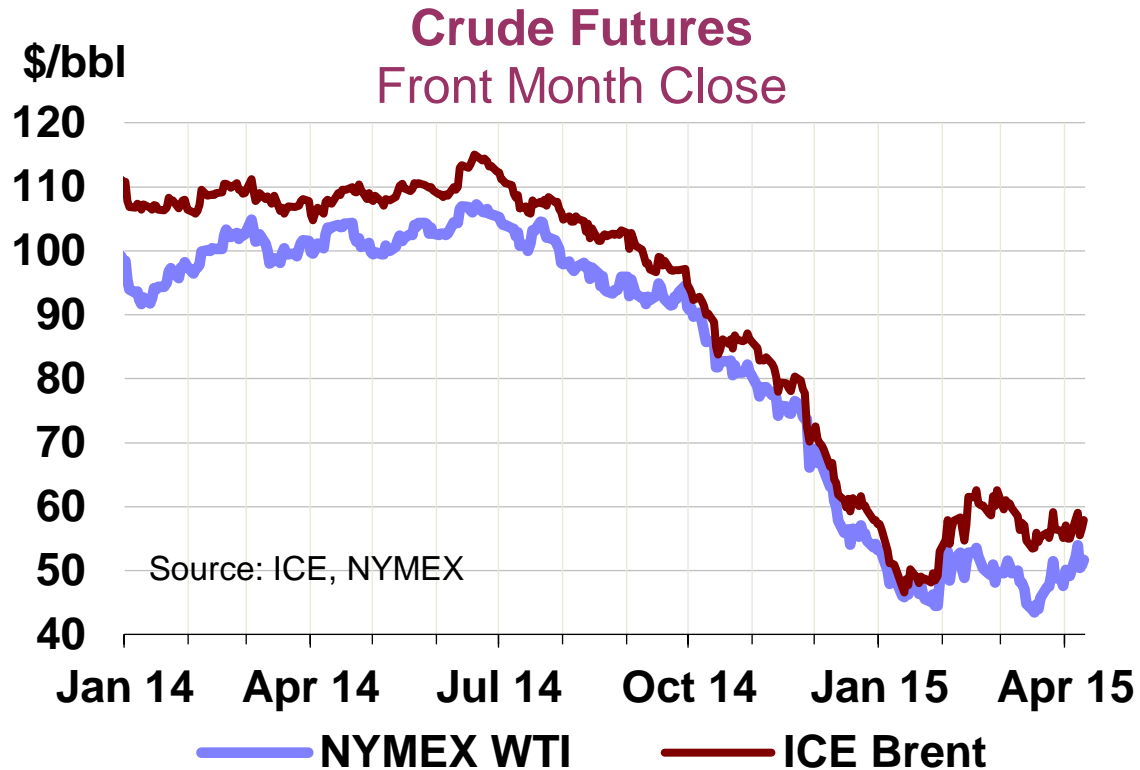




***Madrid WPC Breakfast Conference***  
***7 May 2015***

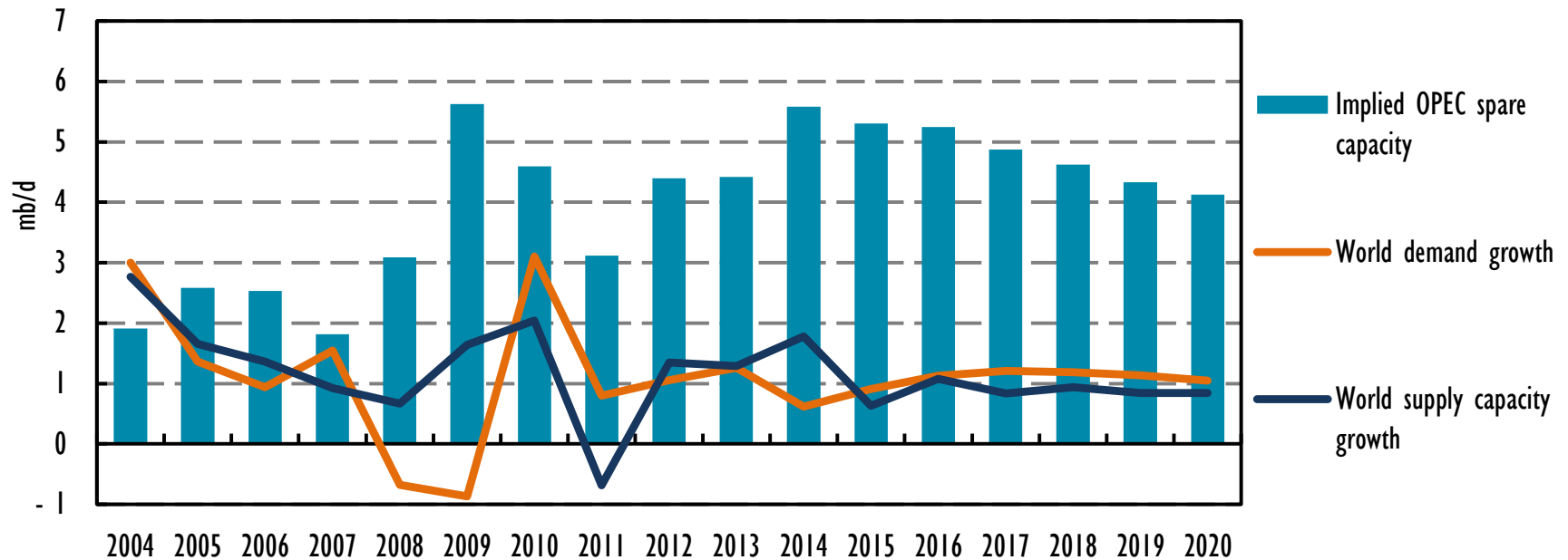
***Keisuke SADAMORI***  
***Director of Energy Markets and Security***  
***IEA***

# Oil prices ease in March, but recover in early April



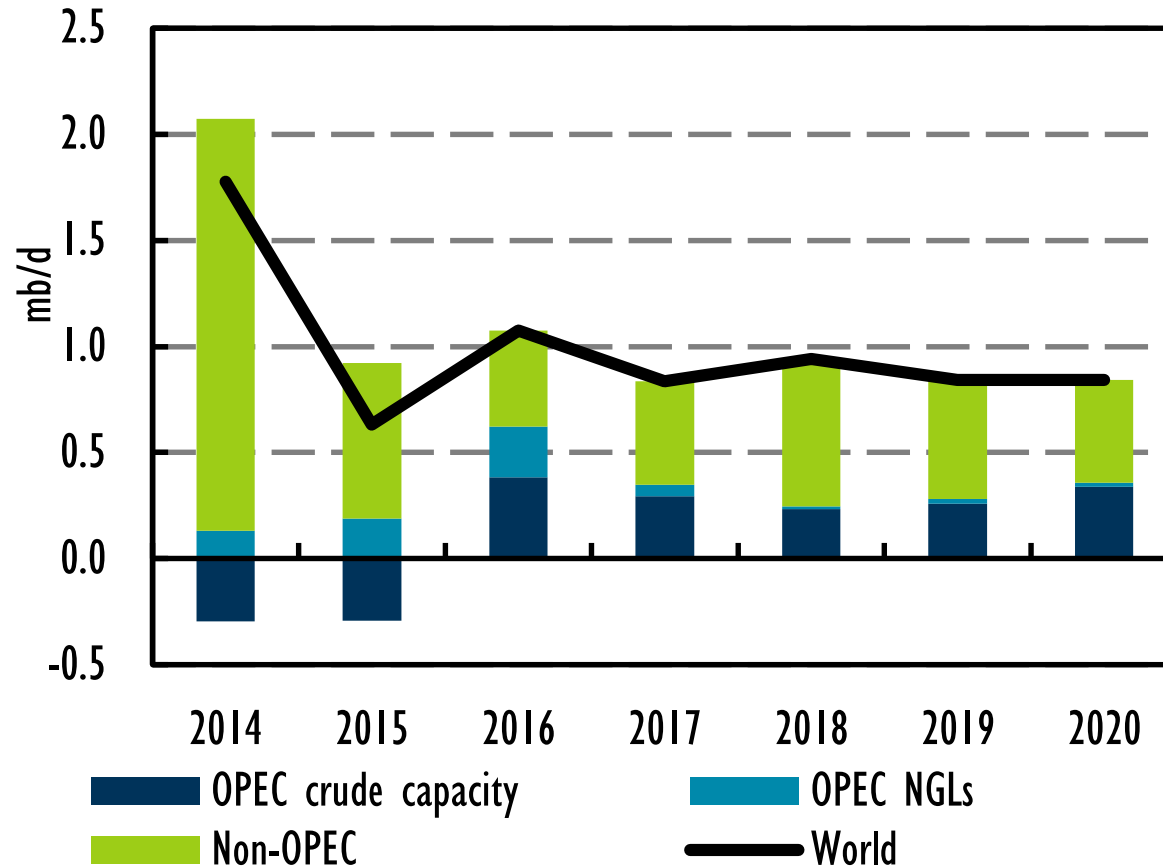
- Higher Middle East exports pressure, Yemen tension supports

# Business as unusual...



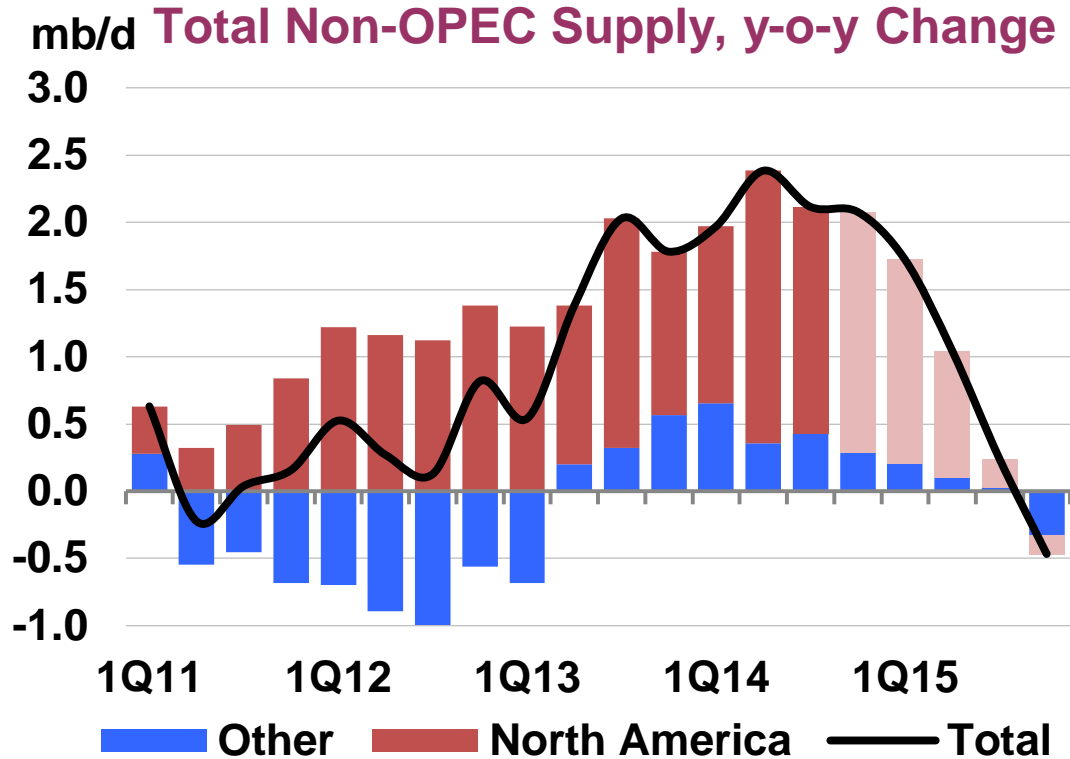
- Supply has become more price-elastic
- Demand less so

# Oil price drop slows supply growth



- Global capacity growth slows to annual 860 kb/d through 2020 from 1.8 mb/d in 2014

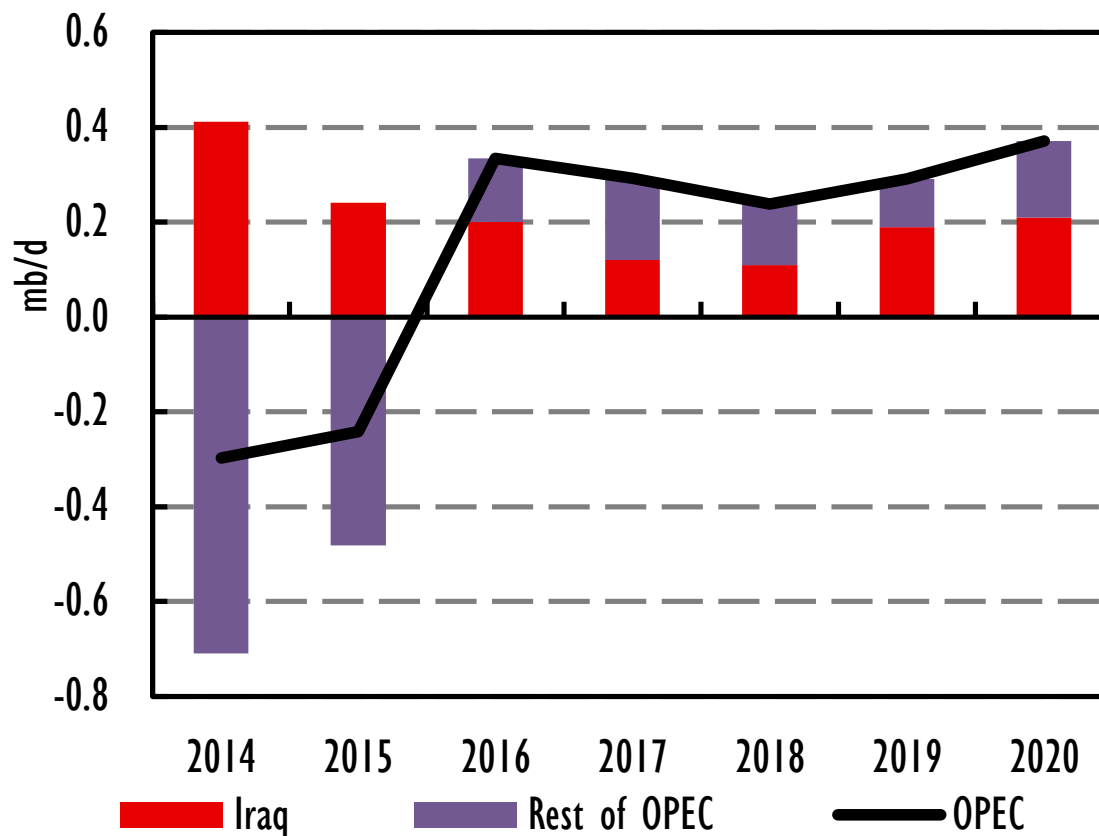
# March non-OPEC supply rose on increased North America output, but growth is slowing



- **Non-OPEC production rose by 100 kb/d m-o-m in March, to 57.7 mb/d.**
- **Non-OPEC expected to grow by 630 y-o-y in 2015 vs 2014 growth of 2.1 mb/d**
- **Non-OPEC output expected to post first y-o-y decline in 4Q15 since 2Q11**

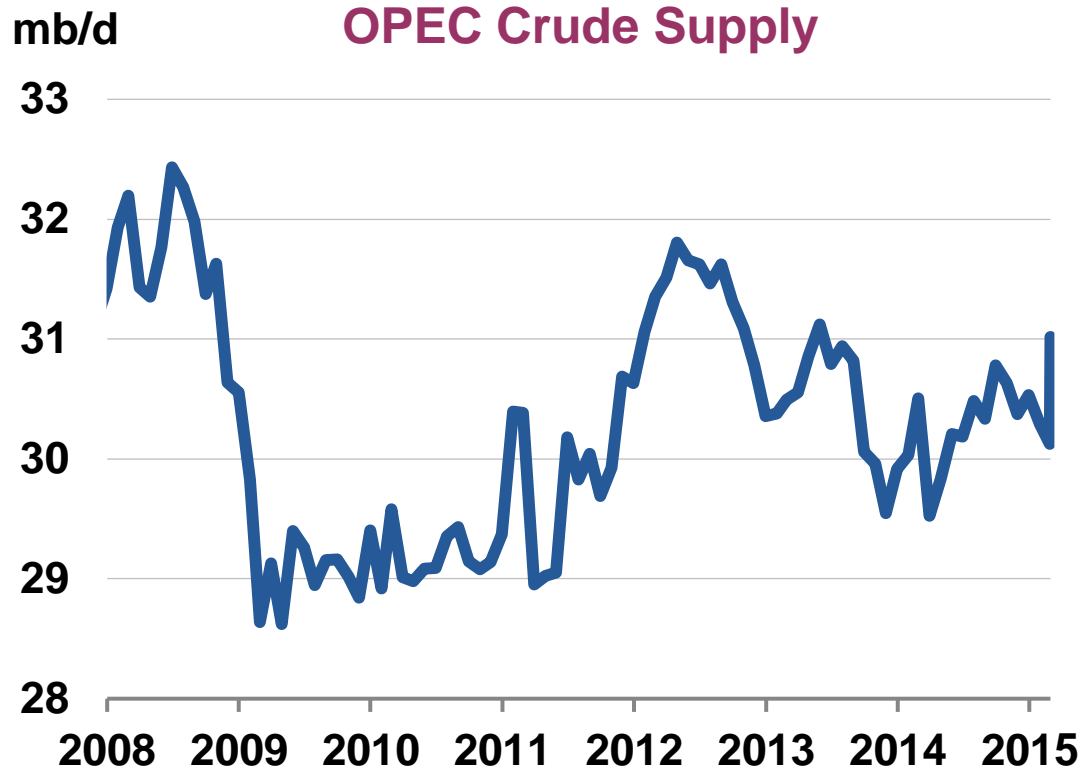
# Iraq dominates OPEC capacity growth

Medium-Term  
Market Report  
2015



- Oil price collapse, ISIL challenge yet to cause substantial slowdown
- Growth estimated at 1.1 mb/d in 2014-2020 period
- Elevated risks

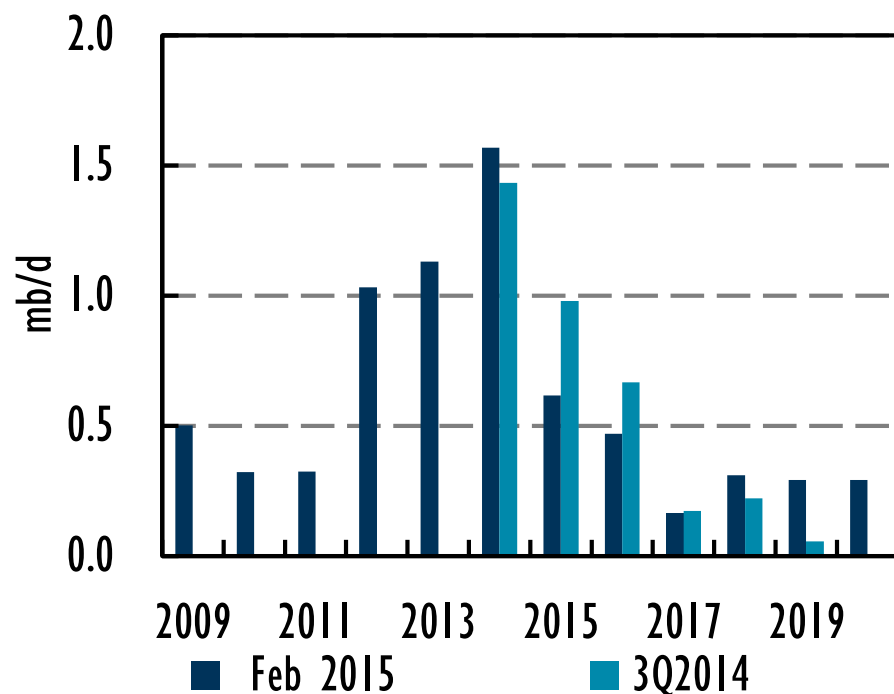
# OPEC supply soars to 31 mb/d in March, up 890 kb/d from February



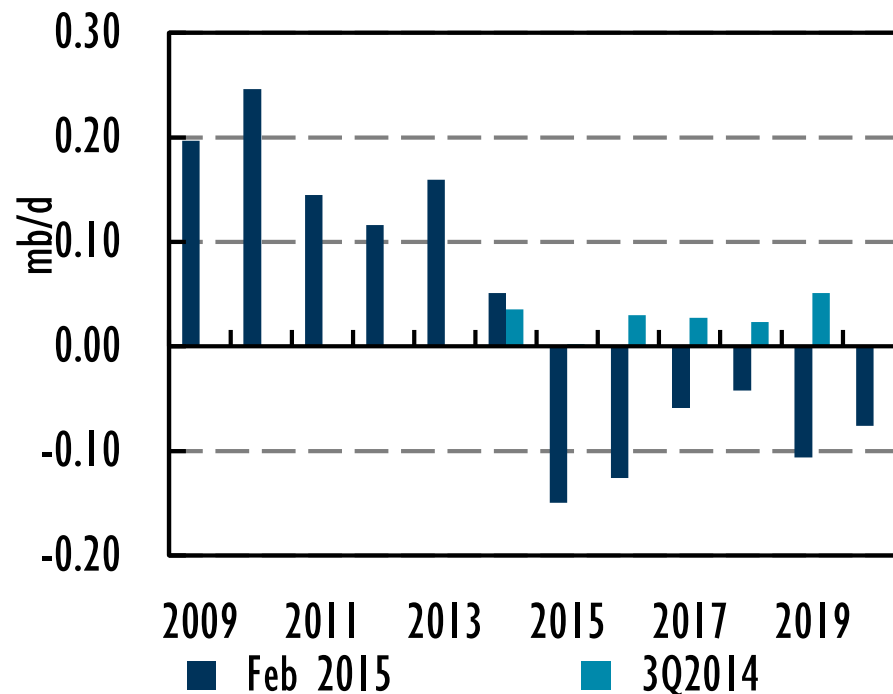
- Higher flows from Saudi Arabia, Iraq and Libya push output to highest in nearly two years
- Biggest month-on-month increase since June 2011

# Survival of the fittest

### Change in US liquids production



### Change in Russian liquids production

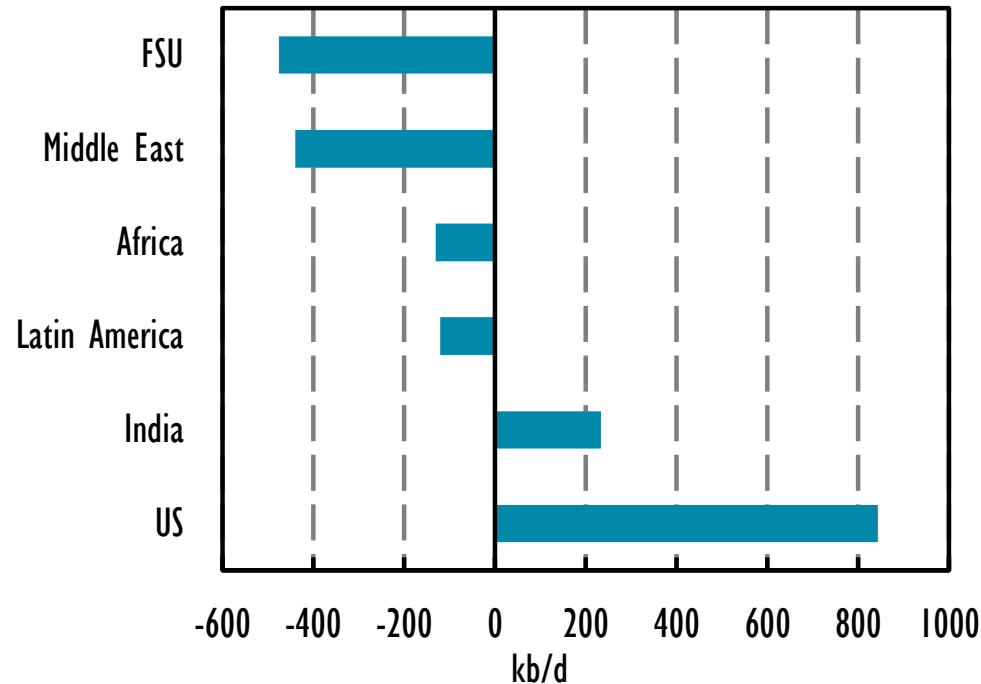


- US production growth slows in 2015-17
- Oil price, sanctions see Russian output contracting by 560 kb/d by 2020



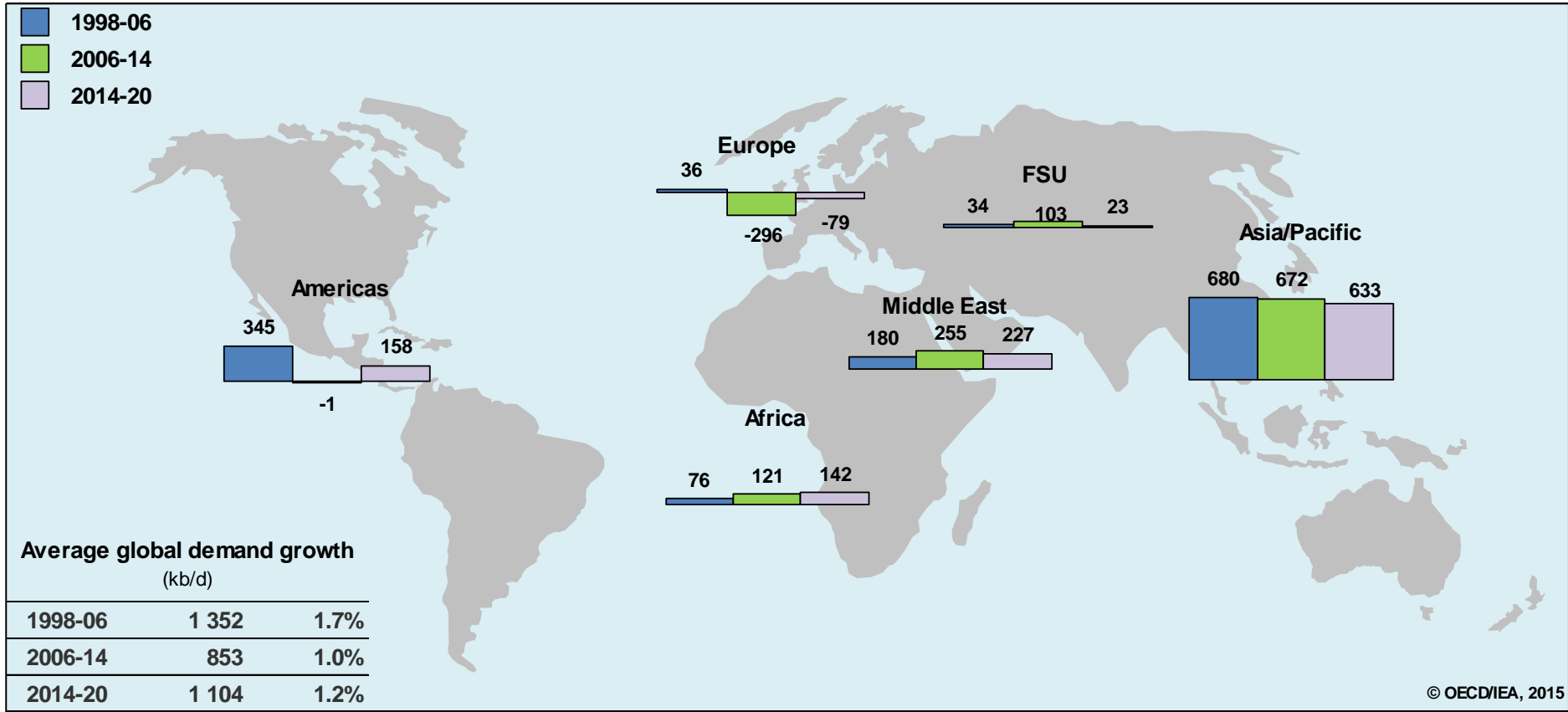
# Lower oil prices get a mixed demand response

*Revised demand growth prospects 2014-2019*



- Although many other factors come into play, lower oil prices generally dampen the demand outlook in net oil-exporters
- Raise the outlook in net oil-imports

# Eastward pull unabated



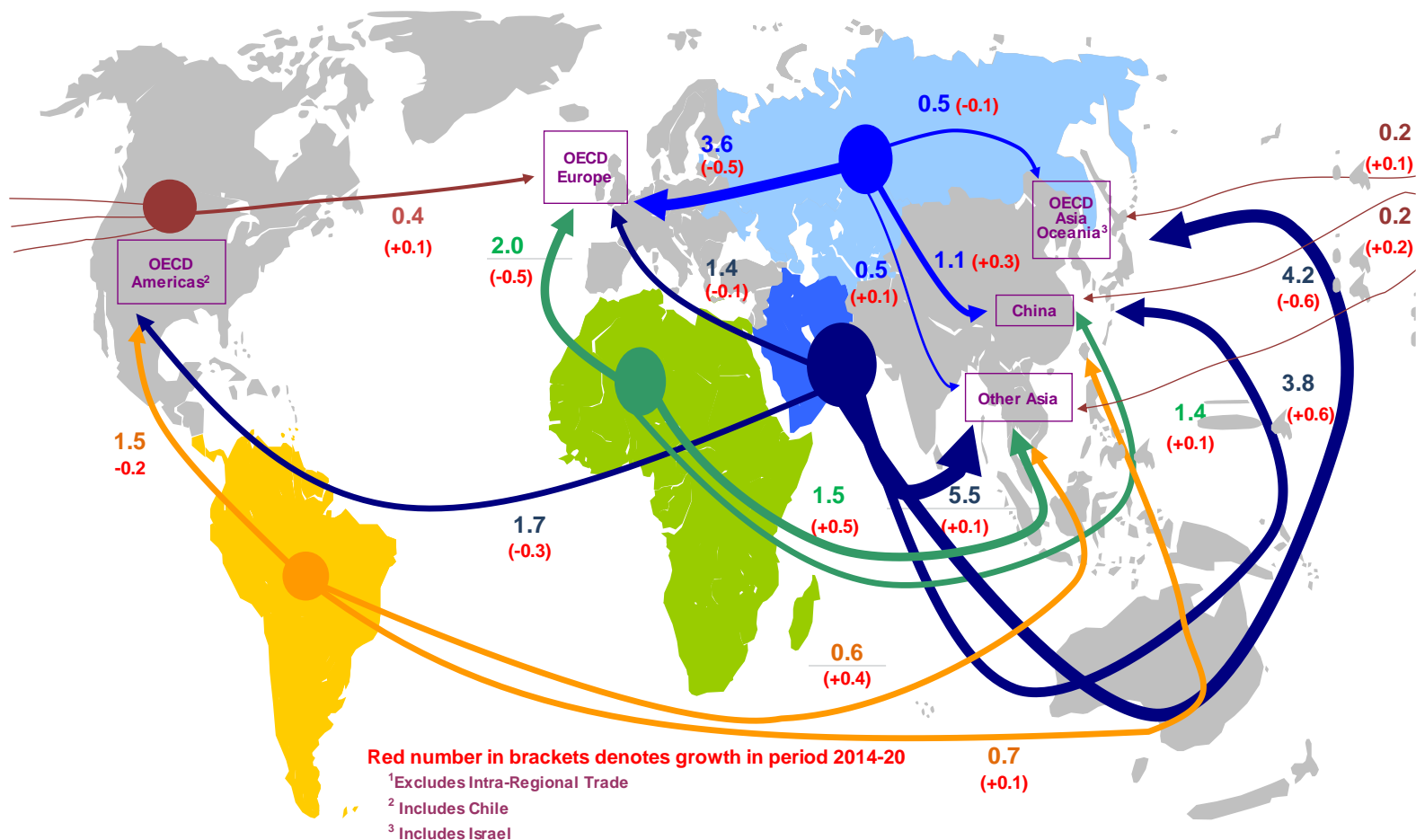
© OECD/IEA, 2015

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

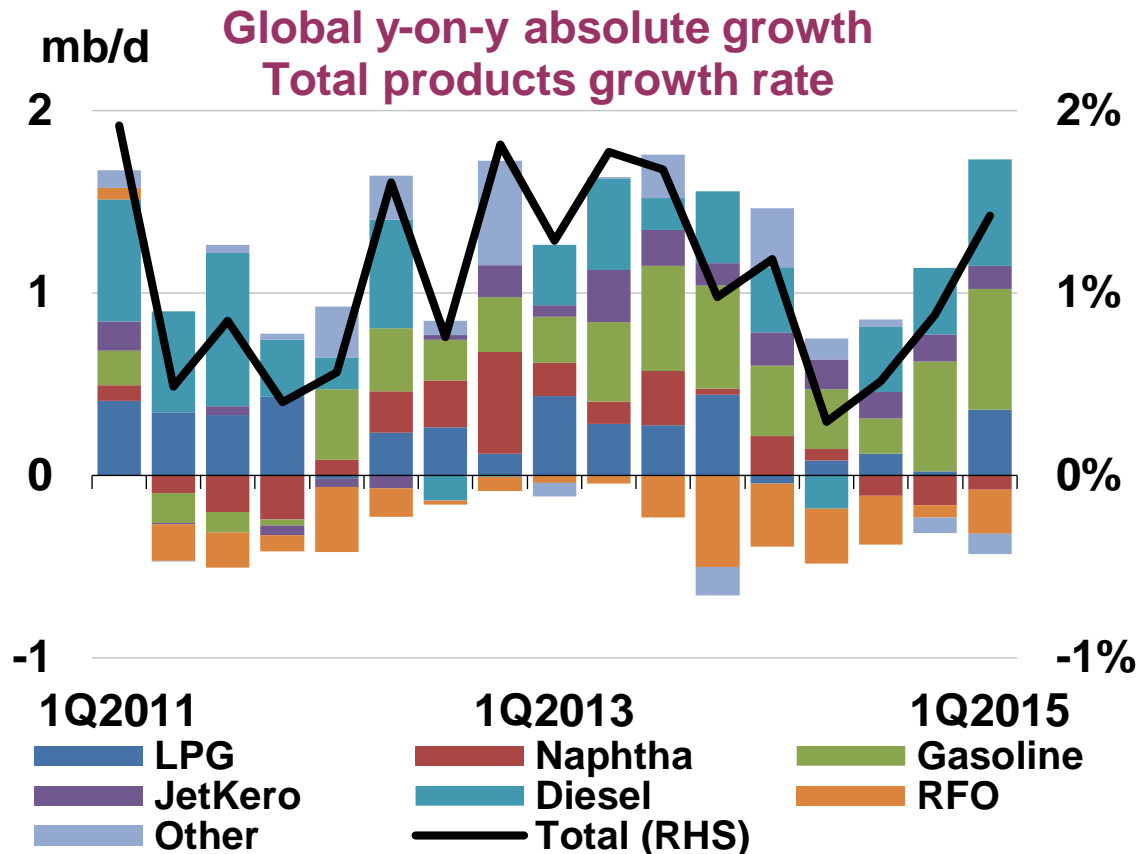
# Oil trade tilts to products

Crude Exports in 2020 and Growth in 2014-20 for Key Trade Routes<sup>1</sup>

(million barrels per day)



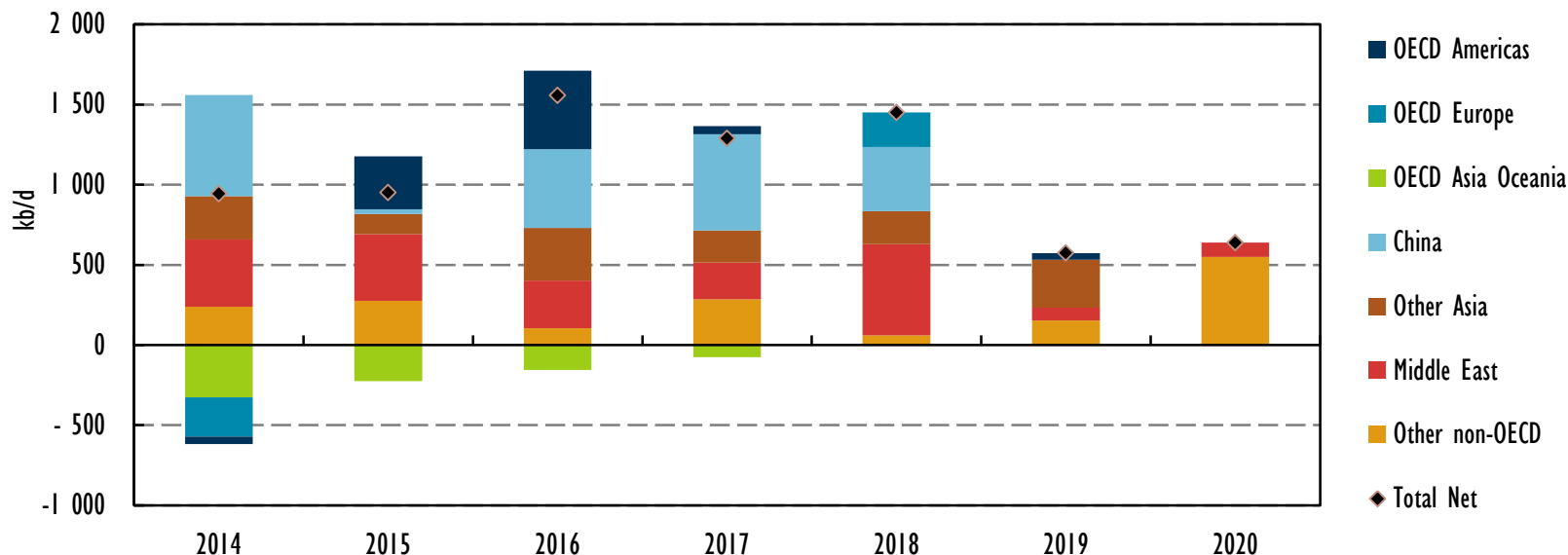
# Global recovery in demand gathers pace



- **+1.3 mb/d in 1Q15, to 93.0 mb/d**
  - Colder weather provided a particular impetus
  - Very strong gains seen in Korea & India
- **Growth of 1.1 mb/d foreseen in 2015 as a whole, to 93.6 mb/d**
  - Up sharply on 2014's +0.7 mb/d gain

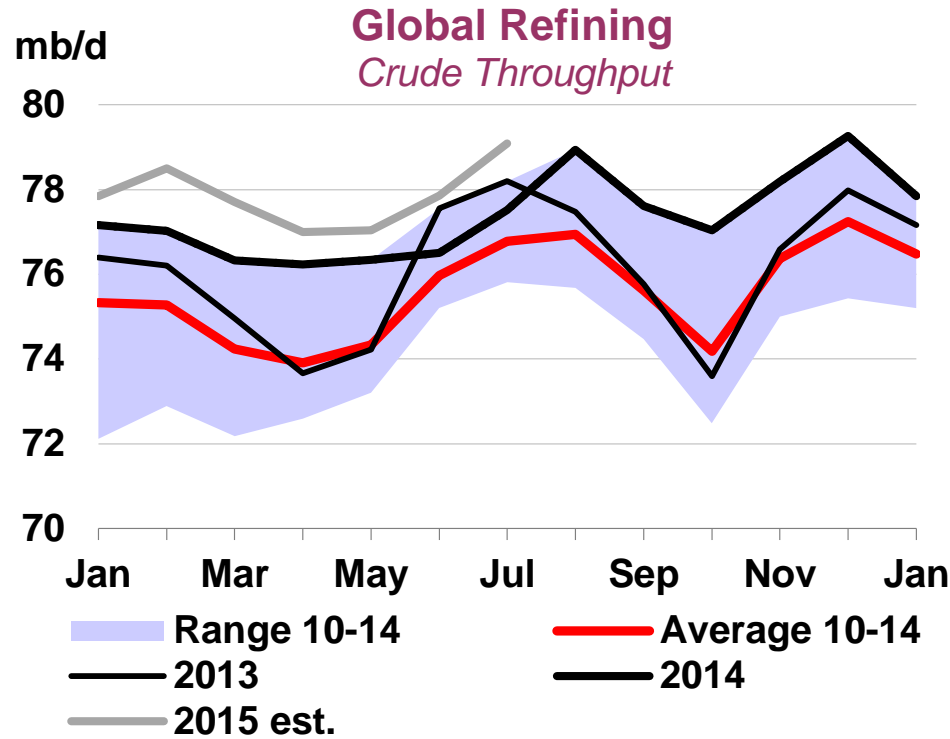
# Refining surplus lingers despite scaling back

*Global crude distillation capacity additions*



- New capacity of 6.4 mb/d by 2020, led by non-OECD Asia, Middle East
- Brief margin respite in 2014 on shutdowns
- Startups lift surplus to 5 mb/d in 2020 from 6-yr low ~3 mb/d in 2014

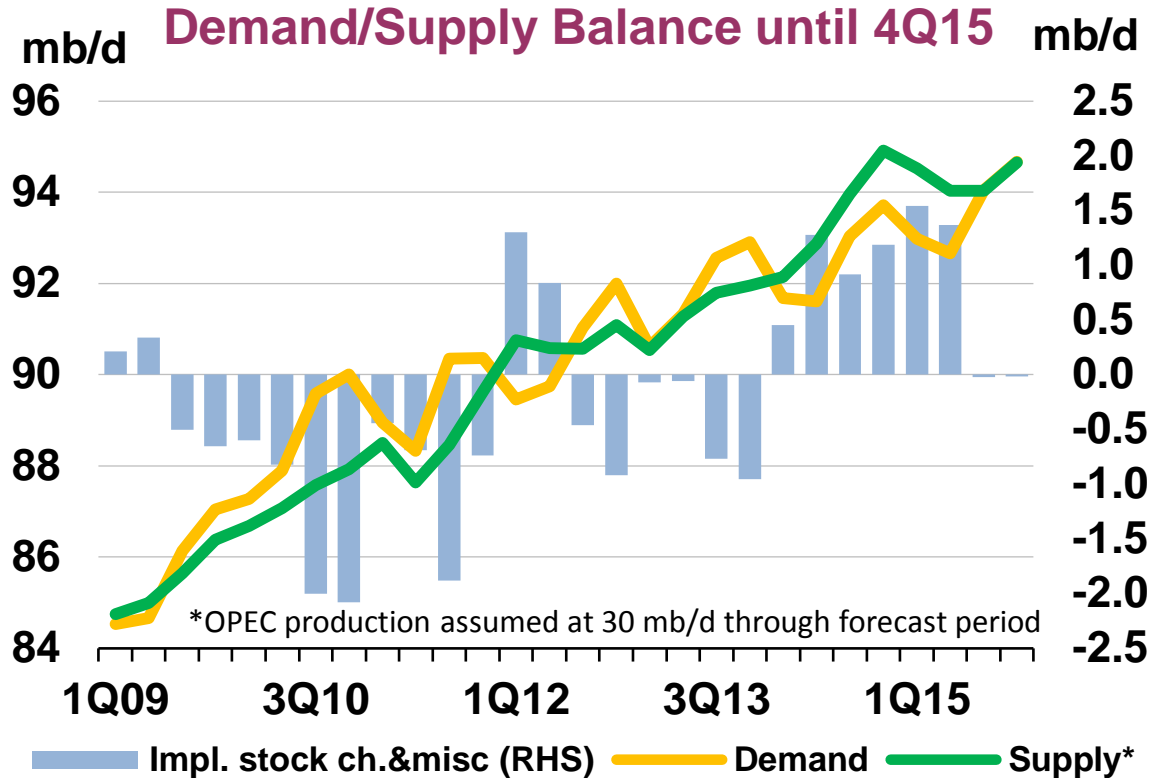
# Global refinery crude demand fall seasonally through May



- Global refinery runs rose in February, despite US refinery maintenance
- Global crude demand to fall through May, as European, then Asian turnarounds commence.
  - Asia takes as much as 2.5 mb/d of capacity offline at peak in May

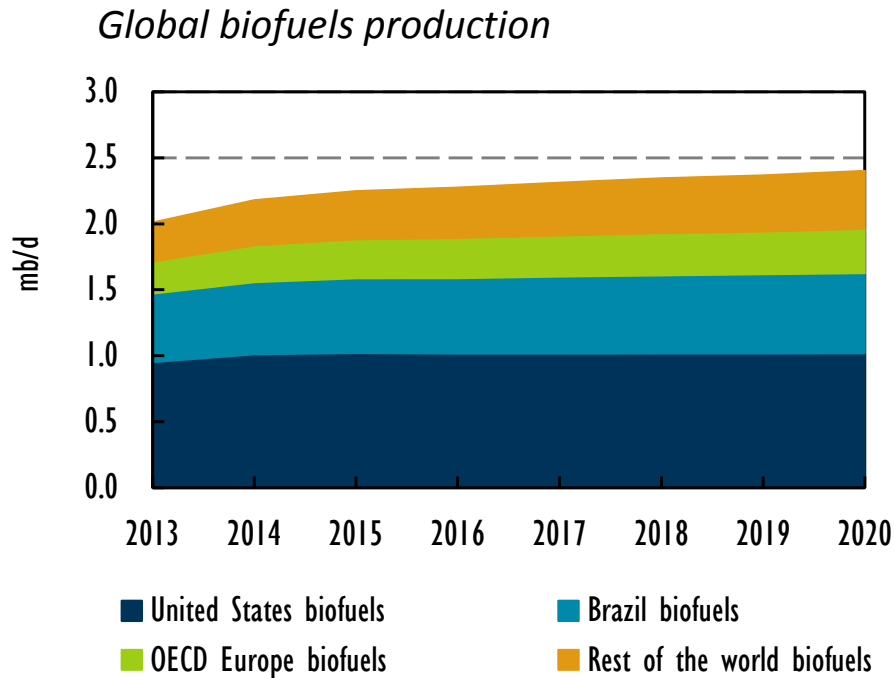
# Recent inventory builds unbalanced

*heavily skewed to crude and centered in the US and China*



- **S&D balances imply 140 mb stock build in 1Q15**
- **90% of this can be identified from preliminary data:**
  - **OECD +50 mb**
  - **China + 76 mb**

# Despite lower oil prices biofuels continue to grow

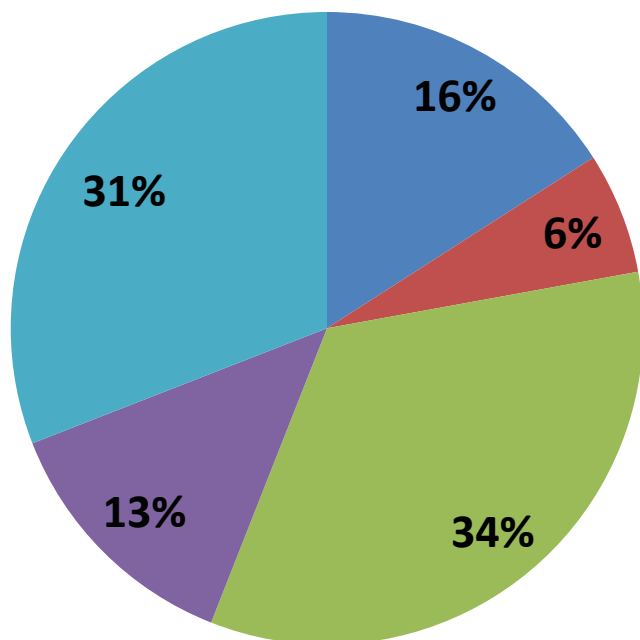


- **Biofuel production is mandate not price driven**



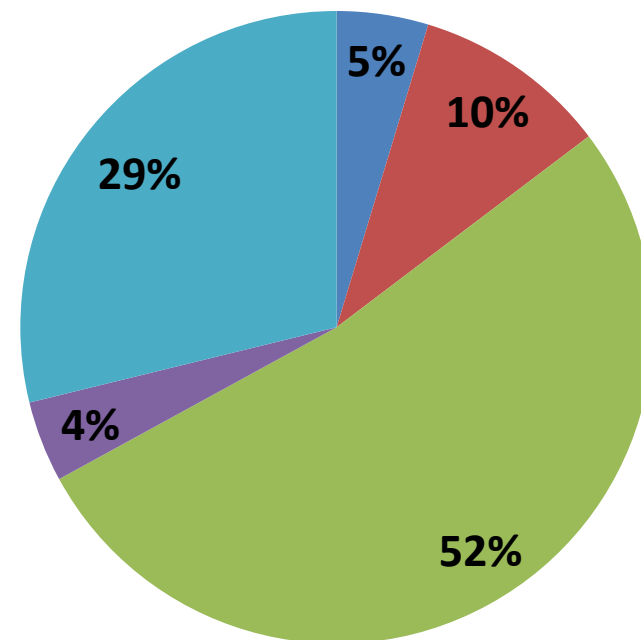
# Oil consumption by sector (OECD)

**1973**



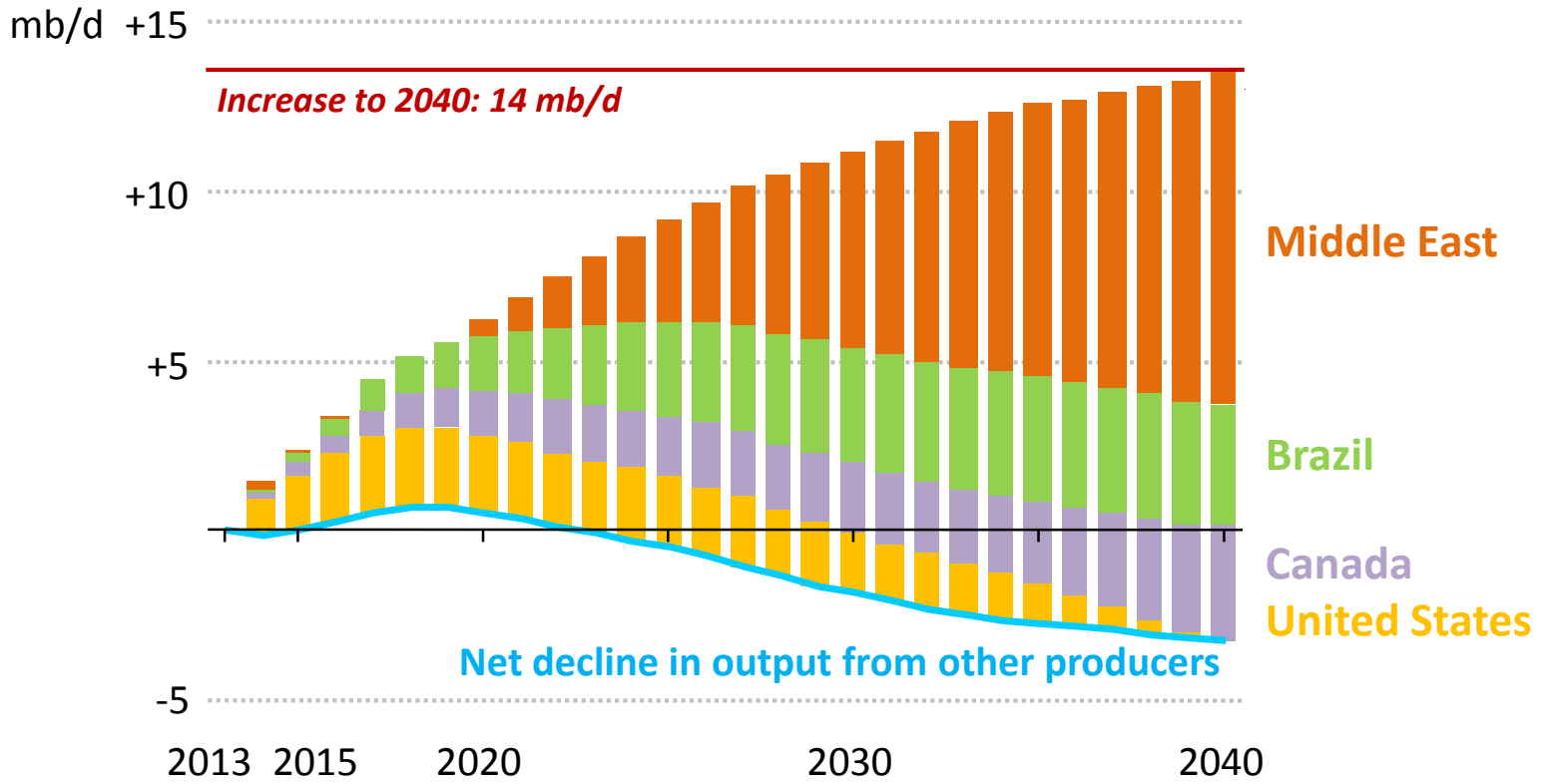
- Industry
- Petrochemical
- Transportation
- Power generation
- Other

**2012**



# Instability in the Middle East a major risk to oil markets

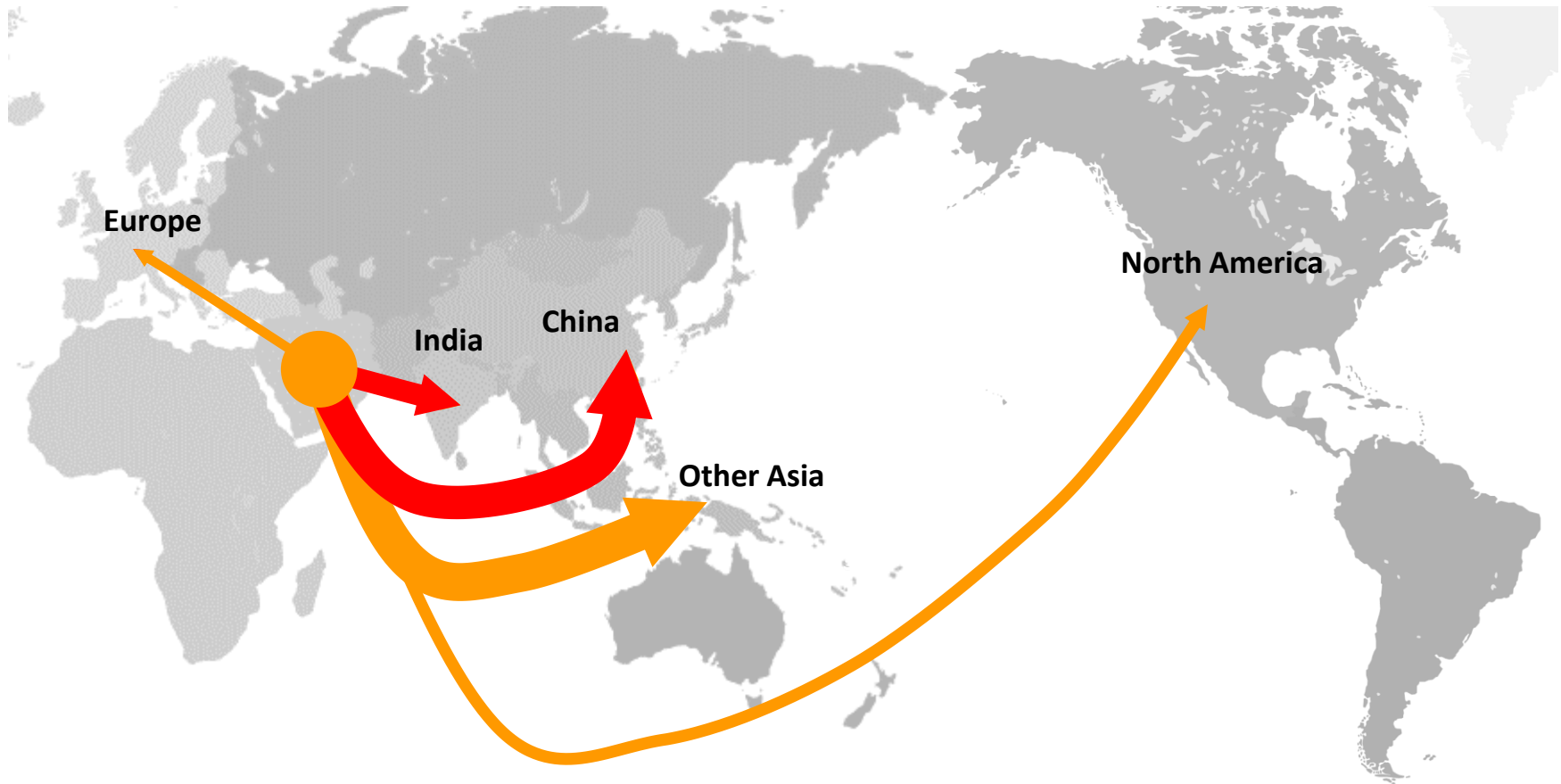
### Oil production growth in United States, Canada, Brazil & the Middle East



**The short-term picture of a well-supplied market should not obscure future risks as demand rises to 104 mb/d & reliance grows on Iraq & the rest of the Middle East**

# Ever-growing crude trade between Asia and the Middle East

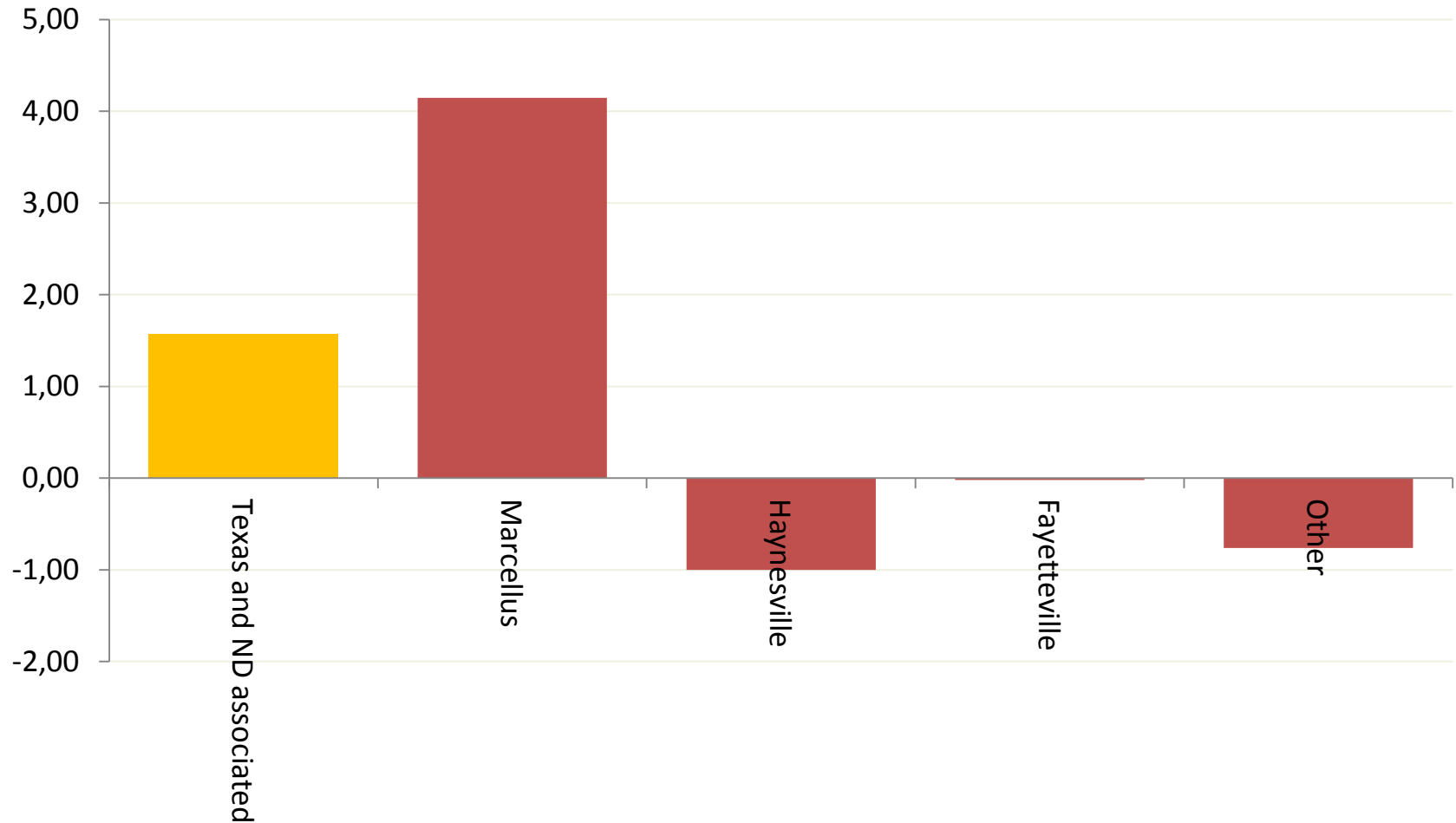
## 2040 crude oil imports



***North America's oil imports fall as it becomes more self-sufficient, and Europe's decrease with falling demand, 90% of Middle East crude exports go to Asia by 2040***

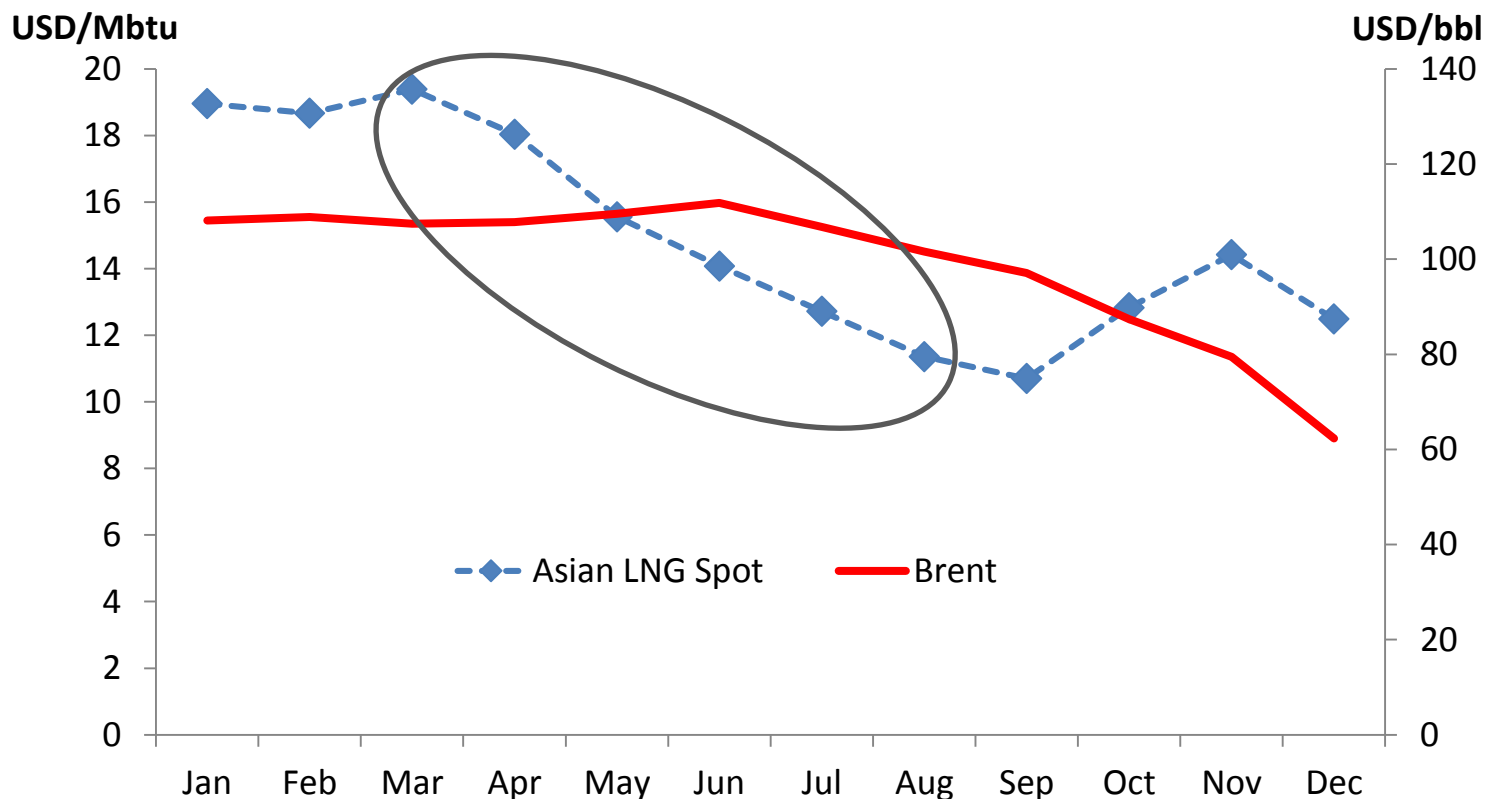
# US shale gas: LTO associated gas might be hit, but benefits from lower drilling costs

## US gas production growth across major shale plays (bcf/d)



# Asia LNG spot prices started to fall sharply well ahead of the drop in oil

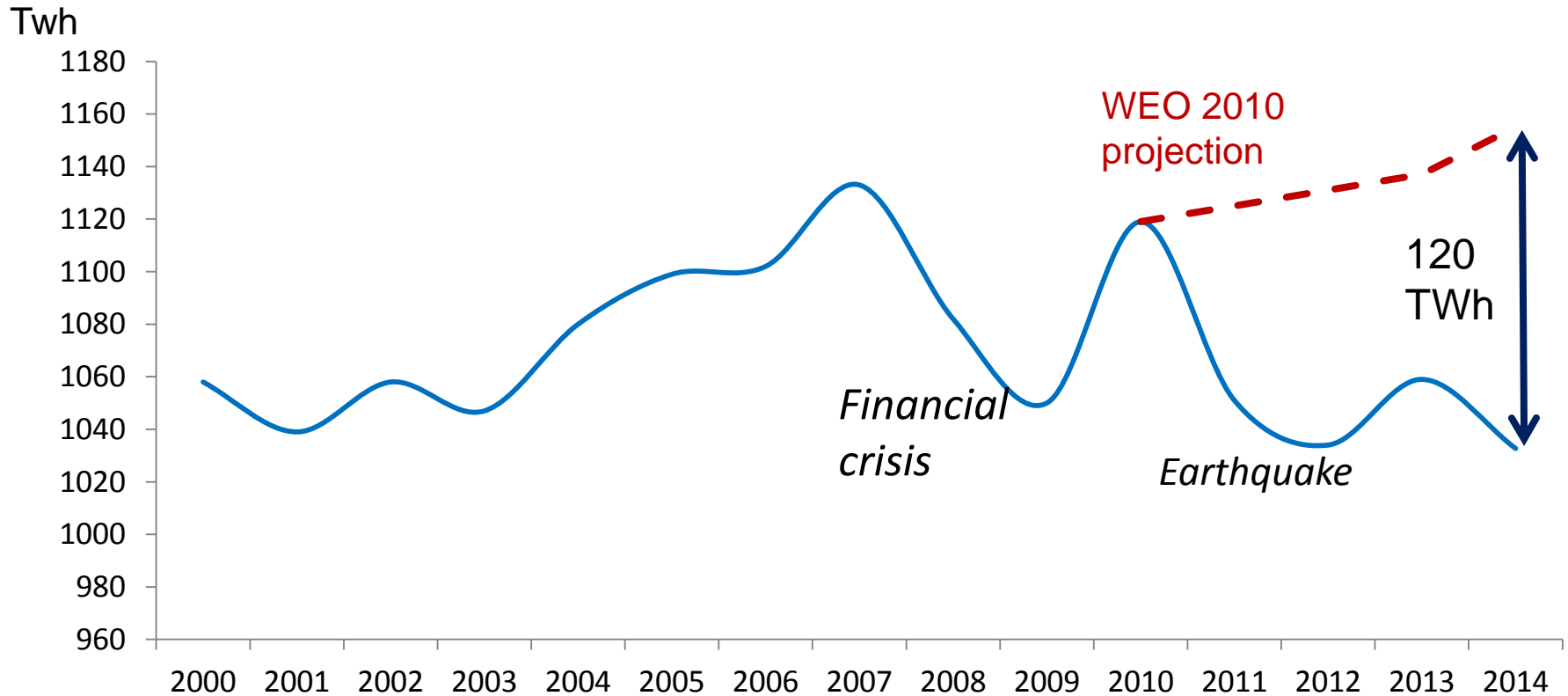
## Oil and LNG prices in 2014



- LNG prices were already falling well ahead of the drop in oil
- Cheap oil linked gas from the new Australian contracts will reduce demand for spot gas

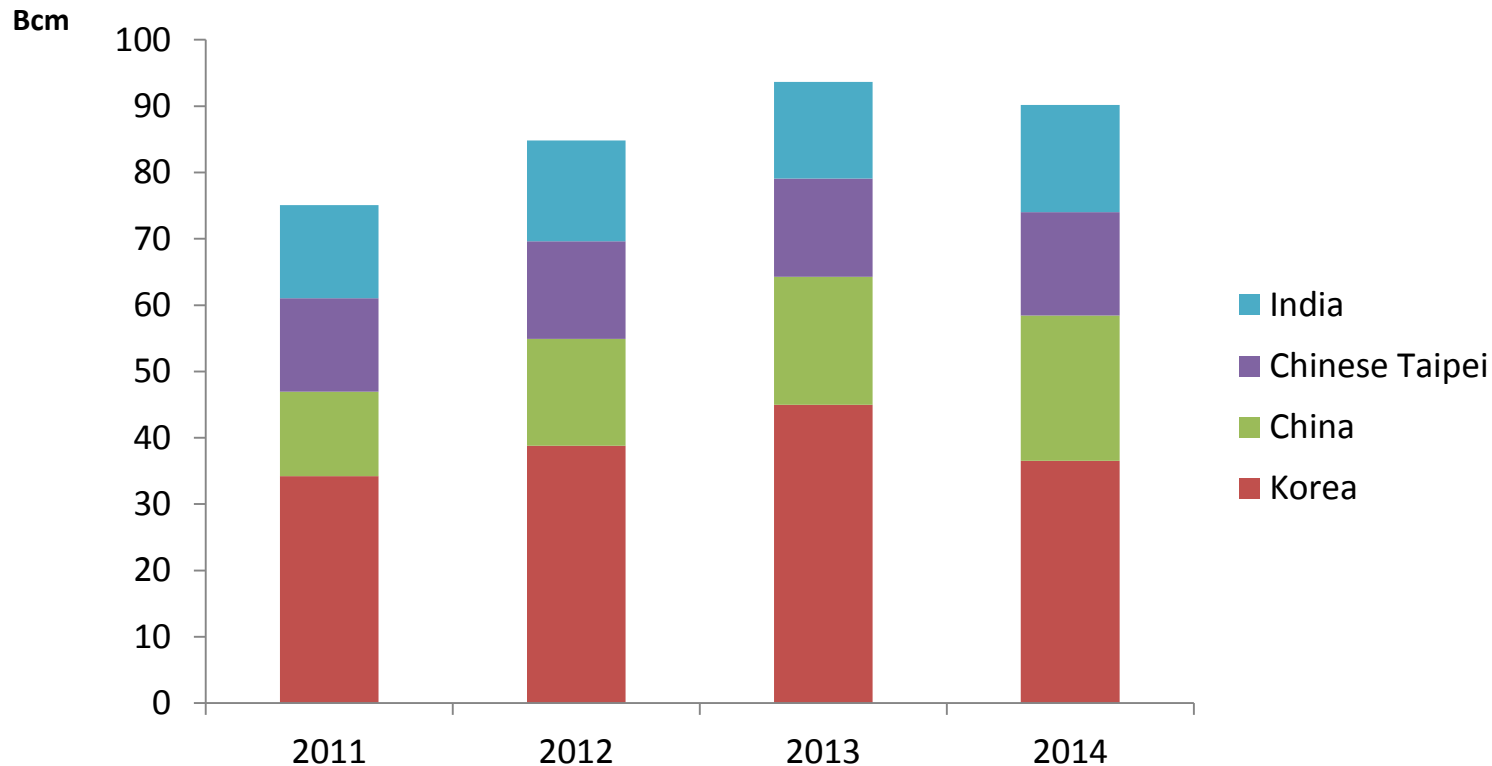
# Japan: persistent electricity demand weakness limits LNG needs

*Japanese power generation*



# Very high prices have had a major impact on Asian demand

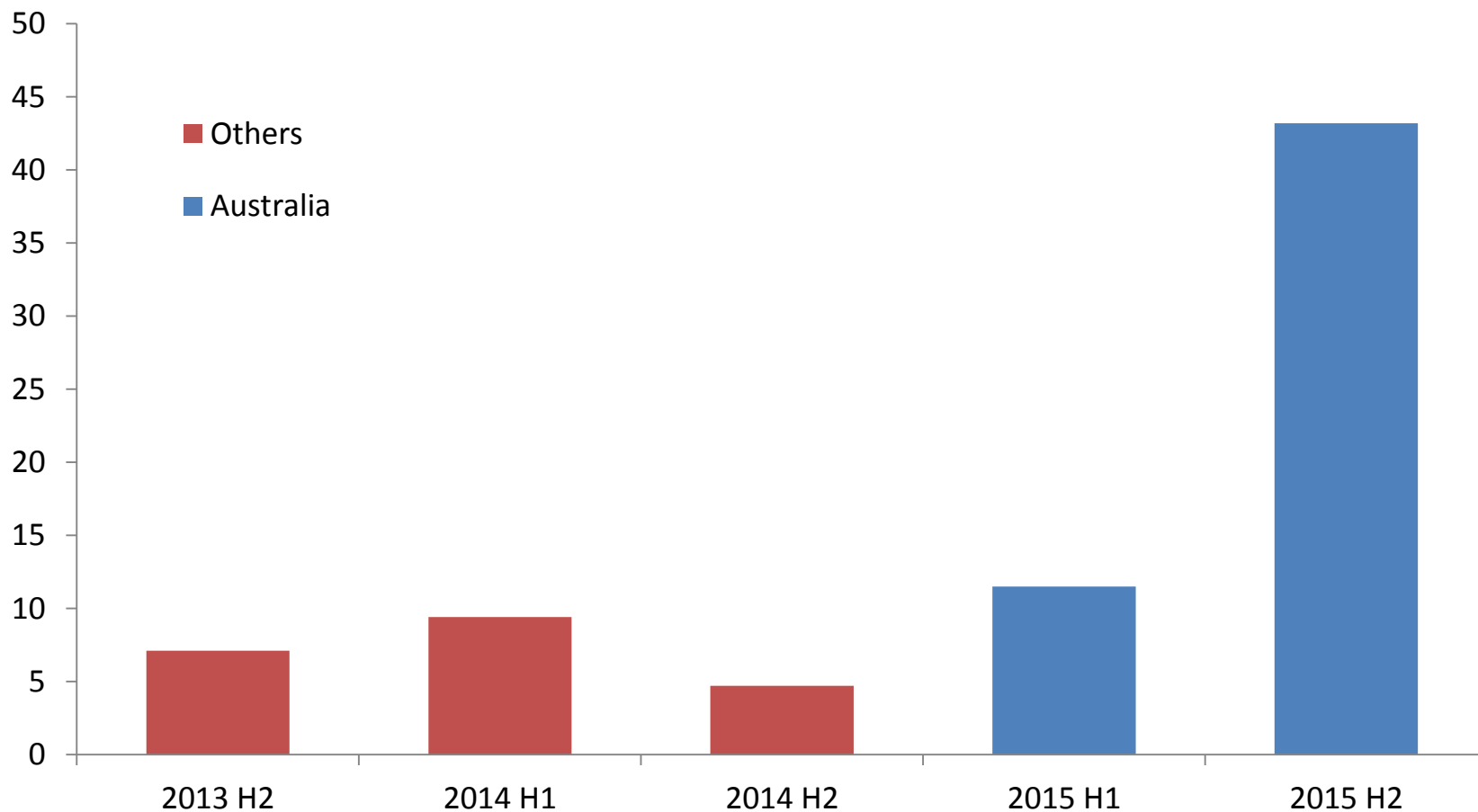
## LNG import volumes in major Asian countries 2011-2014 (Jan-Oct)



- Korean LNG demand has dropped significantly in 2014 due to the restart of nuclear capacity and switch to coal in the power sector.
- India and China underutilized their LNG infrastructure

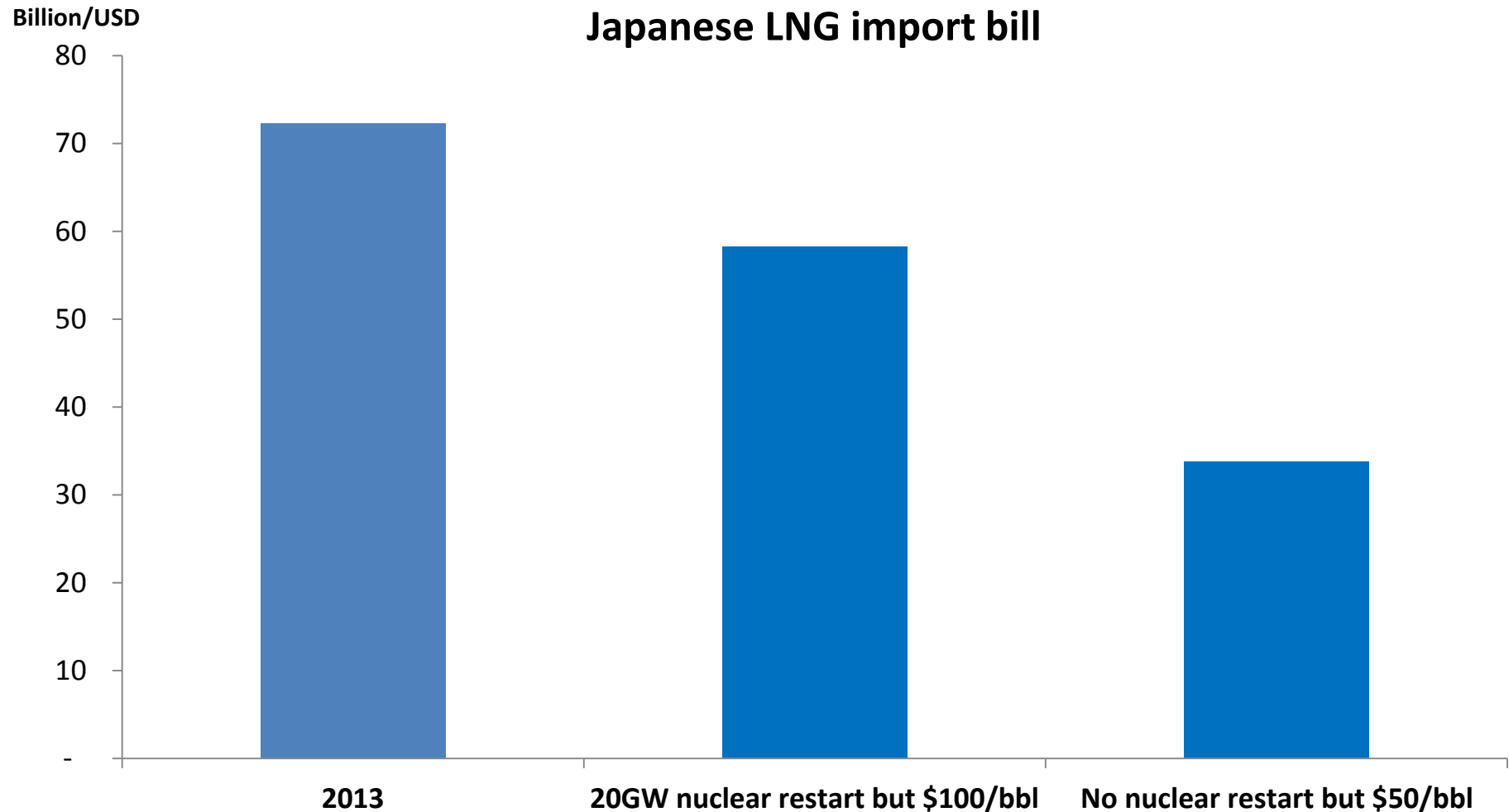
# A wave of new LNG supply is coming

**Additional LNG capacity (growth relative to the previous period, bcm)**



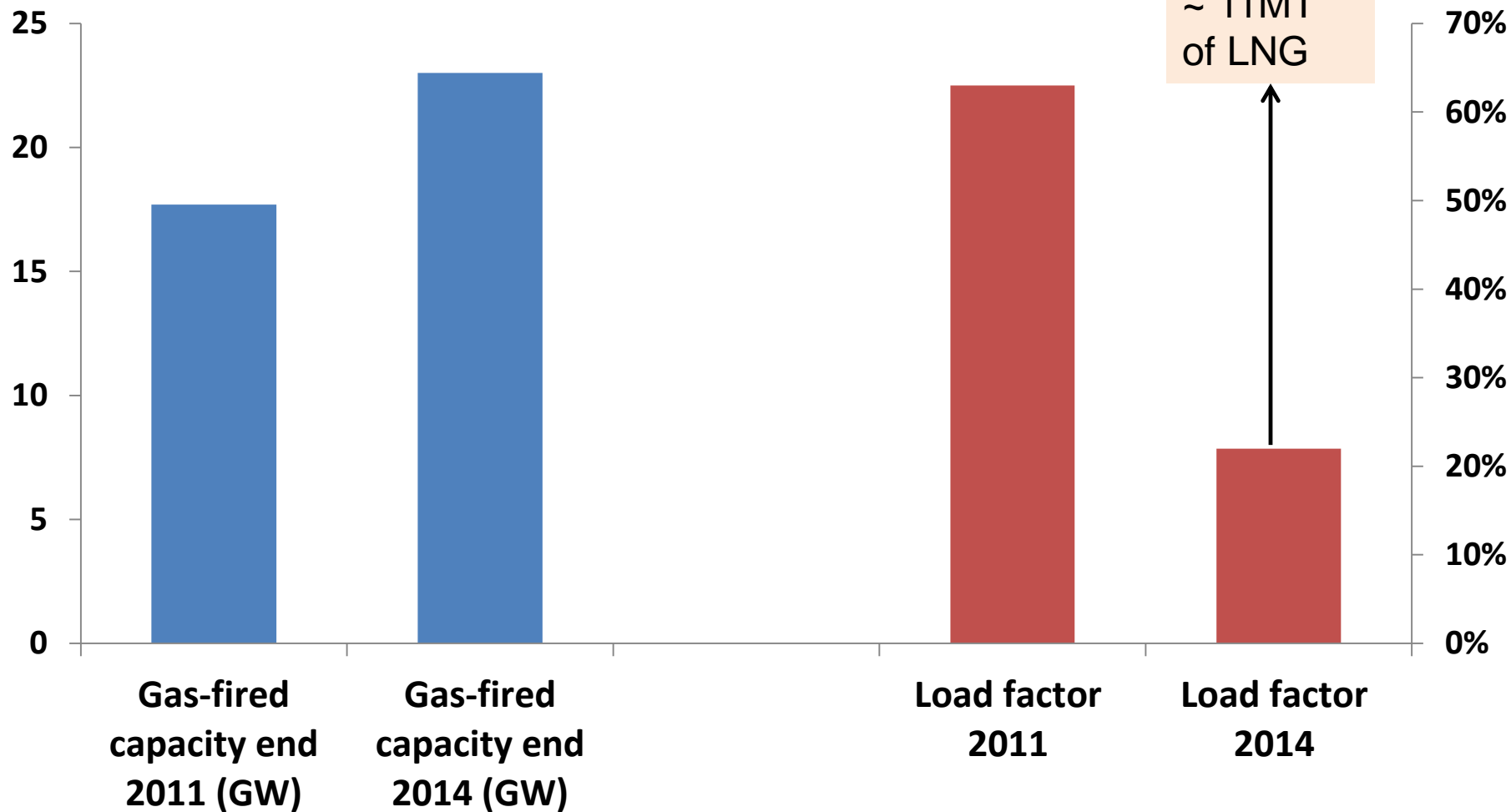


# Large impact on Japanese energy costs

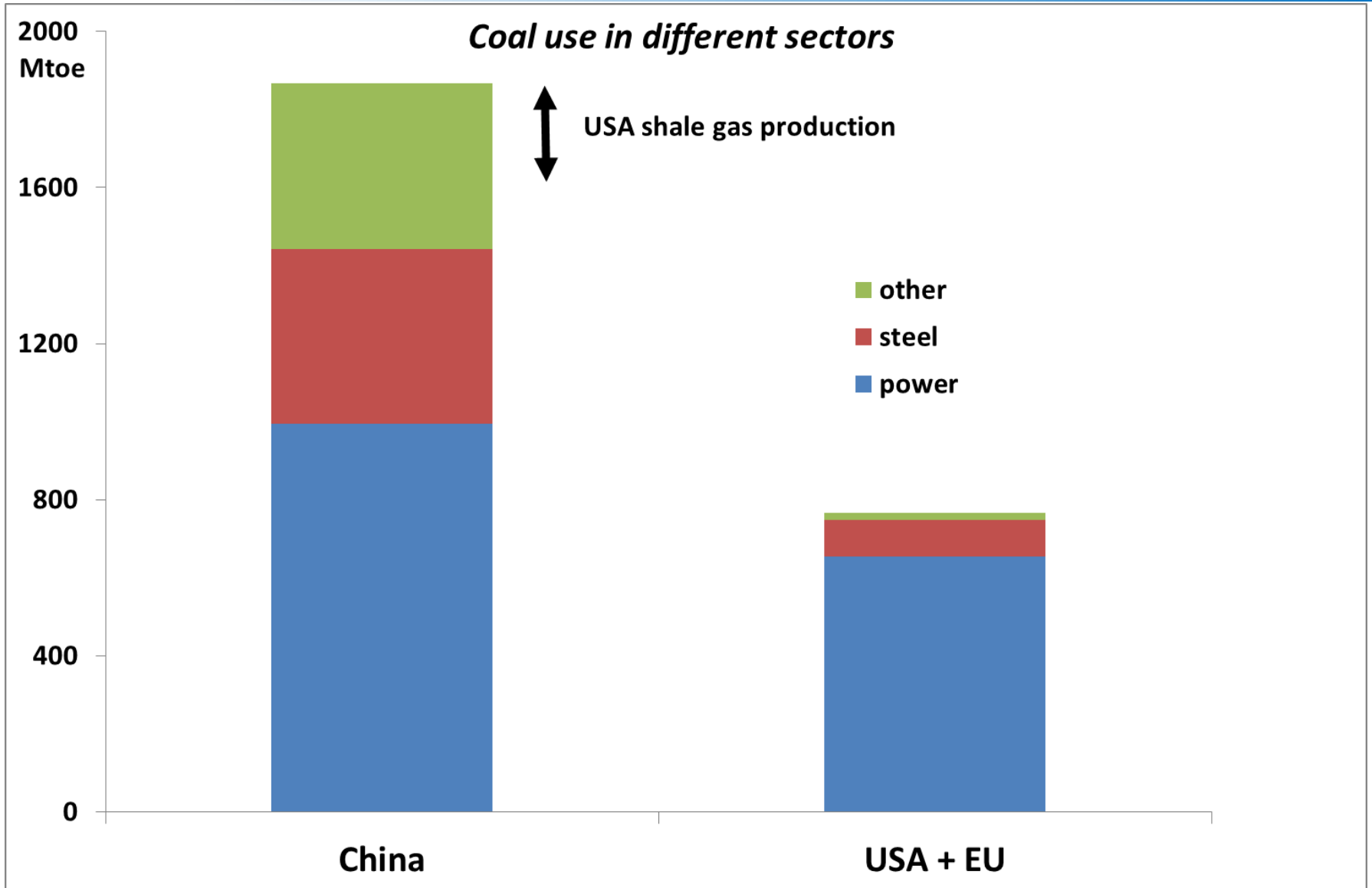


# Cheaper LNG enables faster electrification in India

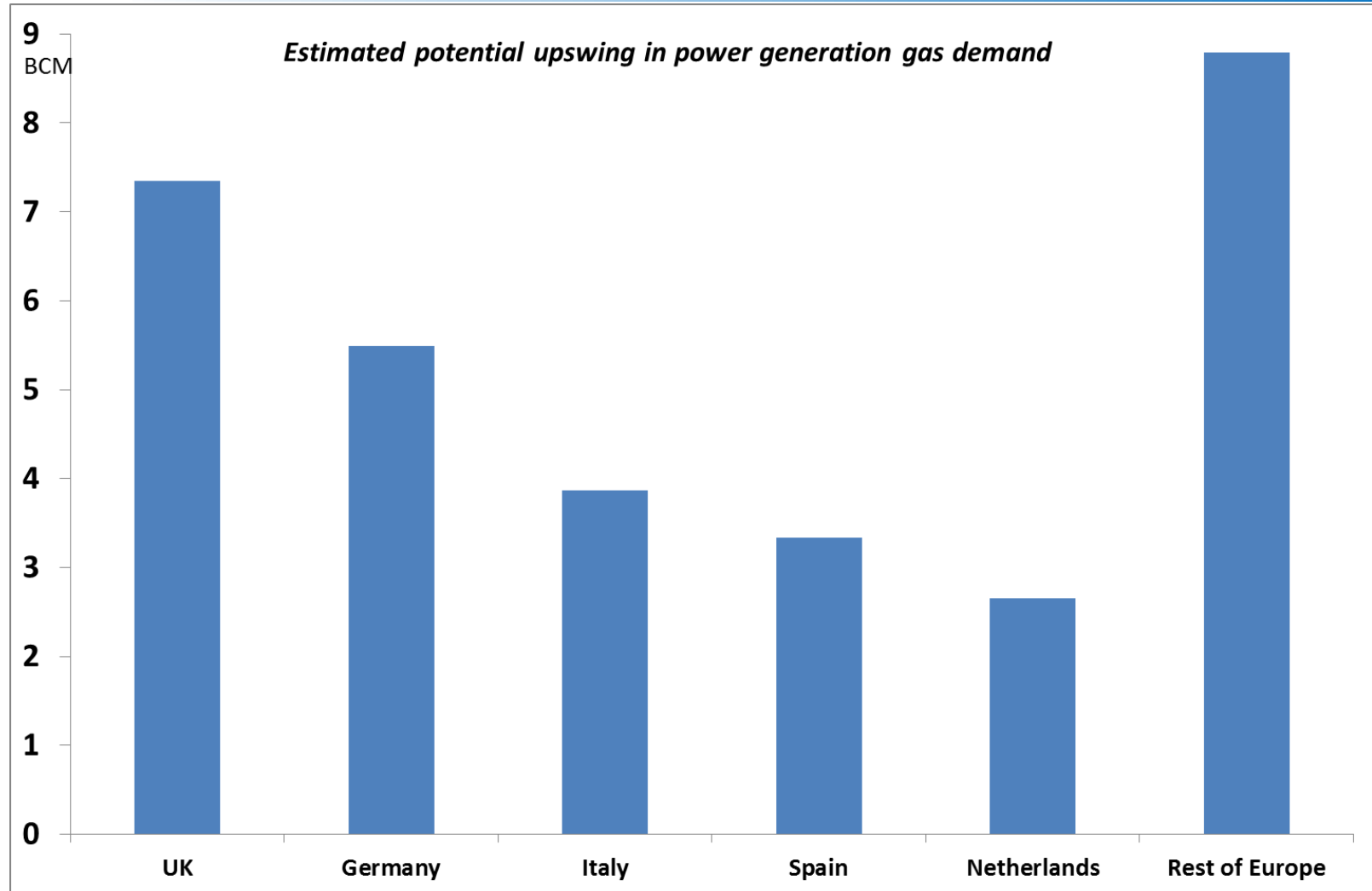
## India gas-fired capacity and load factors



# Gas reduces China's coal dependency outside the power and steel sectors

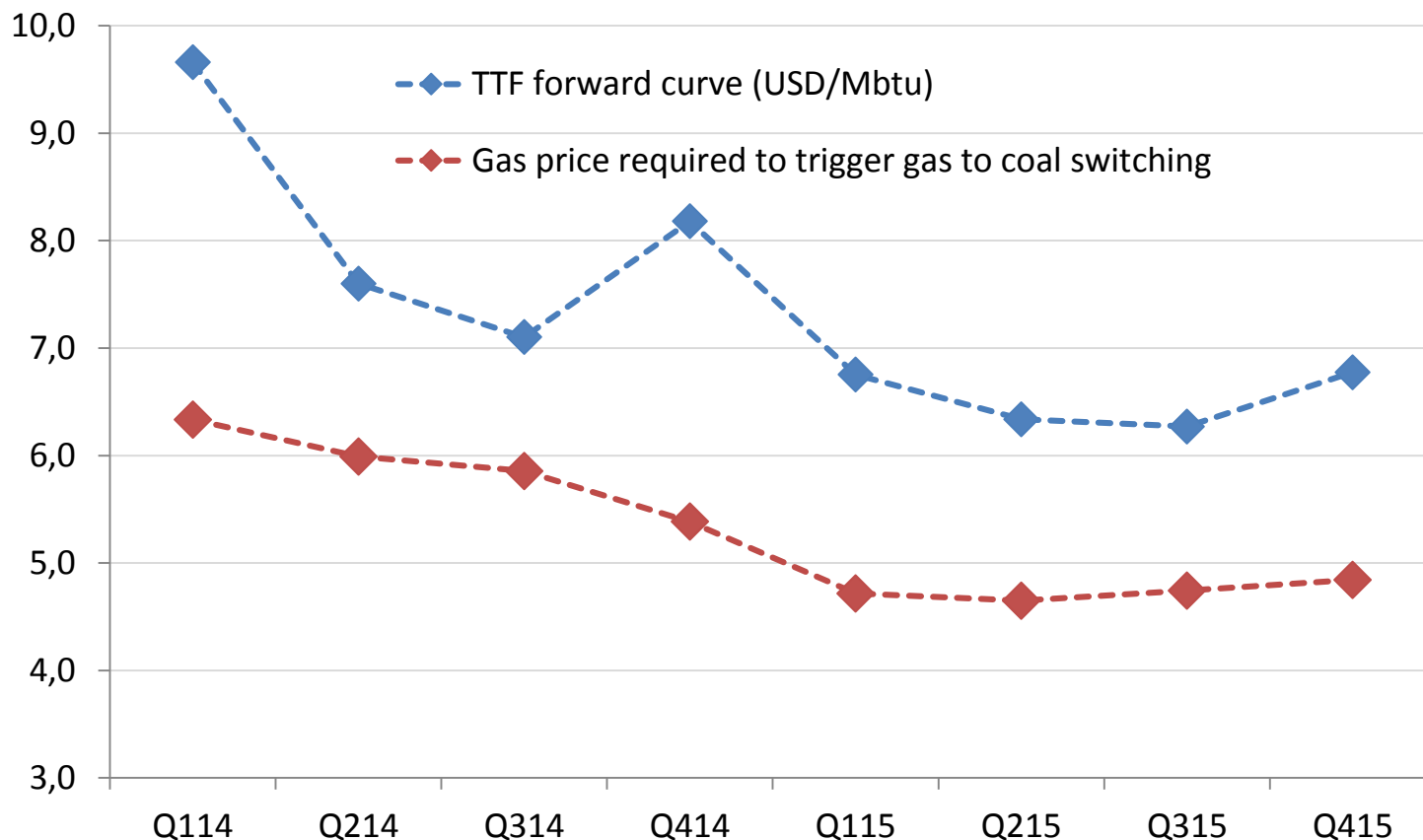


# Significant upside potential in EU power generation



# ....But it requires even lower prices as coal prices are also in a freefall

**European gas prices might need to drop towards \$5/mmbtu if gas-to-coal switching is the way to rebalance the market**

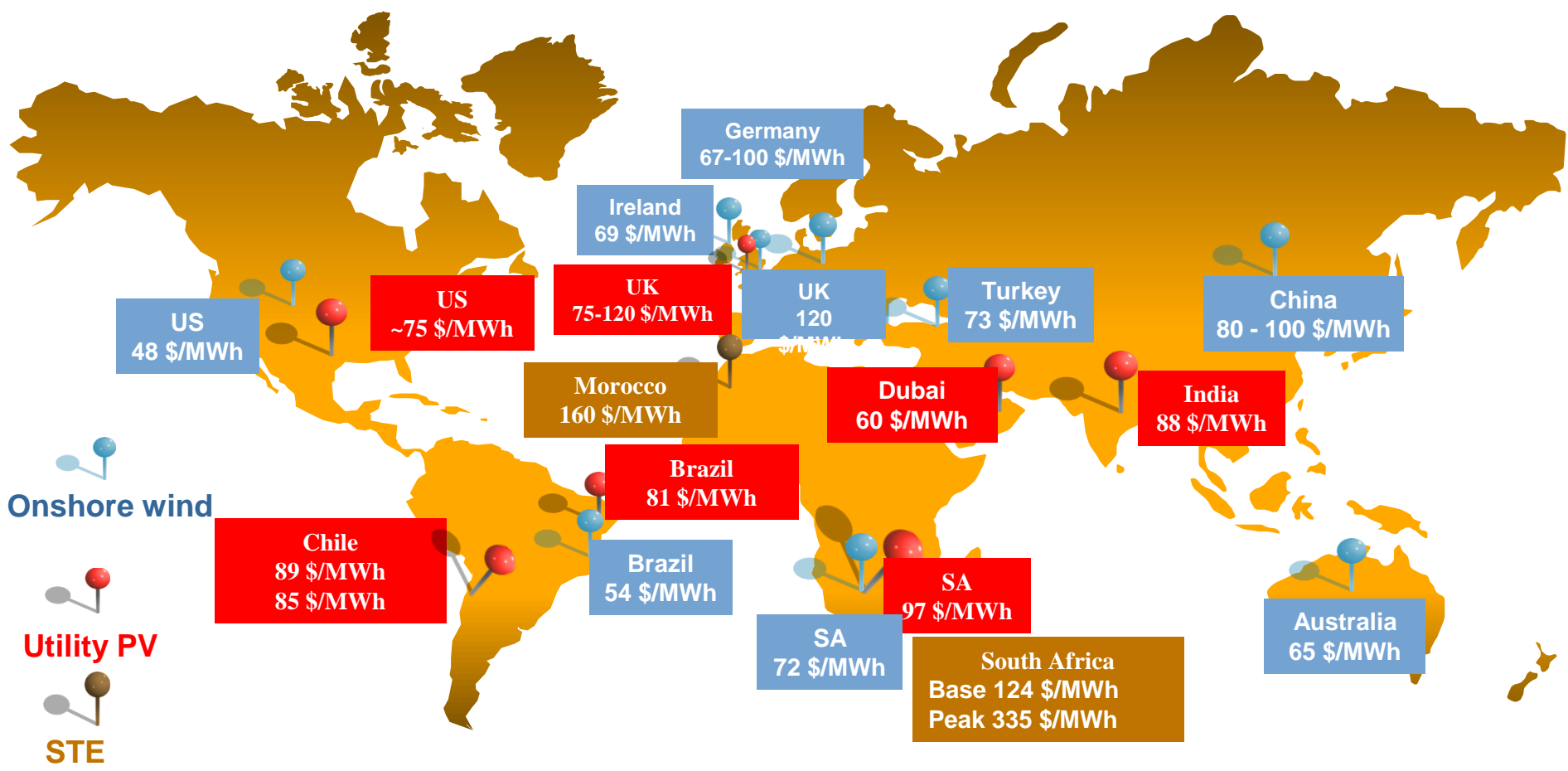


*Note: Based on gas, coal, and carbon forward curves as of May 20 2015 – approximate switching price*

# Increasing examples of wind and solar PV costs comparable to new-build alternatives



Recent long-term remuneration contract prices (e.g. auctions and FITs)



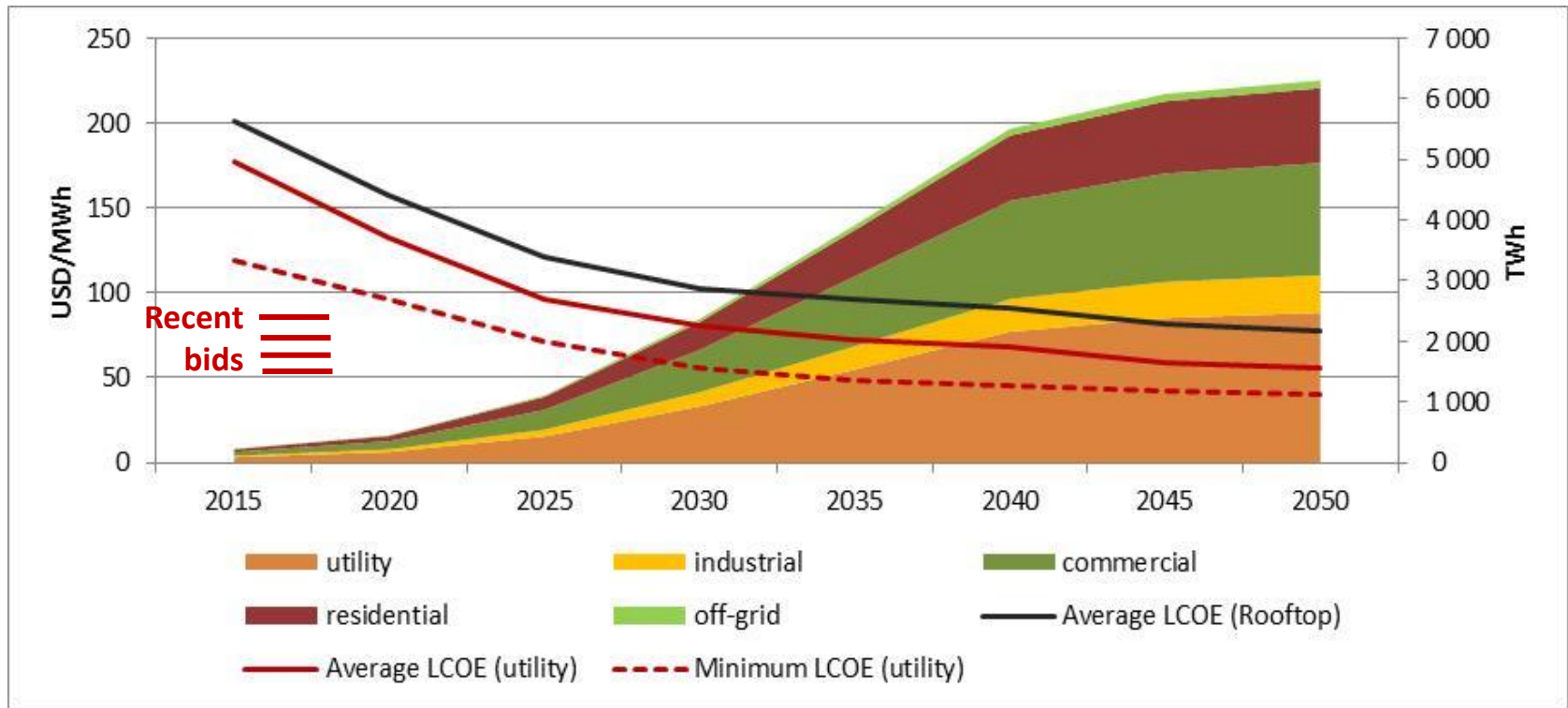
Transition to new era of economic attractiveness for renewables where good resource and appropriate policy and regulatory framework are in place



# Photovoltaic Energy

2014 Edition

## Long term scenario of the Technology Roadmap



- PV could provide 16% of global electricity by 2050 and 20% of CO<sub>2</sub> emission cuts
- Based on cautious cost assumptions and 8% WACC
- Key factor will be flexibility of power systems to integrate large share of v-RE; STE will play a complementary role to PV