



Oil and Gas Security

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6 March 2018 (APEC-OGSNF)

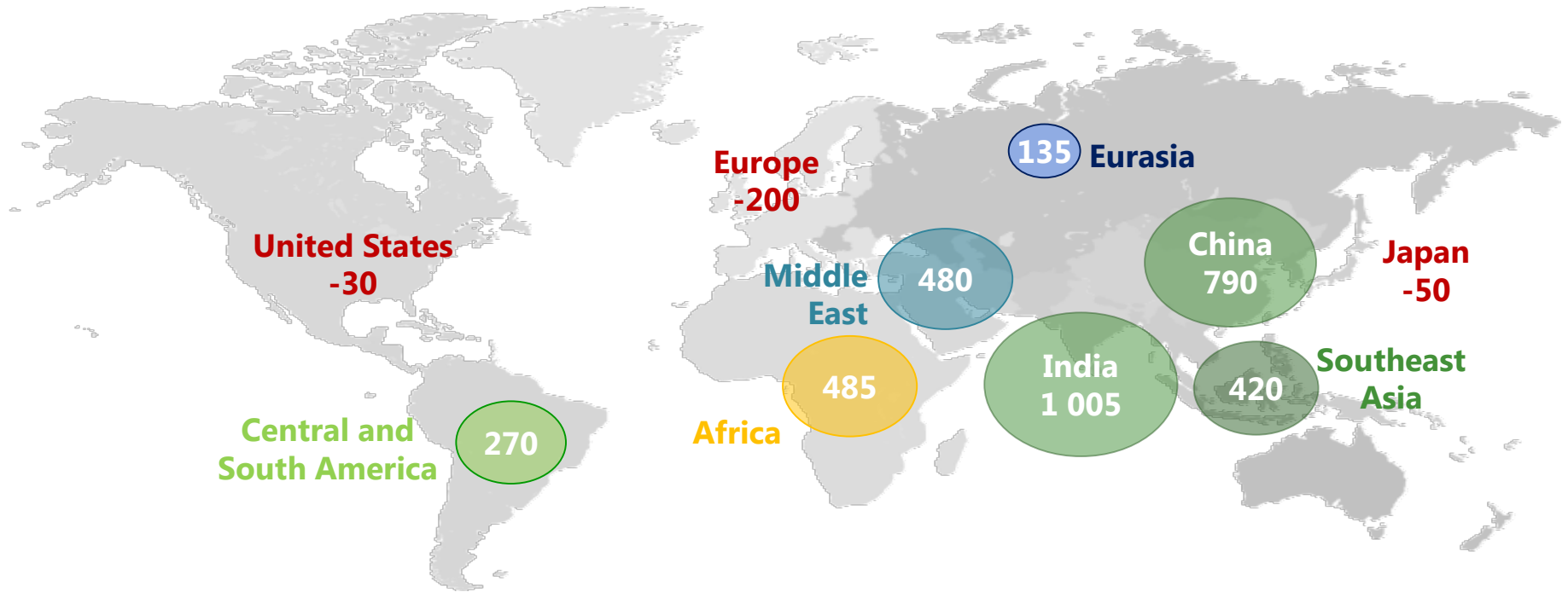


Long-term Energy Markets Outlook

Key takeaways from WEO 2017

India takes the lead, as China energy growth slows

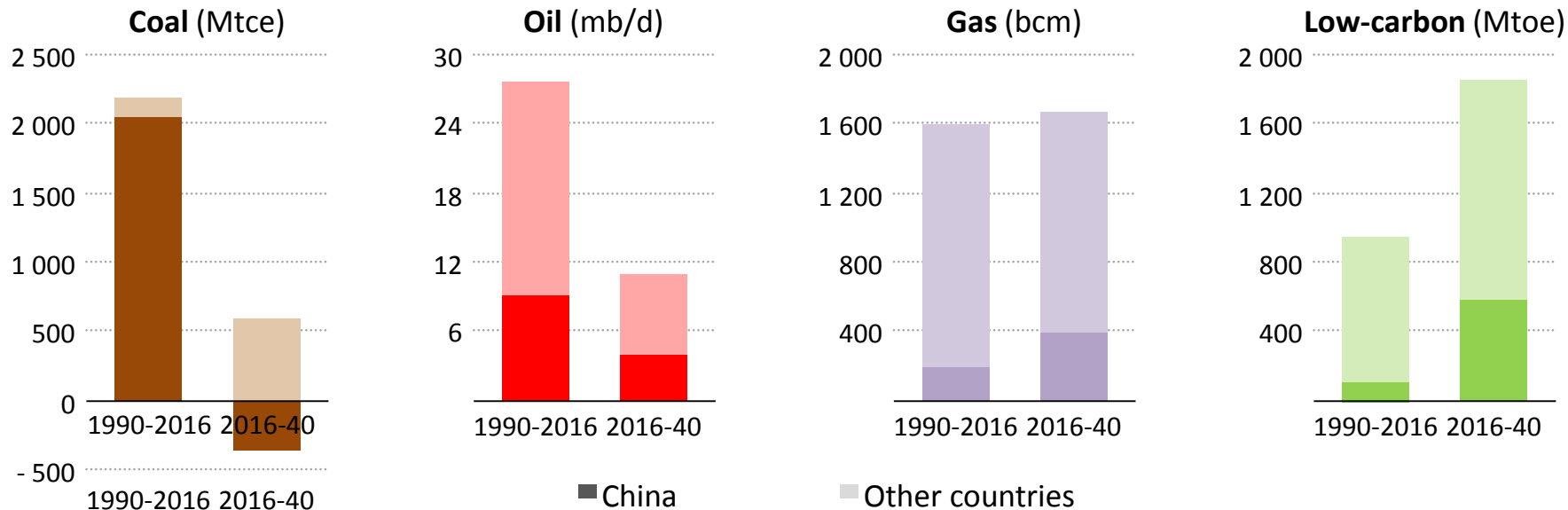
Change in energy demand, 2016-40 (Mtoe)



India, China and other developing Asia will be critical in determining the future trajectory of global energy demand & CO₂ emissions

China moves global energy markets, again

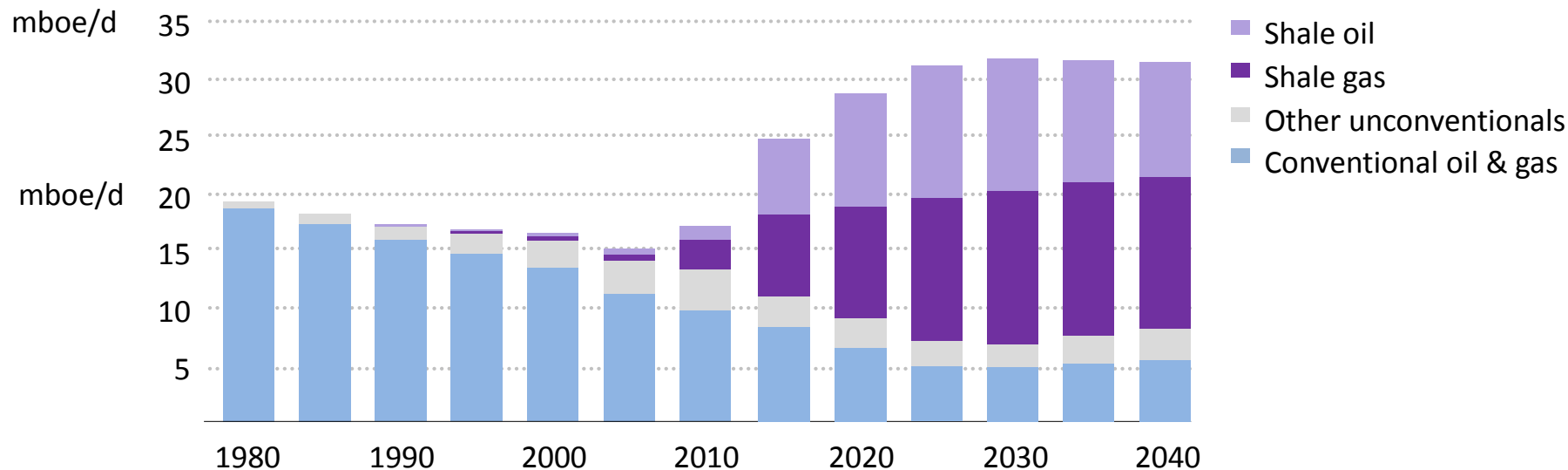
Change in world energy demand by fuel



**Low-carbon sources & natural gas meet 85% of the increase in global demand:
China's switch to a new economic model & a cleaner energy mix drives global trends**

US becomes undisputed leader of oil & gas production

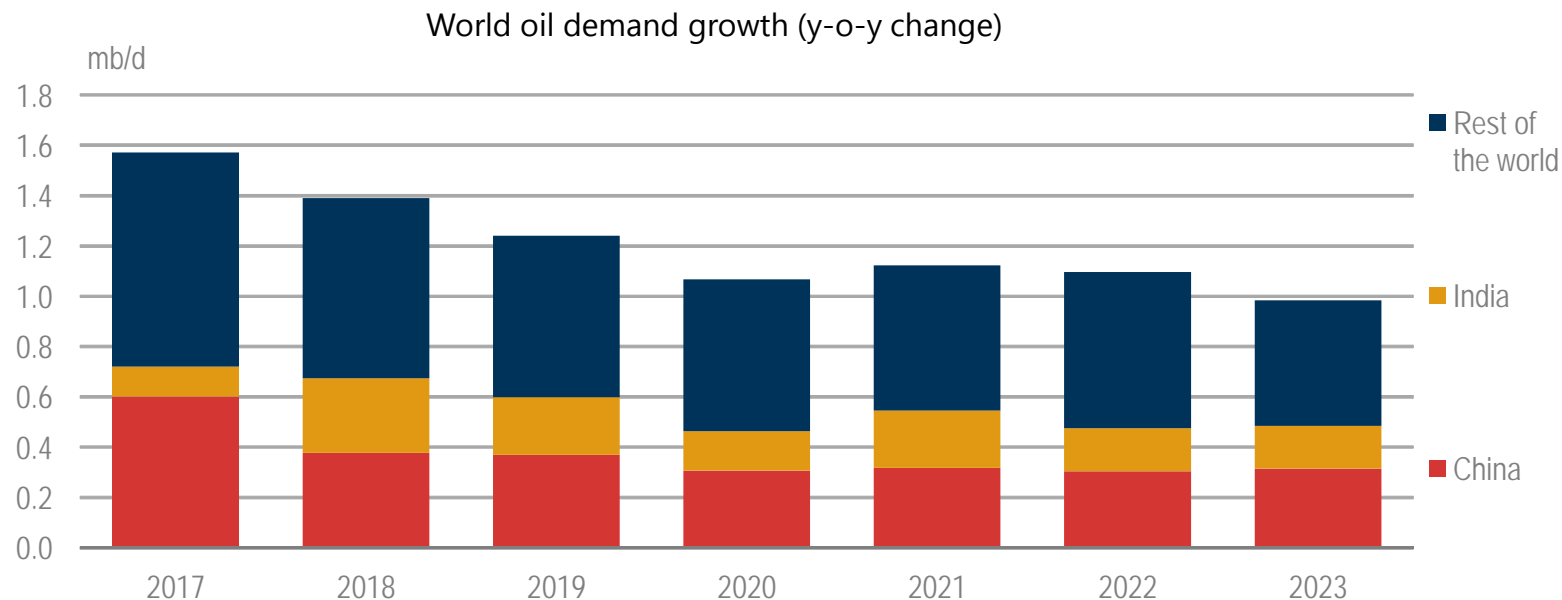
Oil and gas production in the United States



The US is already switching to become a net exporter of gas & becomes a net exporter of oil in the 2020s, helped also by the demand-side impact of fuel efficiency & fuel switching

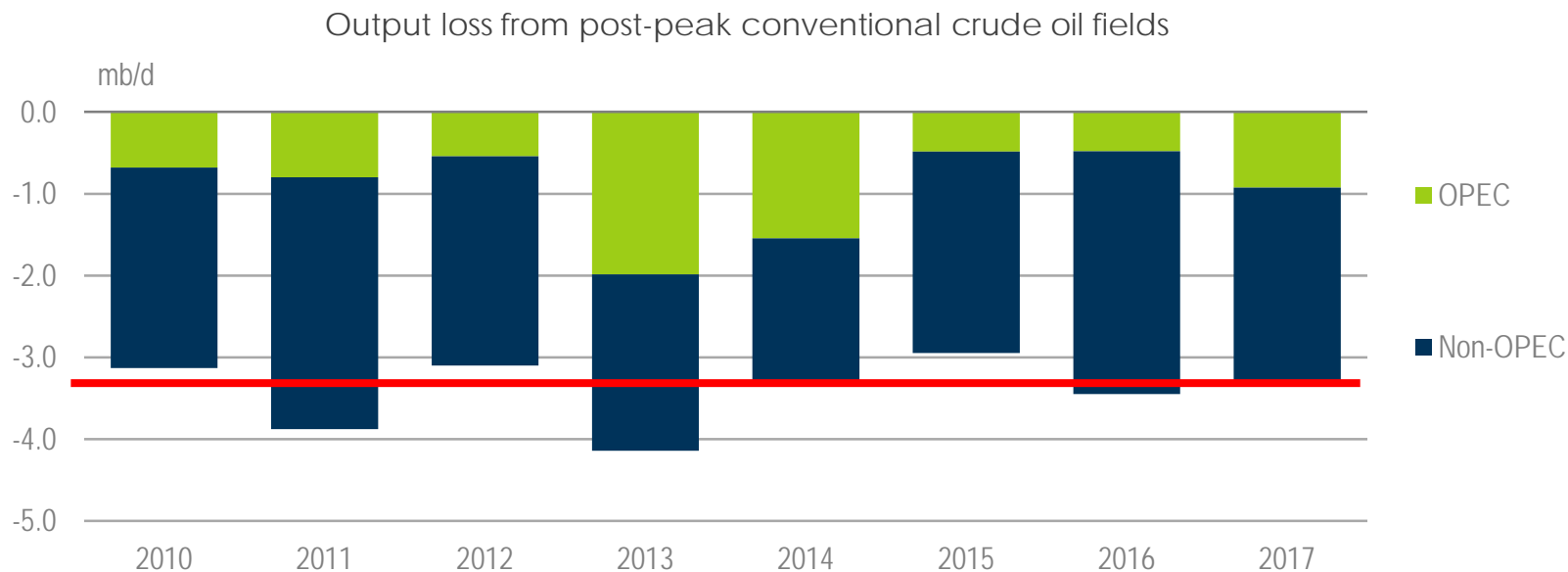
Oil Market (Mid-term, to 2023)

Robust global oil demand growth to 2023



China and India account for almost half of world oil demand growth

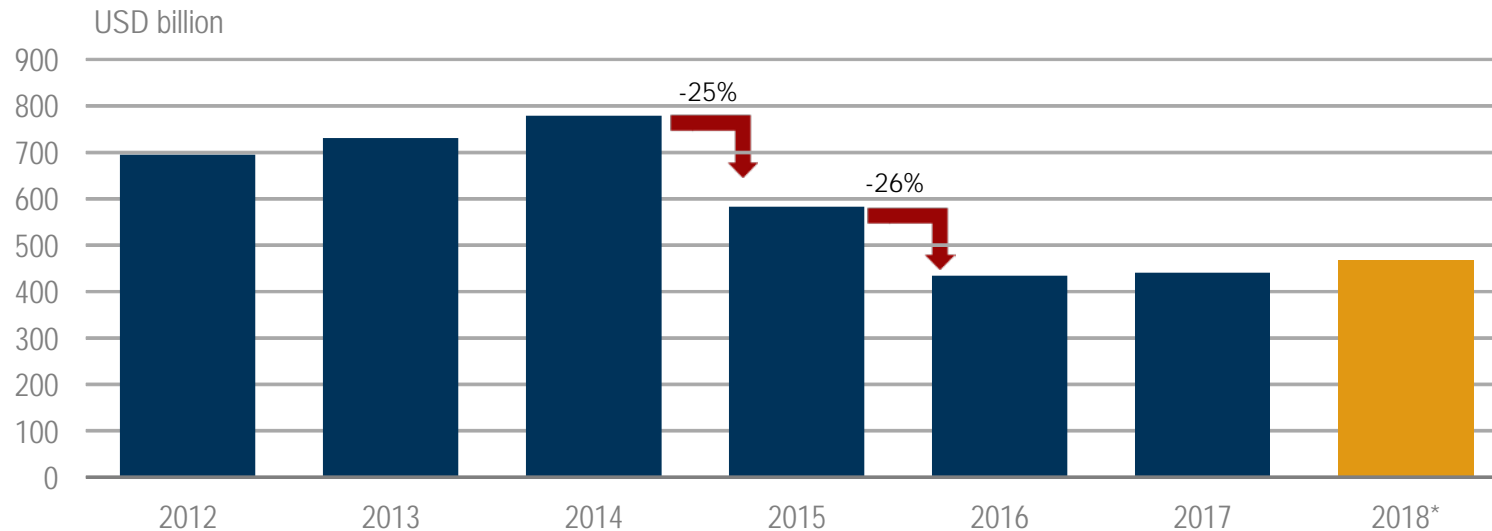
Oil industry needs to replace one North Sea each year



Ageing oil fields lose more than 3 mb/d per year despite slowing decline rates.

Only limited uptick in global upstream spending

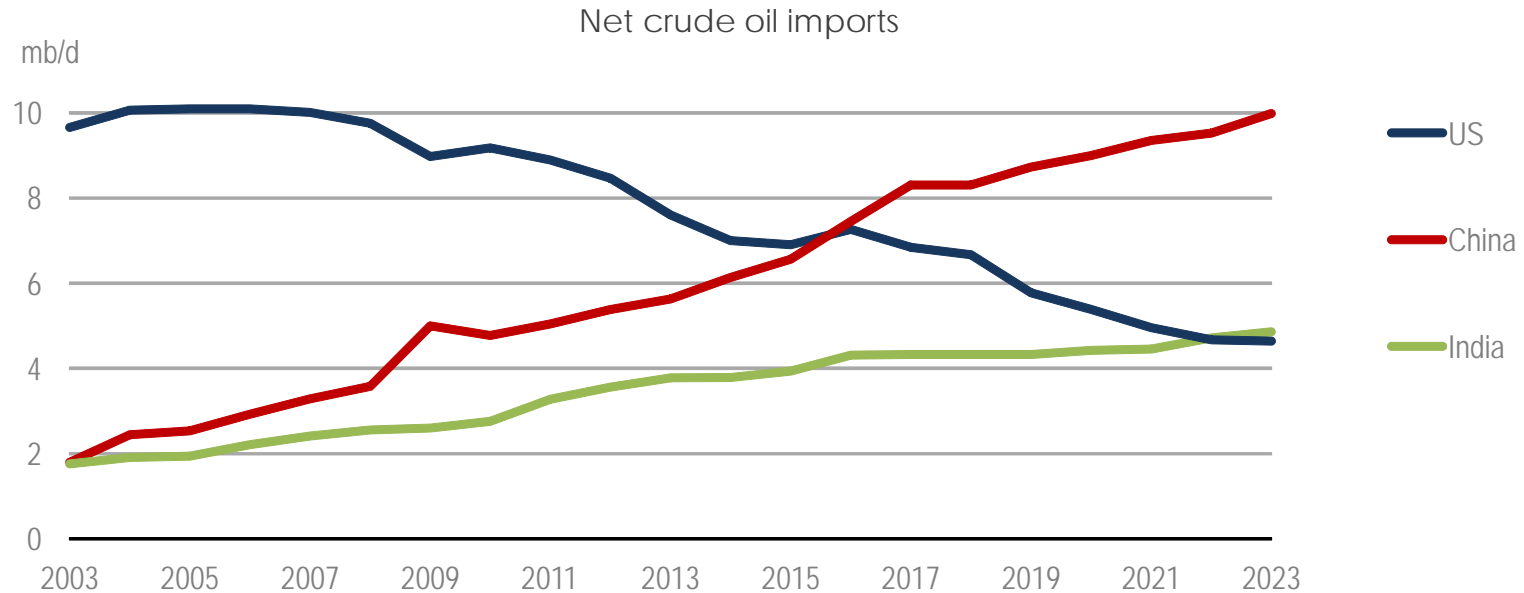
Global oil and gas upstream capital spending 2012-2018



*Preliminary based on selection of investment updates

**Producers spend more on short cycle supply, especially US LTO.
Investments in conventional fields remain depressed, but some signs of renewed interest in offshore.**

China net crude oil imports double the US in 2023

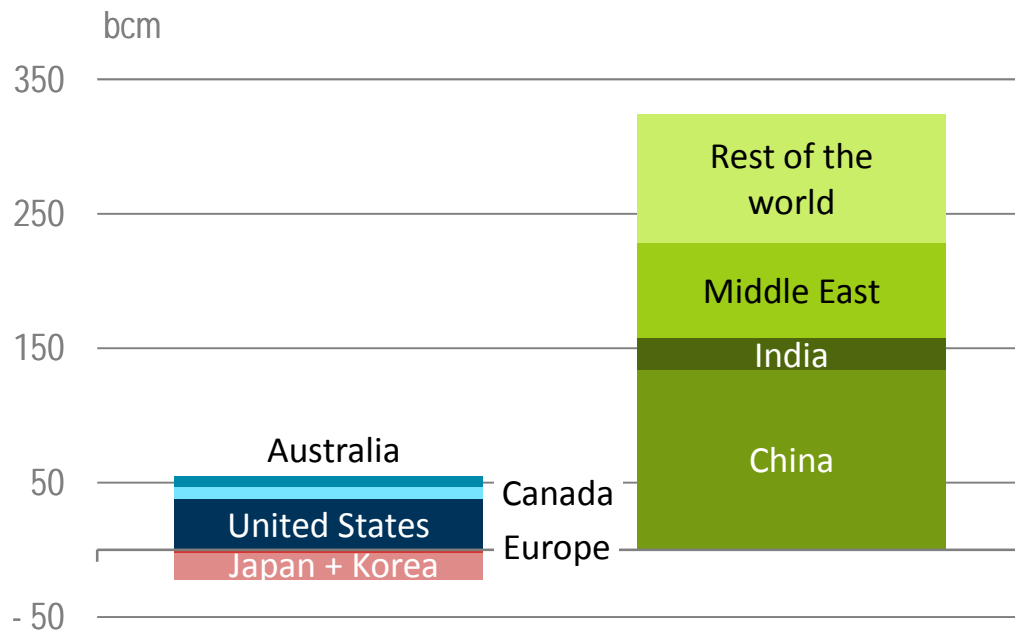


Indian imports, too, surpass the US in 2023 as shale growth reduces US import dependence.

Gas Market (Mid-term to 2022)

Gas demand growth focuses in developing countries

Global gas demand growth is around 360 bcm in 2016-22

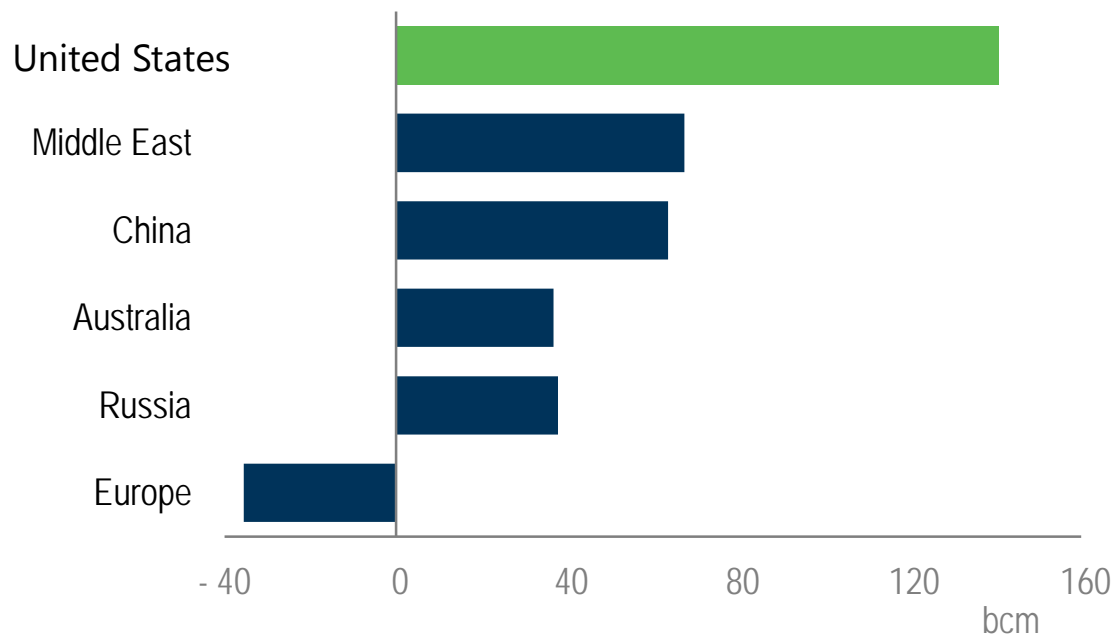


Developing countries account for around 90% of the incremental gas demand
The United States accounts for most of the growth in the developed economies

The United States accounts for 40% of global gas production growth



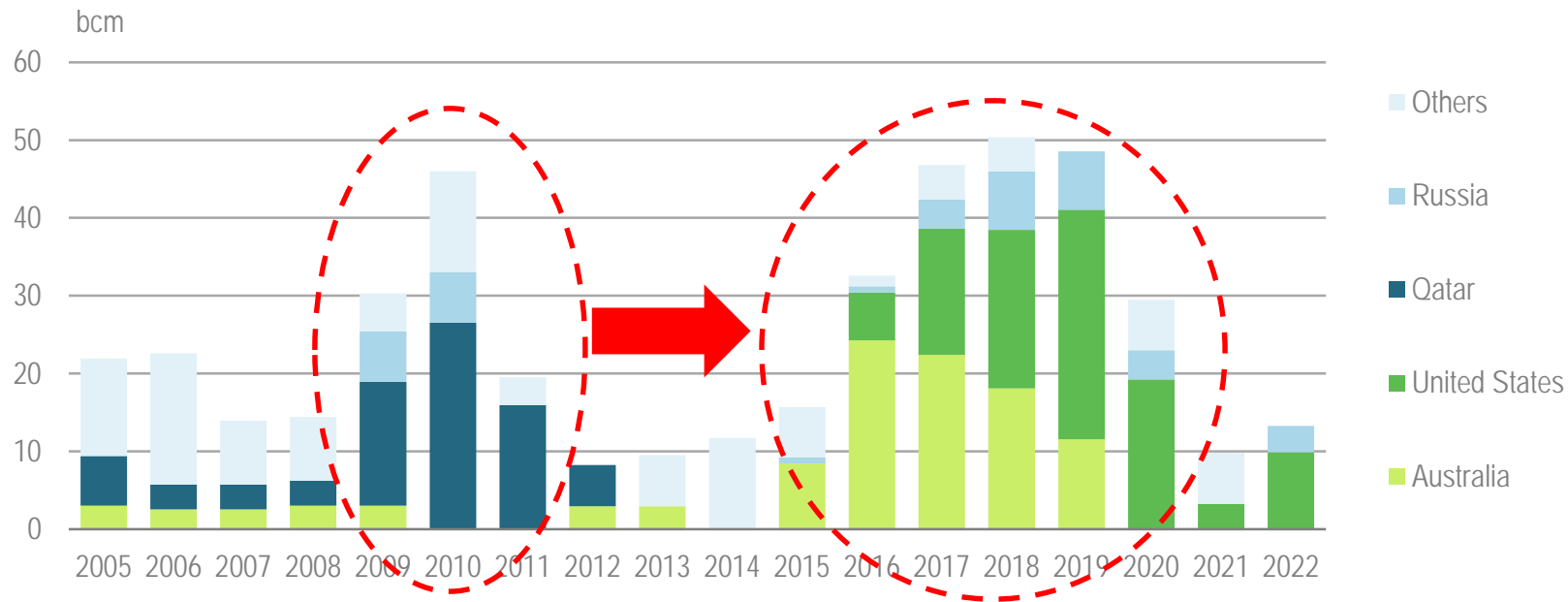
Global gas production growth, 2016-22



The Middle East will continue its production growth
China will also show robust growth

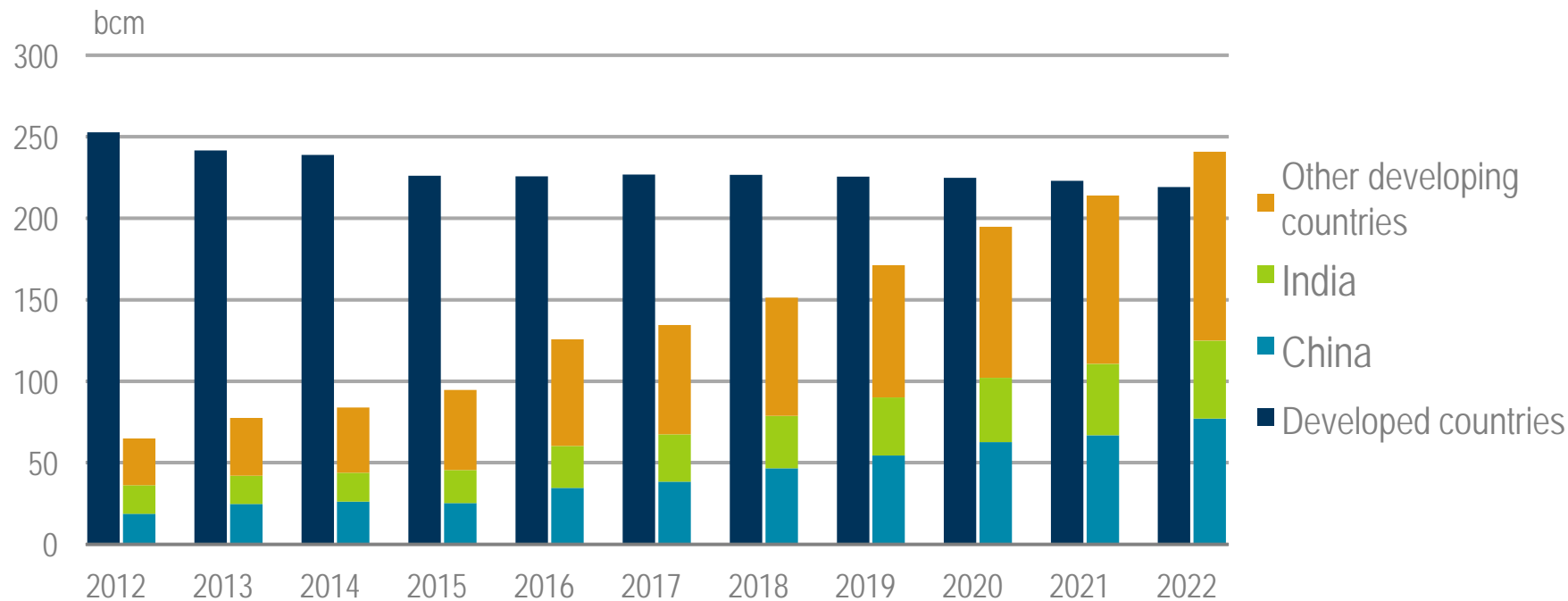
Second wave of additional LNG supply is already coming online

Incremental LNG capacity , 2005 - 2022 (bcm)



**Today, around 140 bcm of export capacity are under construction
Australia and the United States account for 75% of them**

LNG import volumes , 2012 - 2022 (bcm)



China, India and other developing countries will import more than 50% of all LNG by 2022

- **Use of alternative supply routes**
 - *Diversity of supply routes & sources is key*
 - *Pipeline (inc reverse capacity), LNG (spot cargoes)*
- **Stocks (storage)**
 - *Industry and/or public stocks*
 - *Underground and/or LNG storage*
- **Spare capacity**
 - *Domestic production, gas in pipelines*
- **Demand-side measures**
 - *Interruptible contracts (pre-negotiated)*
 - *Public appeal (Government campaigns)*
 - *Fuel-switching*

**Gas Security is different from oil security;
Stock are not common and more expensive**

Oil Security

Economic costs of disruptions

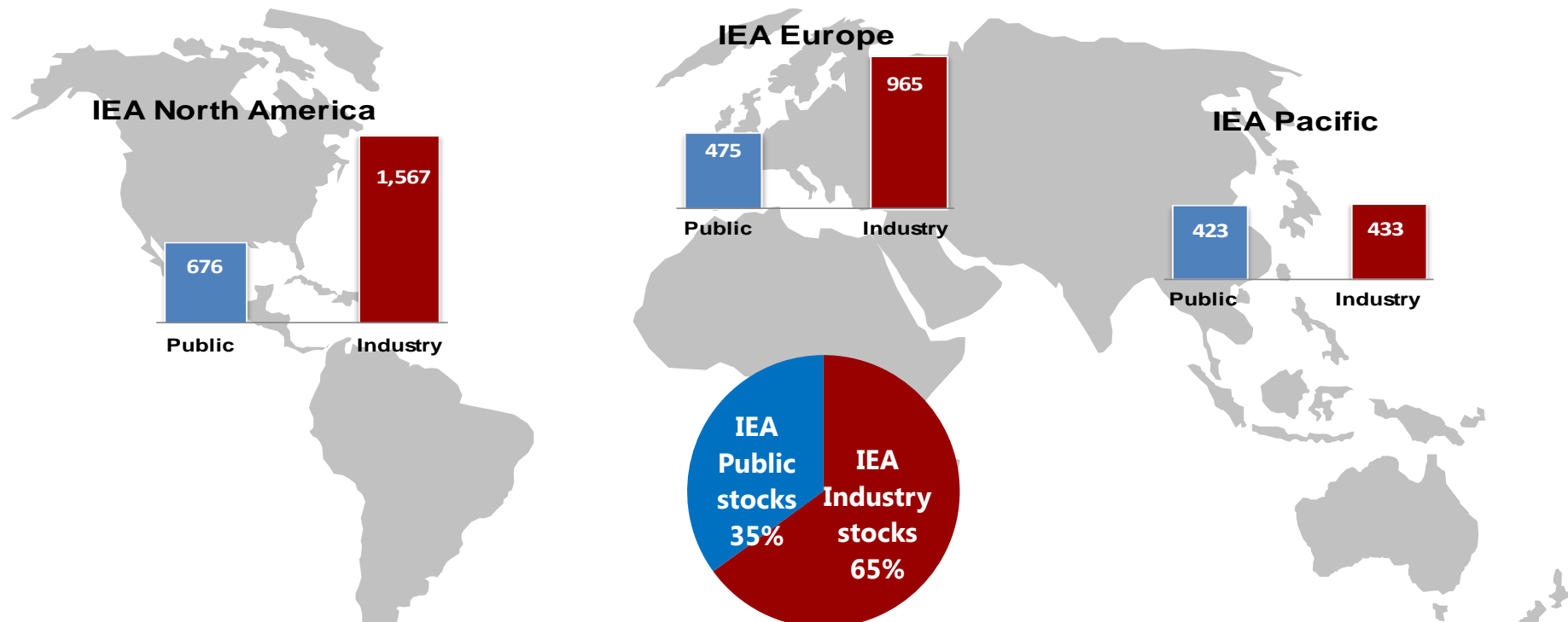
- Higher oil import costs, GDP losses

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Total IEA stocks



Total IEA: 4.5 billion barrels

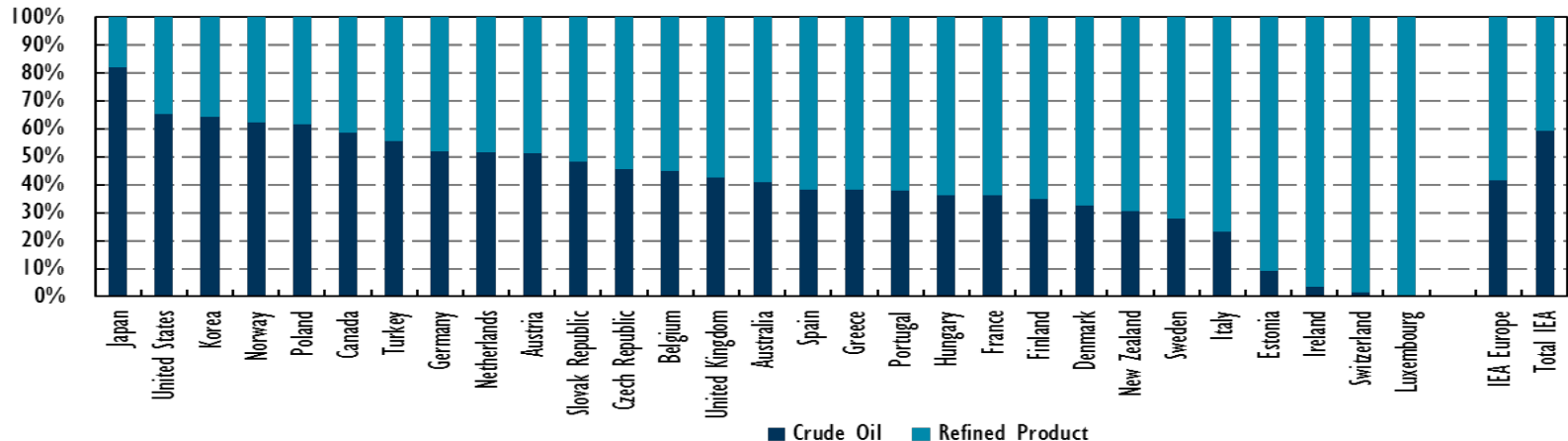
Crude oil vs product

- **IEA obligation does not specify**

- EU leg. requires 1/3 of stocks held as products

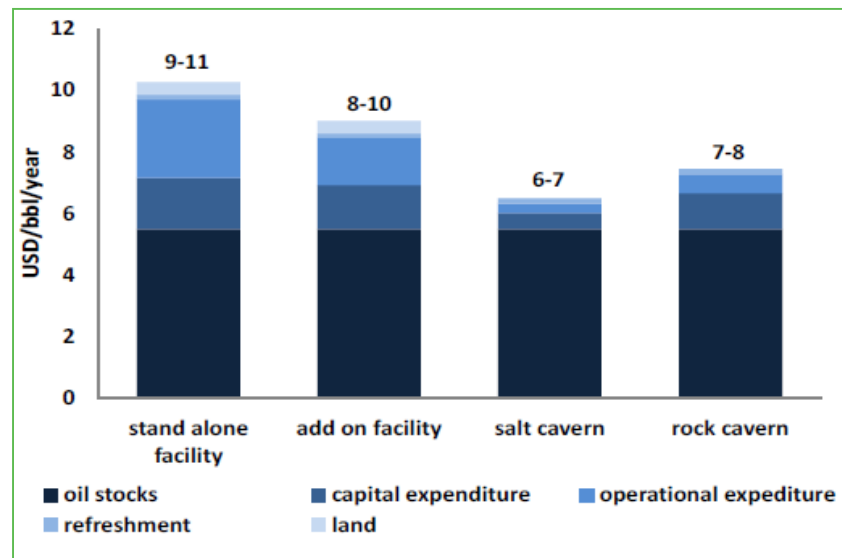
- **Choice depends on several factors:**

- Price of storing products can be significantly higher
- Countries with large refining industry will store more crude for flexibility



Stockholding Cost Analysis

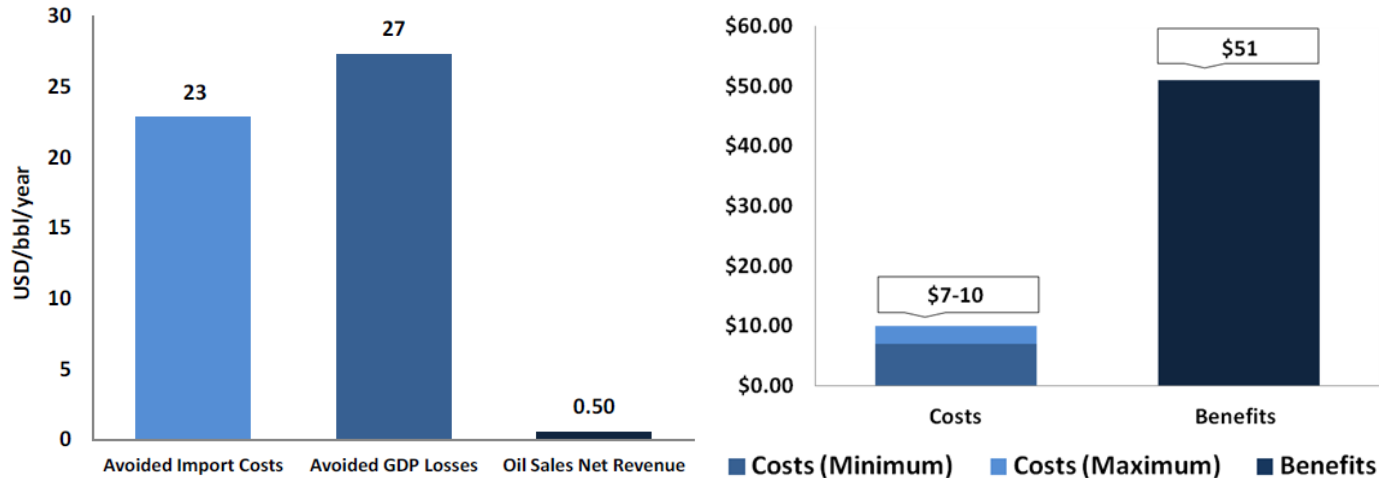
- Set-up costs:
 - Land costs: buying or leasing terrain
 - Construction of facility
 - **Purchase of stocks**
- Operating costs:
 - Maintenance
 - Staff
 - Utilities
 - Insurance etc.
- Refreshment costs: to ensure product quality



(Source: IEA analysis of costs and benefits of stockholding, 2013; update in 2018 expected)

Economic benefits of stocks

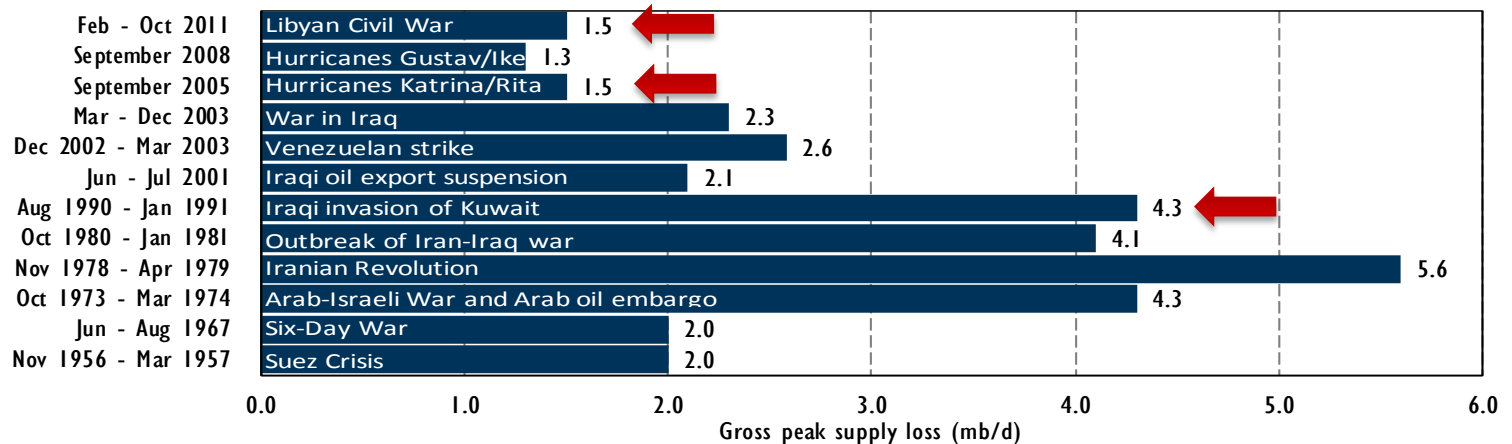
Indicative annual benefits and costs per barrel of stock



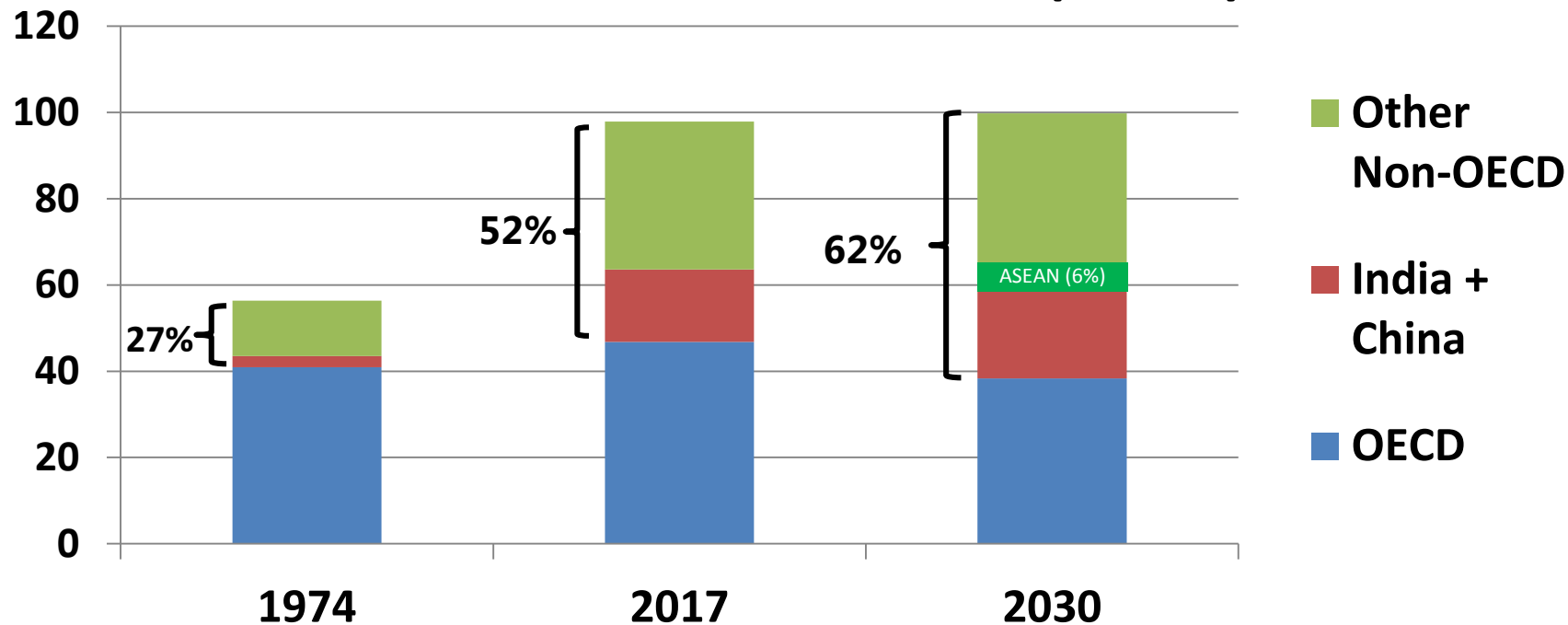
- Payoff from “insurance”
- Over 30 years period USD 3.5 trillion avoided costs

Major Oil Supply Disruptions & IEA Stock Release

- Three coordinated stock releases since IEA established: 1991, 2005, & 2011
 - Not “trigger happy”
- Each disruption must be assessed individually
 - Market context critical
 - Severity of a disruption not only measured in oil lost

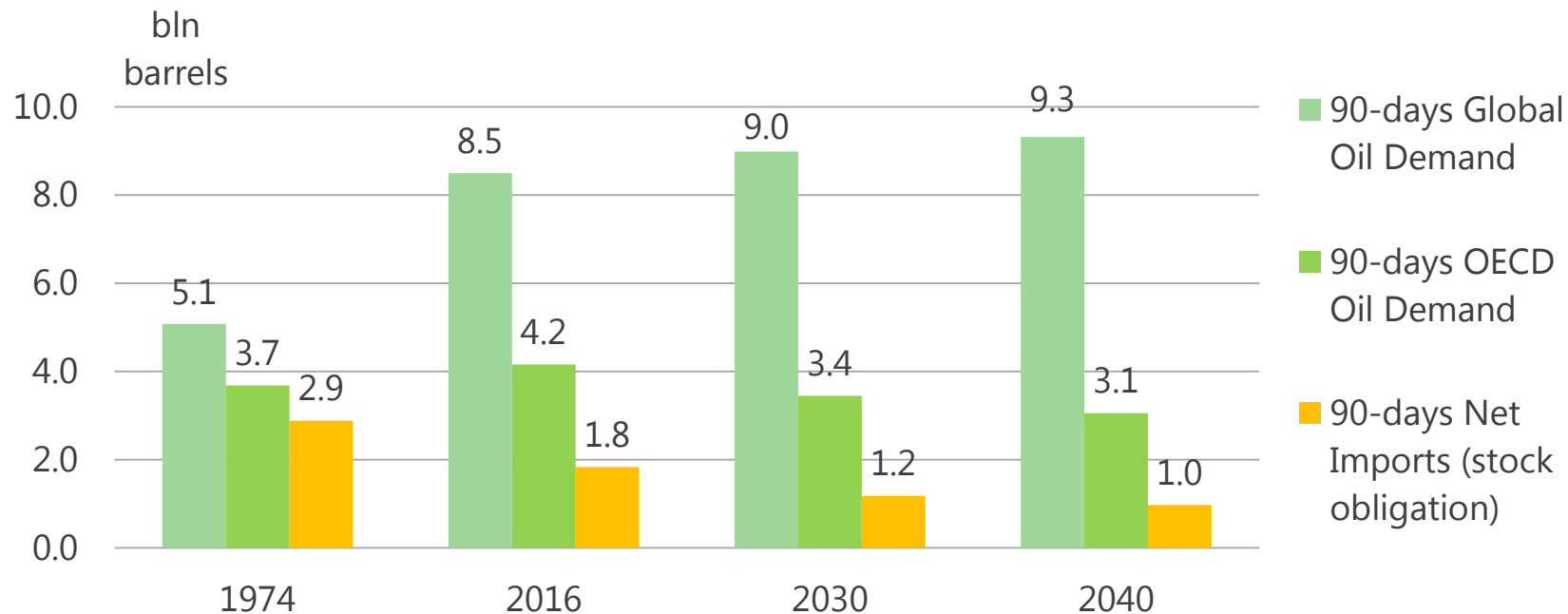


World Oil Demand 1974-2030 (mb/d)



* Based on World Energy Outlook 2016 "New Policies" Scenario

Why is engagement with partner countries desirable?



In the future, IEA stocks alone can no longer compensate for global supply shortfalls

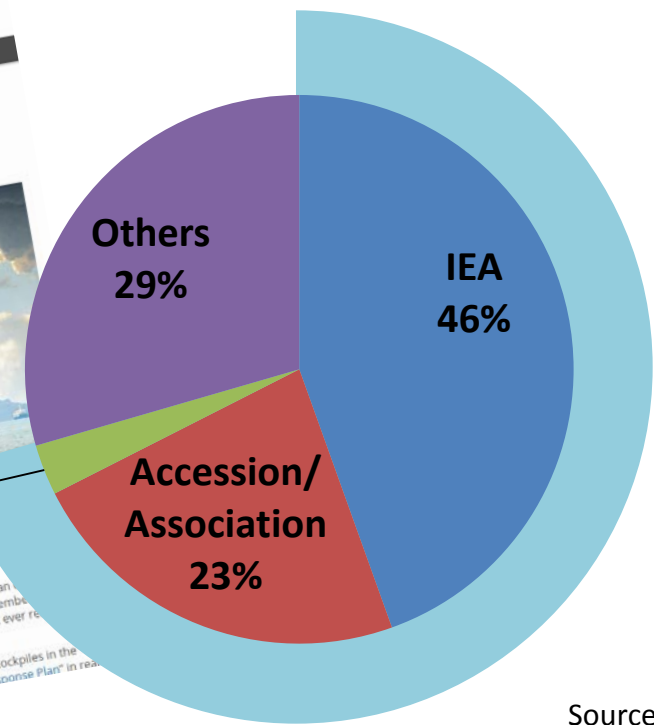
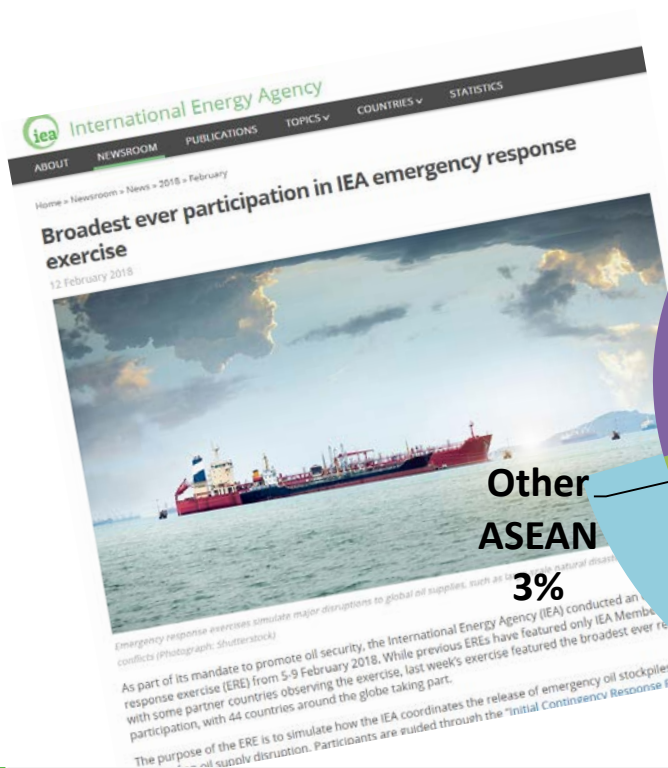
Enhanced Cooperation with Association Countries

- Association activated with China, Indonesia, & Thailand in 2015
- Since then, Morocco, Singapore, India and Brazil joined the Association



➤ Enhanced collaboration in Energy Security is a win-win solution

- Shared priority to take common effective measures for oil supply emergencies
 - By developing Emergency Response Systems
- Common intention to build & maintain emergency reserves
 - Collaborate with the IEA in their use in emergencies
- Work with the IEA to test the level of preparedness to meet supply disruptions
 - Ex) Emergency Response Exercises, Emergency Response Assessments, etc.



Together with Accession/Association countries, it represents almost **70% of global oil demand**, compared to only 46% if limited to IEA member countries.

Source: IEA Oil Information 2017

Participation of non-IEA member countries to Emergency Response Exercise marked concrete synergies between IE's 'open-doors' policy and our core mandate: enhancing energy security.

Information on IEA energy security

The image shows a screenshot of the IEA website's 'Energy Security' page. The page features a navigation menu with 'HOME', 'ABOUT US', 'TOPICS', 'COUNTRIES', 'NEWSROOM & EVENTS', 'PUBLICATIONS', and 'STATISTICS'. The main content area includes a 'TOPIC Energy security' section with sub-topics like 'What is energy security?', 'Energy security emergency response', and 'Member country emergency policies'. A featured article titled 'Beyond energy security: IEA study measures economic benefits of oil stocks' is highlighted with an image of oil storage tanks. To the right, there is a 'Publications' section and a 'Closing Oil Stock Levels in Detail' table for July 2014.

Overlaid on the screenshot is the cover of the book 'ENERGY SUPPLY SECURITY Emergency Response of IEA Countries, 2014'. The cover features a world map and an image of an oil tanker.

Country	Oil stocks (million barrels)	Oil stocks (million barrels)	Oil stocks (million barrels)	Oil stocks (million barrels)	Oil stocks (million barrels)
Canada	245	137	0	0	0
United States	245	130	106	0	0
Total IEA North America	490	267	106	0	0
Australia	53	53	0	0	0
Japan	162	71	91	0	0
Korea	228	113	115	0	0
New Zealand	103	89	14	0	14
Total IEA Asia Pacific	556	356	220	0	28
Austria	107	27	80	13	0
Belgium	166	68	83	16	0

<http://www.iea.org/topics/energysecurity/>

Greece	113	113	0	0	0
Hungary	175	65	110	0	0
Ireland	108	19	90	0	36
Italy	124	124	0	19	0
Luxembourg	90	90	0	74	0



www.iea.org

