

Global Context

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Global Context

Industry structure

- what is E&P, who is involved

Global energy trends

- demand and supply by energy source
- oil and gas resources and production
- what is happening today

Key challenges

- renewing exploration in the UK North Sea
- making unconventional work in the UK
- resetting project delivery
- improving UK operational performance

What is “Exploration and Production” ?

Upstream – “E&P”

- exploration
- development
- production
- transport to sales point



Downstream

- refining
- petrochemical plants
- liquid product distribution
- natural gas distribution

Key E&P players

Government

Finance

- HM Treasury 
- Dept of Treasury 

Leasing

- Oil & Gas Authority 
- BOEM 

Regulation (safety & environment)

- Health & Safety Exec've 
- BEIS 
- BSEE 

Operators

Integrated Majors

- ExxonMobil, Shell, Chevron, Total, BP

E&P Focused

- Occidental, Conoco-Phillips, EOG, Suncor, Canadian Natural, Anadarko

National Oil Companies (NOCs)

- Saudi Aramco, Gazprom, NIOC (Iran), Rosneft, PetroChina, Statoil

Services / Contractors

Engineering, Procurement & Construction (EPC)

- eg Bechtel, Hyundai, McDermott, Technip, Aker, Daelim, Petrofac

Drilling

- eg Noble, Transocean, Diamond, Nabors, H&P

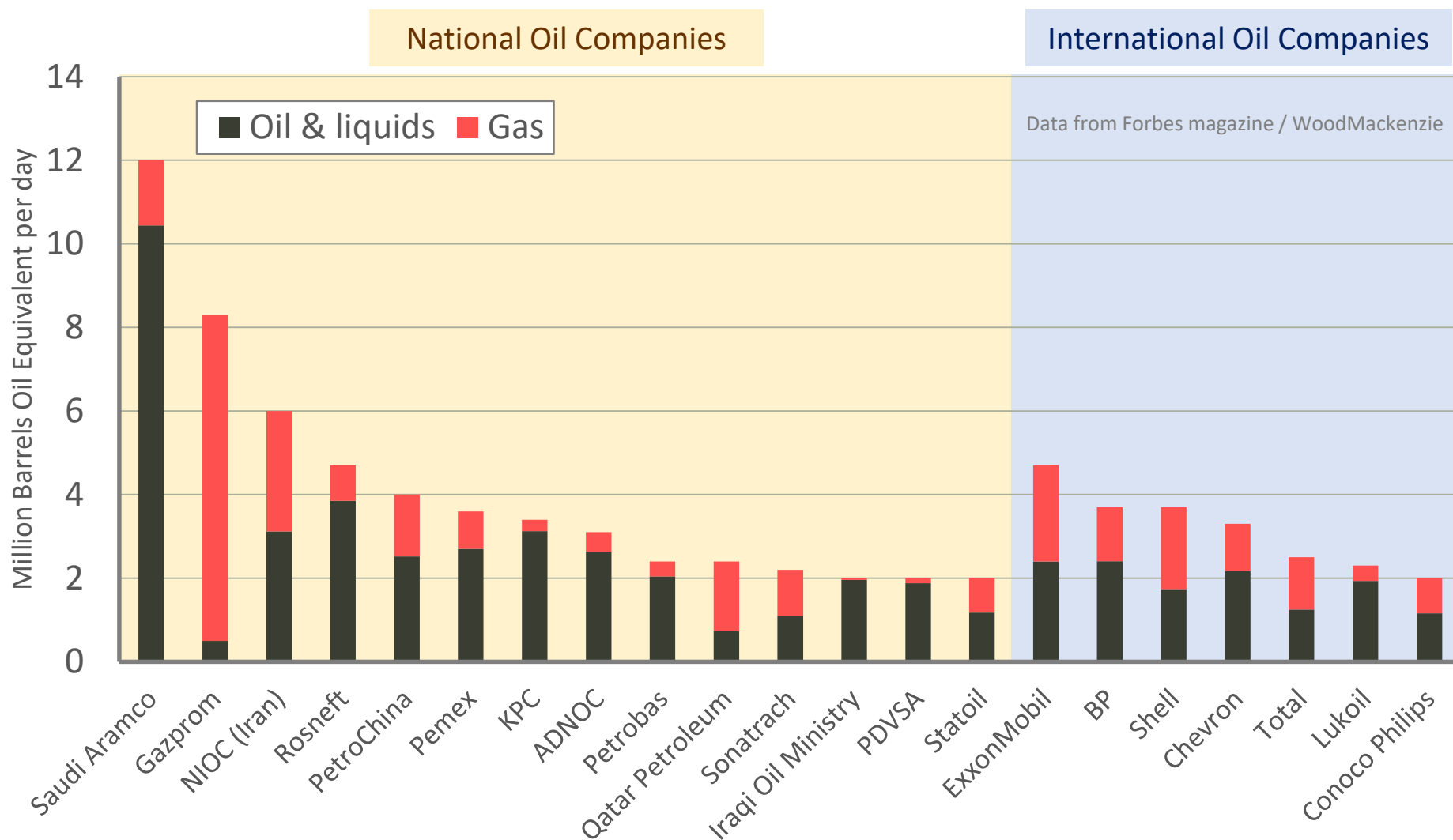
Oilfield Services

- eg Halliburton, Schlumberger, Oilfield Varco, Weatherford, GE Energy

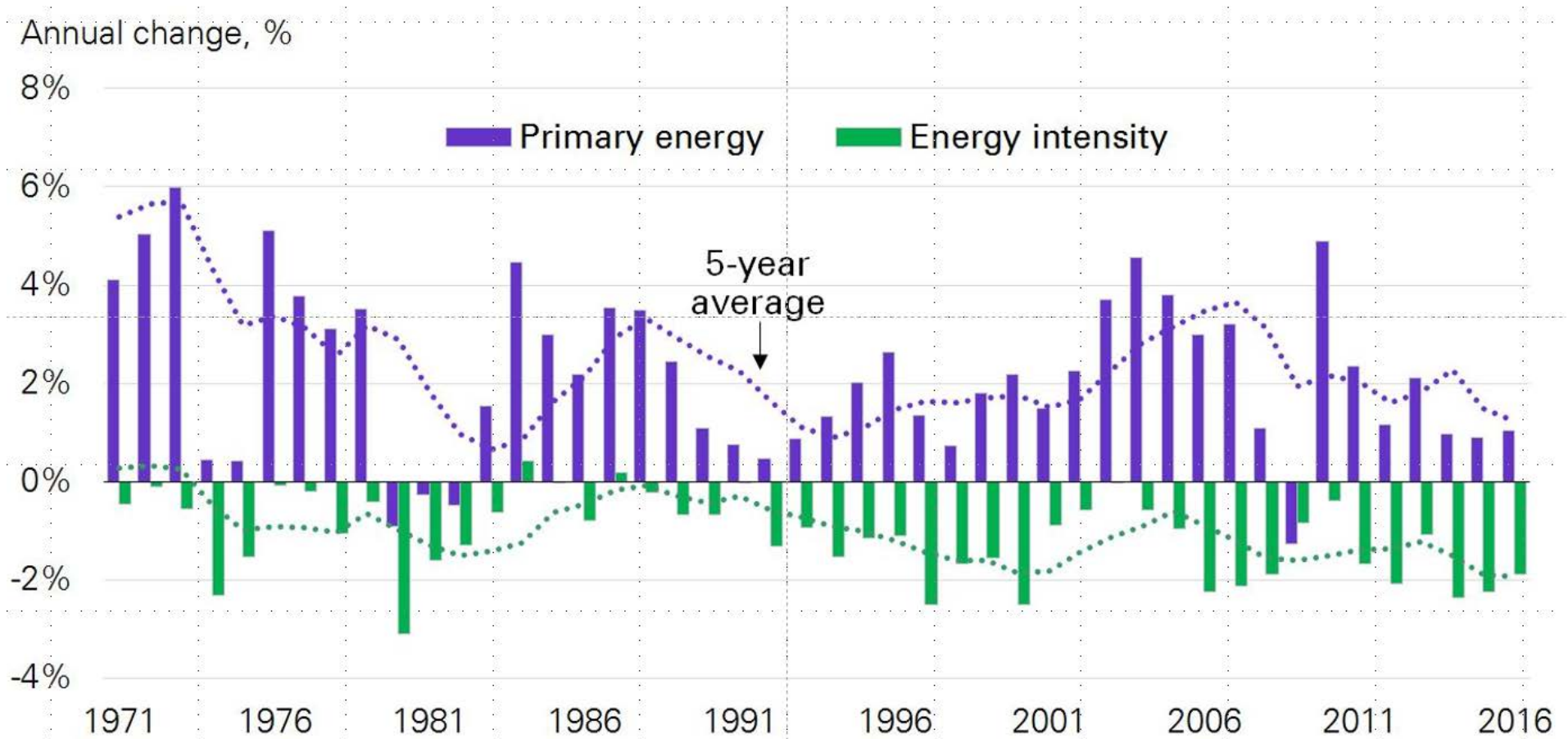
Seismic

- eg Western Geco, CGG, PGS

2014 production, largest 21 companies



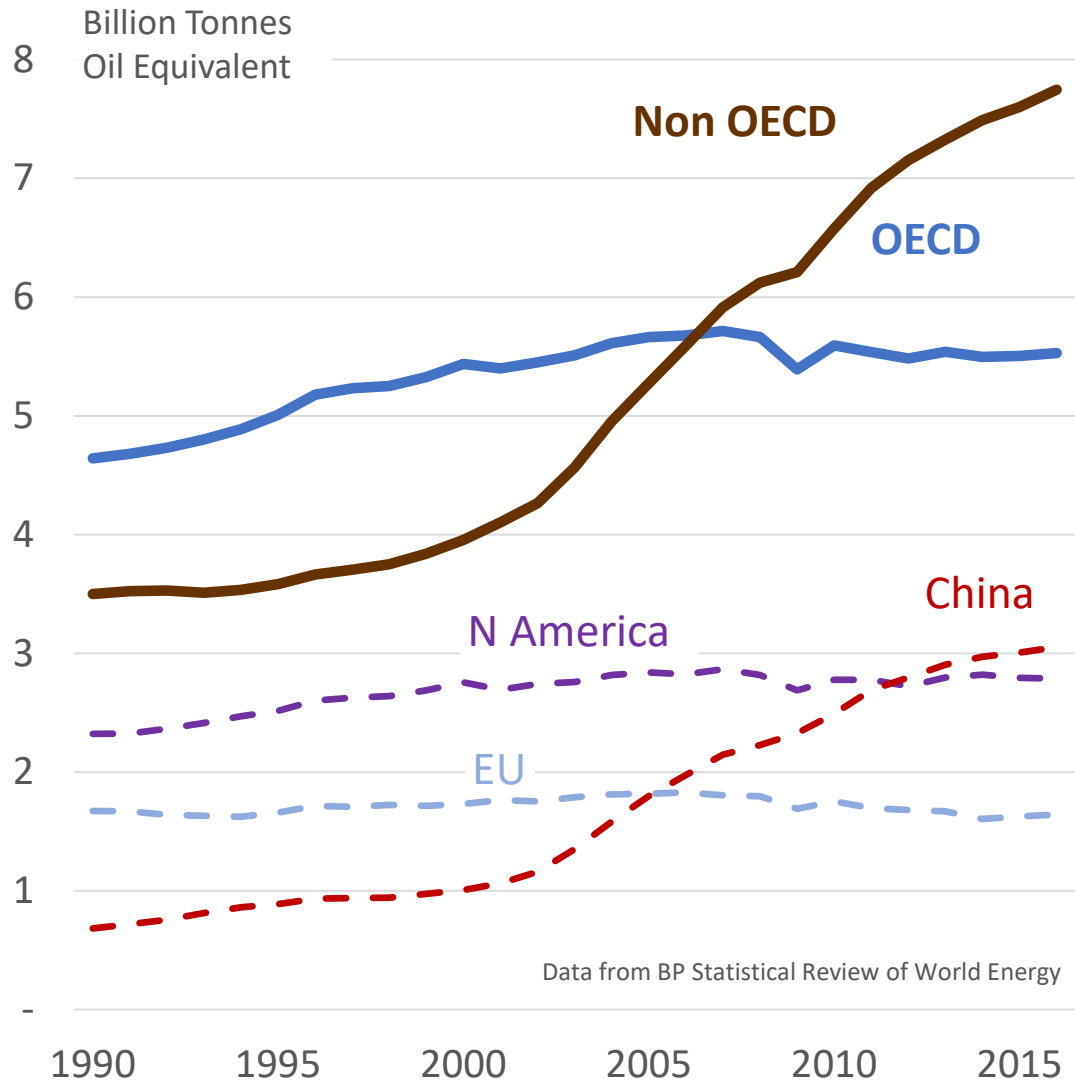
Energy Growth below GDP Growth



BP Statistical Review of World Energy

© BP p.l.c. 2017

Primary Energy Consumption



Non OECD Driving Energy Growth

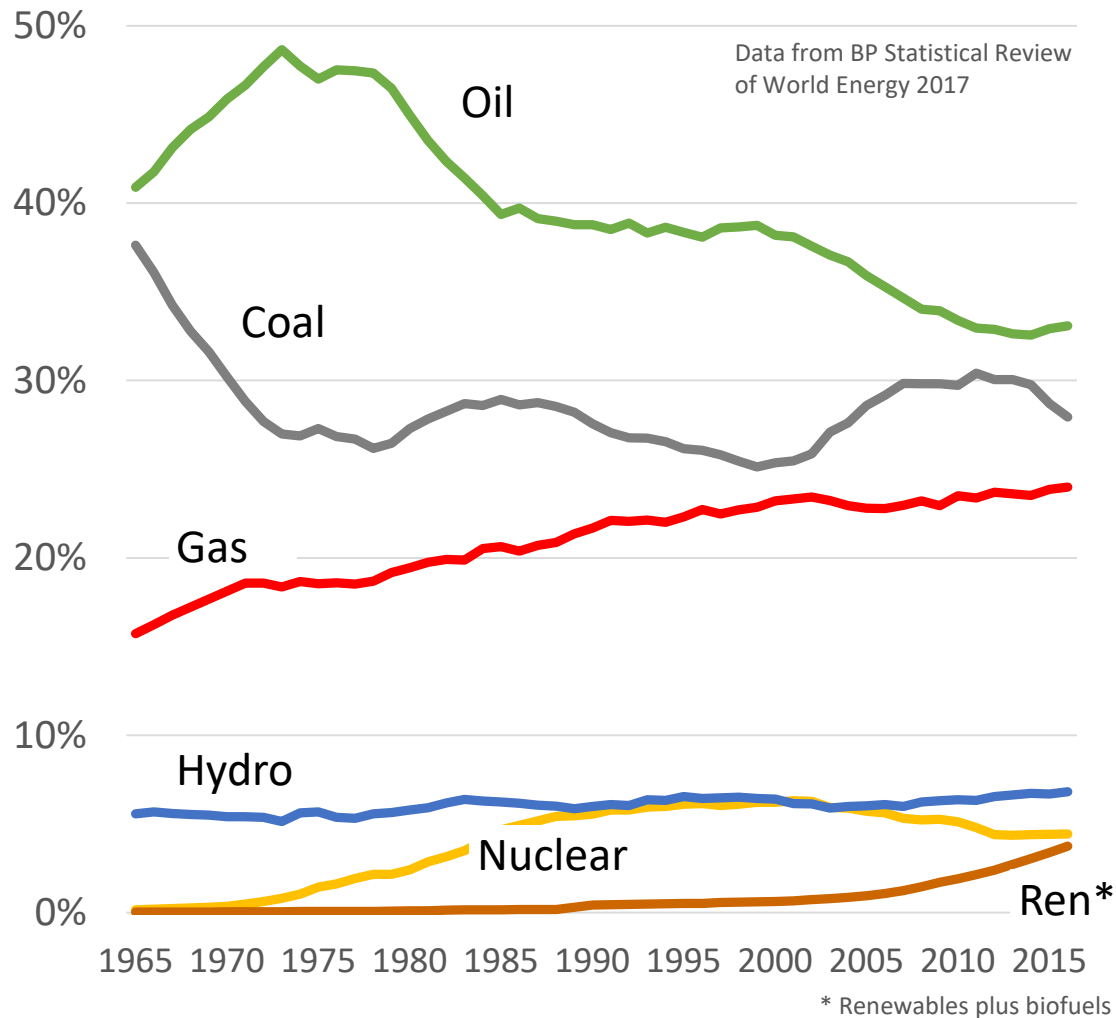
- China consumes 23% of global primary energy use
- India at 5% and growing at > 5% pa
- Pace of China energy growth has slowed with reduced GDP growth and falling energy intensity

OECD Energy Demand Flat

- Slow GDP growth matched by pace of falling energy intensity
- N America consumption 21% of global primary energy use, EU 12%

Energy Sources

Shares of global primary energy



2016 Points

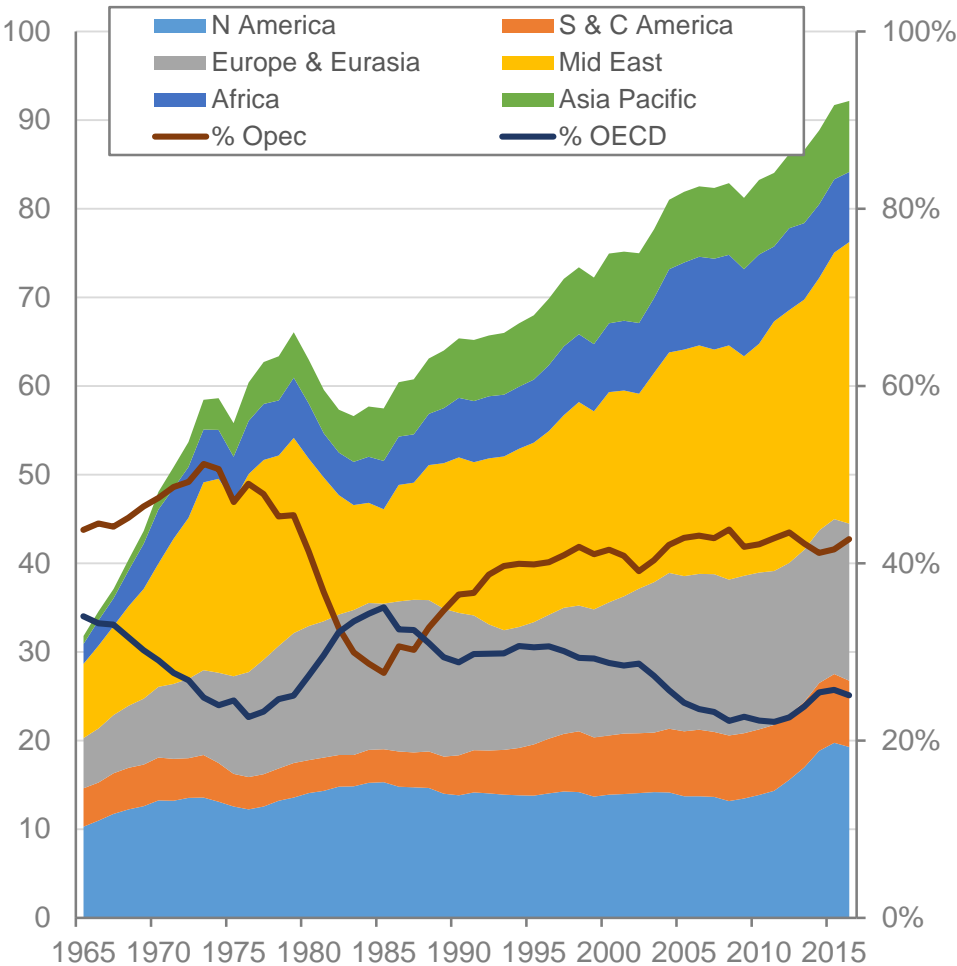
- Oil and grew by 1.8% boosted by GDP growth and price falls
- Coal fell 1.4%
- Non fossil fuels hit high of 15% share

Macro picture

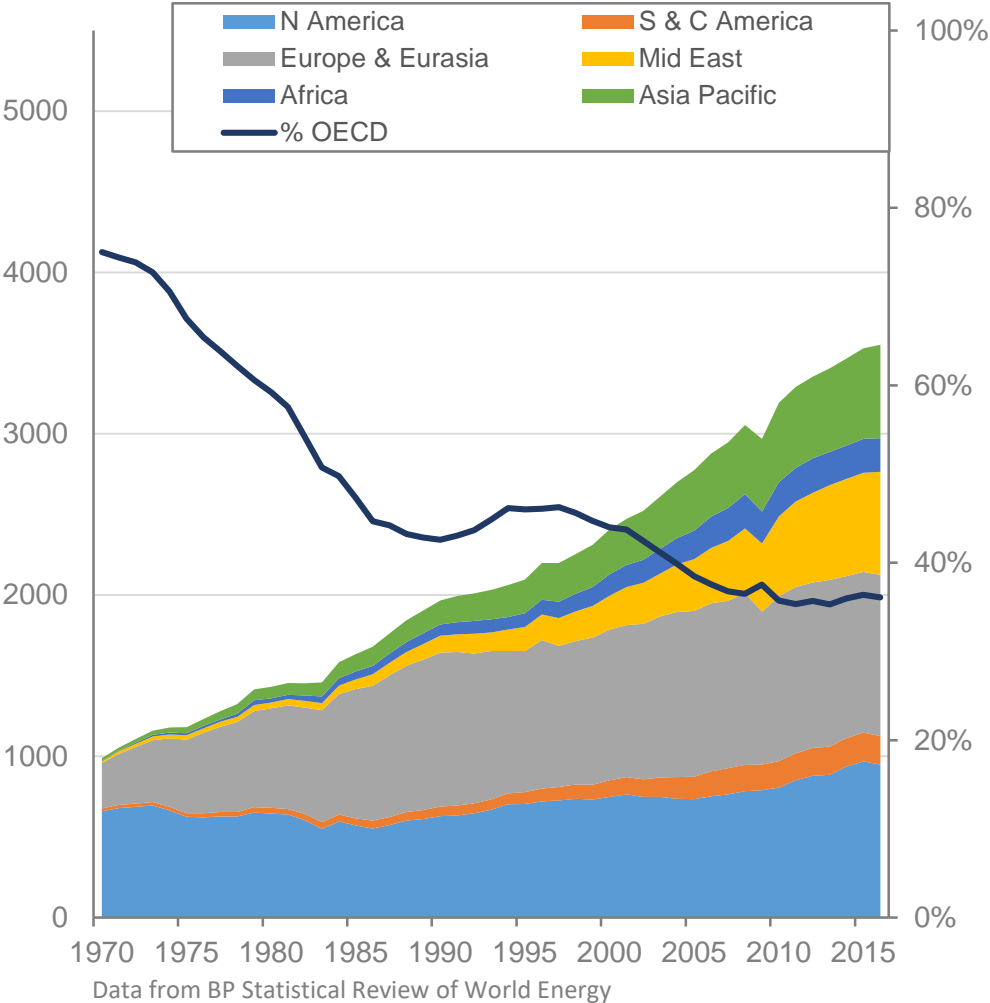
- Renewables are fastest growing source (16% pa average growth since 2006), but are only 3.8% of total
- Strongest growth in solar, 50% pa growth since 2006 (has slowed, 30% pa 2015 – 16); wind next highest (22% pa since 2006)
- Overall demand for oil and gas set to grow
- Reducing emissions requires coal to gas switch in addition to non fossil growth

Oil and Gas Production

Million bpd Oil Production

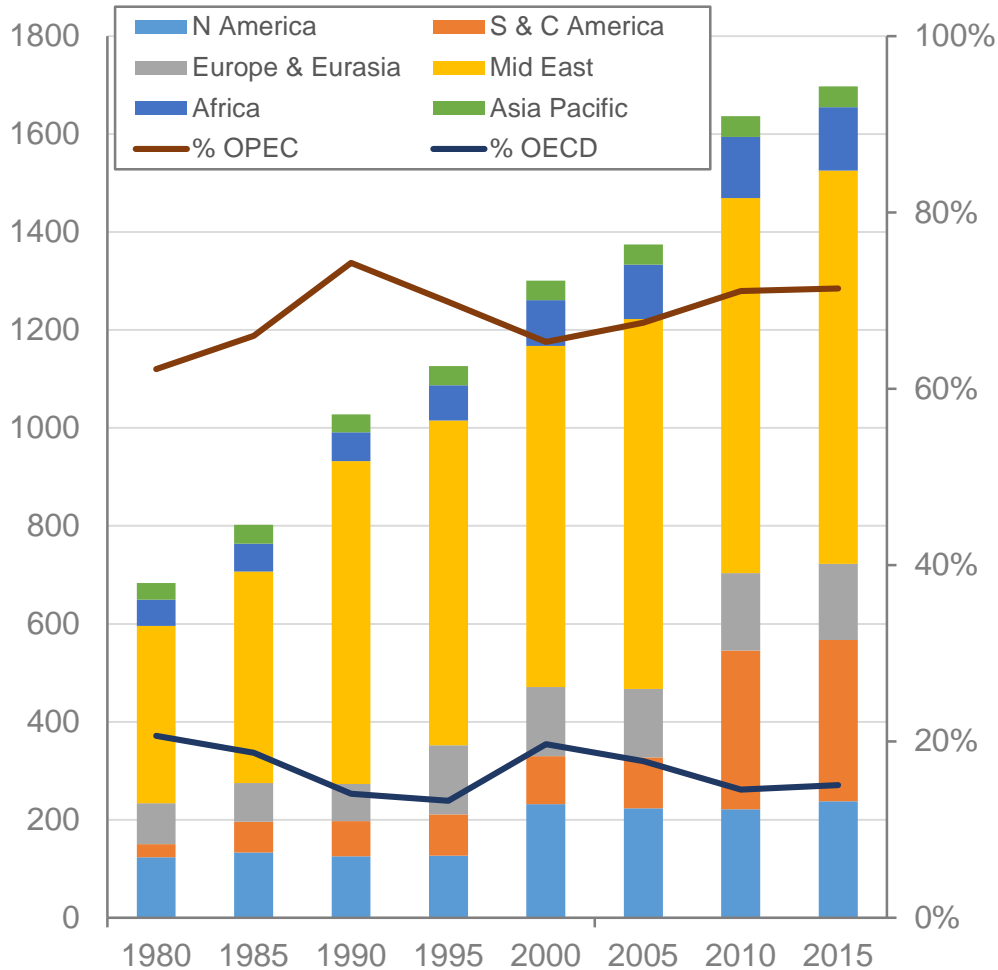


Billion Cubic Meters pa Gas Production (scaled to oil graph by equivalent energy)



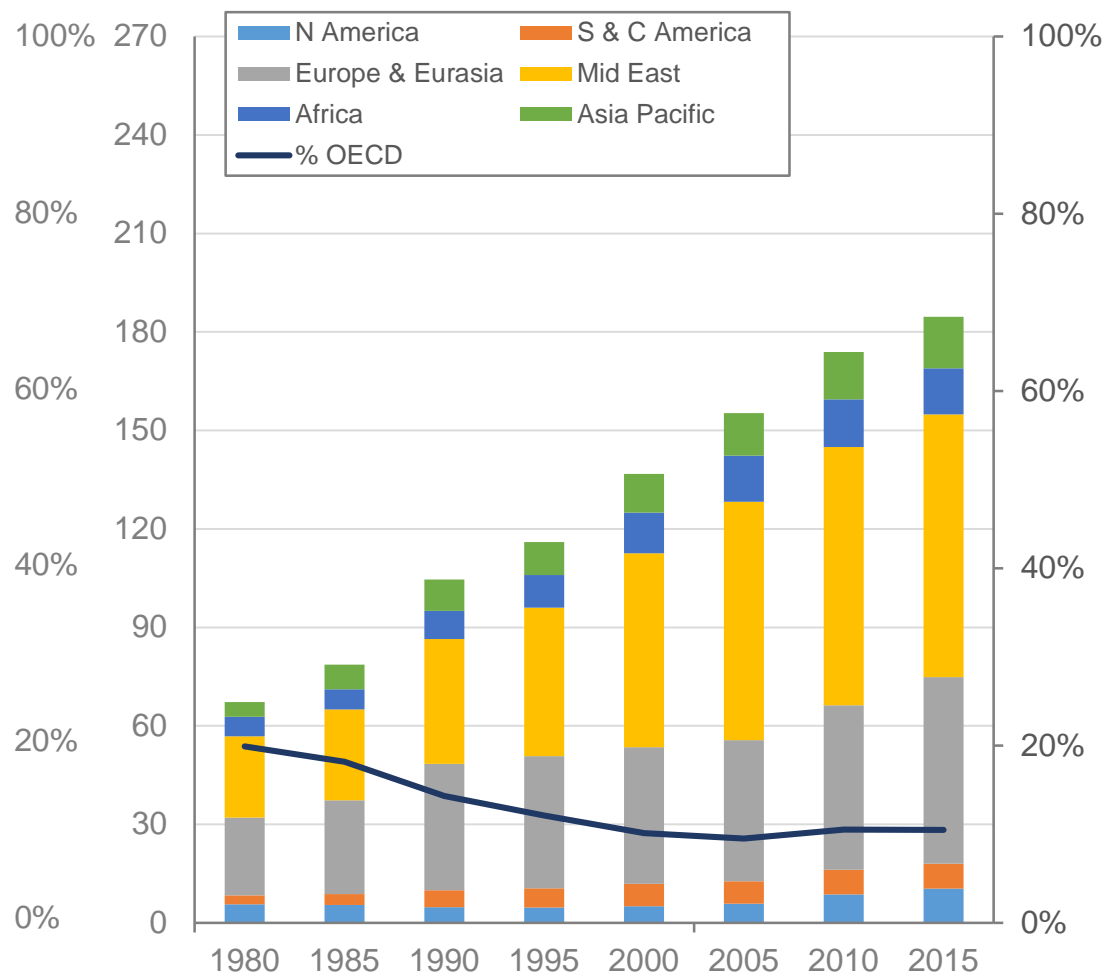
Oil and Gas Proved Reserves

Thousand Million bbl



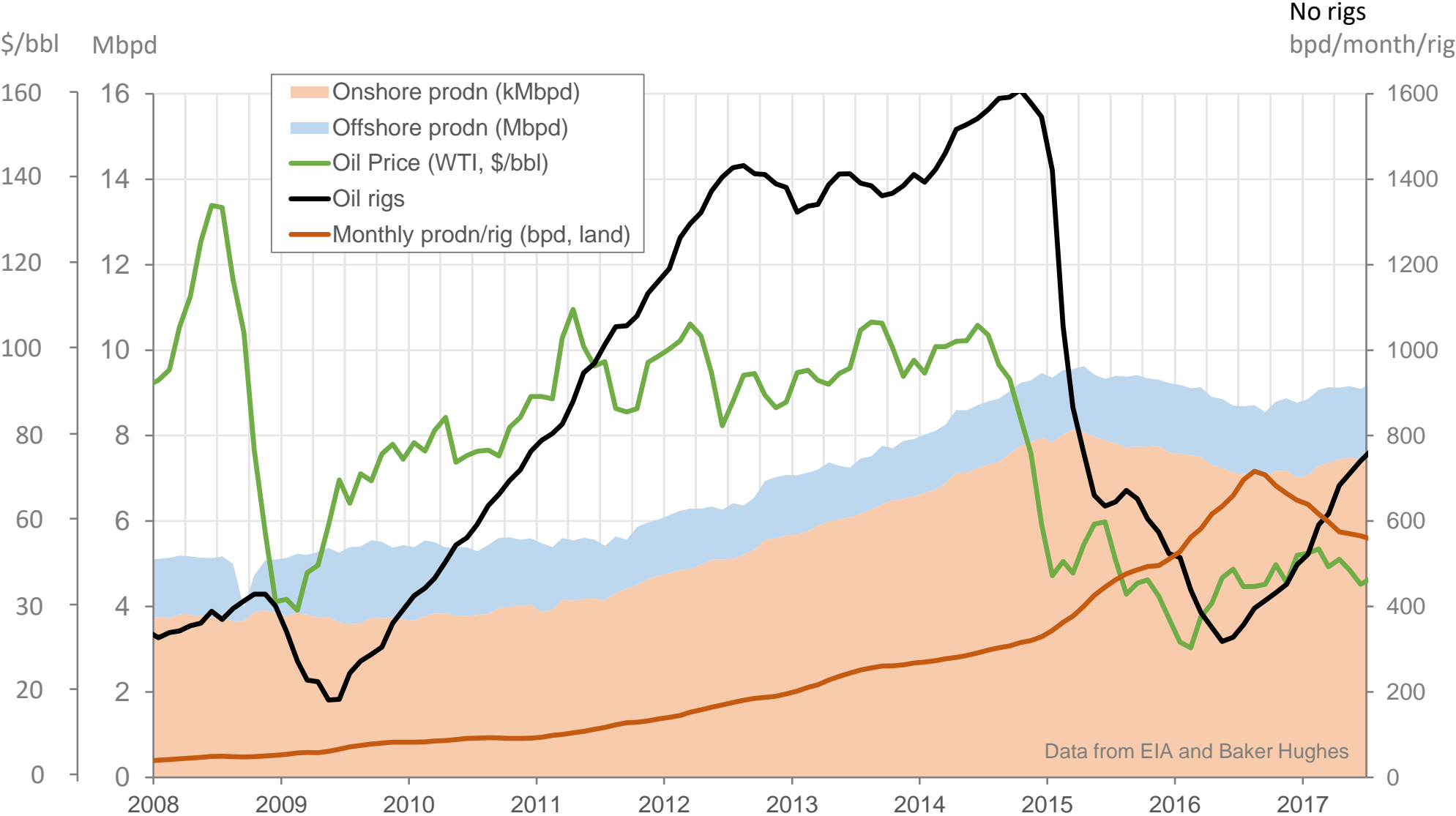
Trillion Cubic Meters

(scaled to oil graph by equivalent energy)



Data from BP Statistical Review of World Energy

US Oil Production 2005 – end 2Q 2017

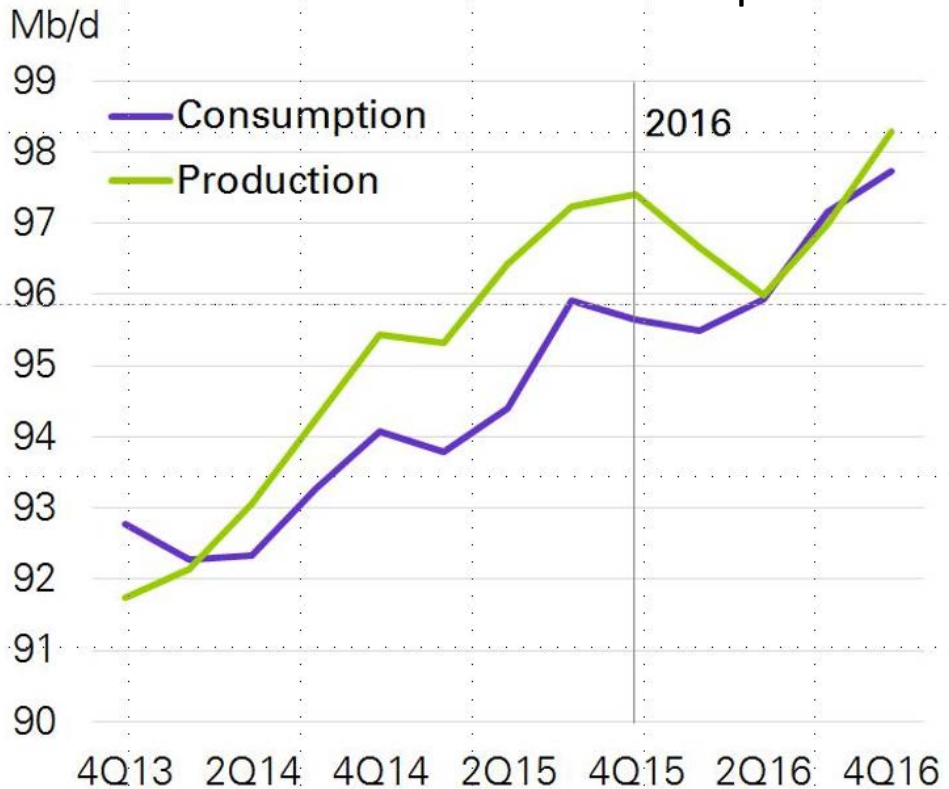


Oil Price Drivers

Consumption and production returning to balance

- OPEC constraints and reduced investment have brought consumption and production back into balance
- Stocks remain at historically high levels

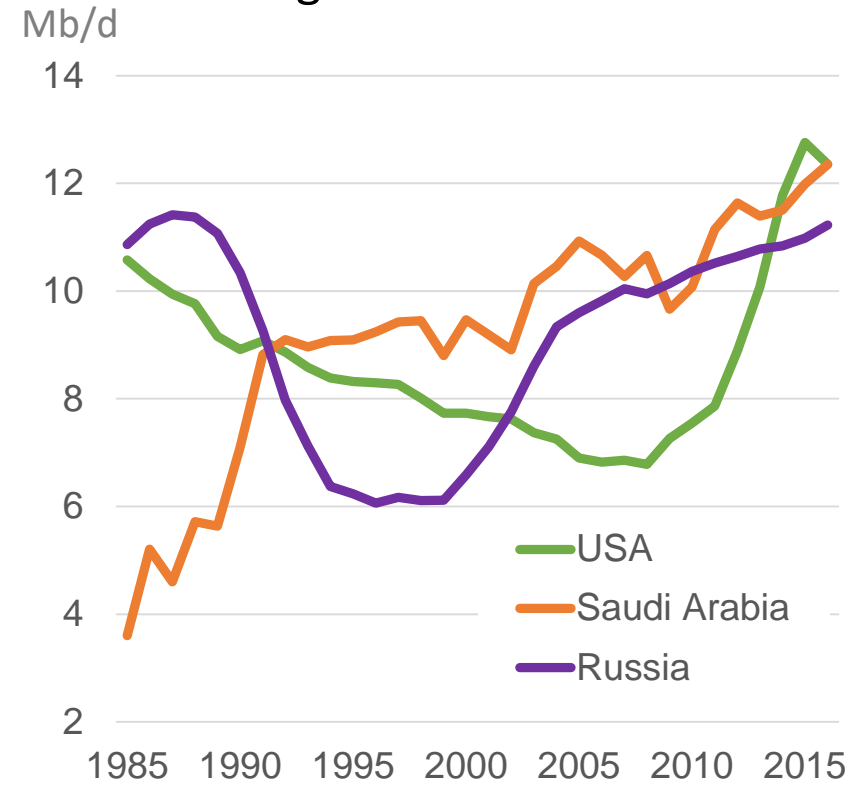
Oil Production and Consumption



BP Statistical Review of World Energy

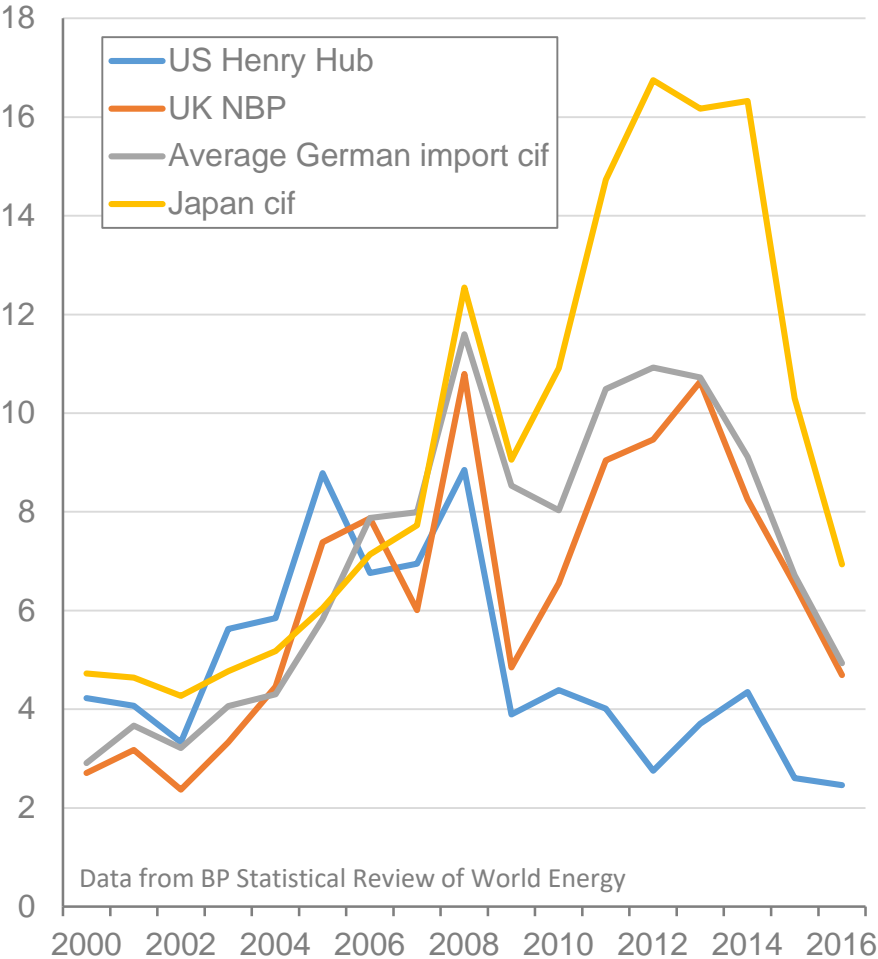
Source: includes data from the International Energy Agency © OECD/IEA 2017

Largest Producers

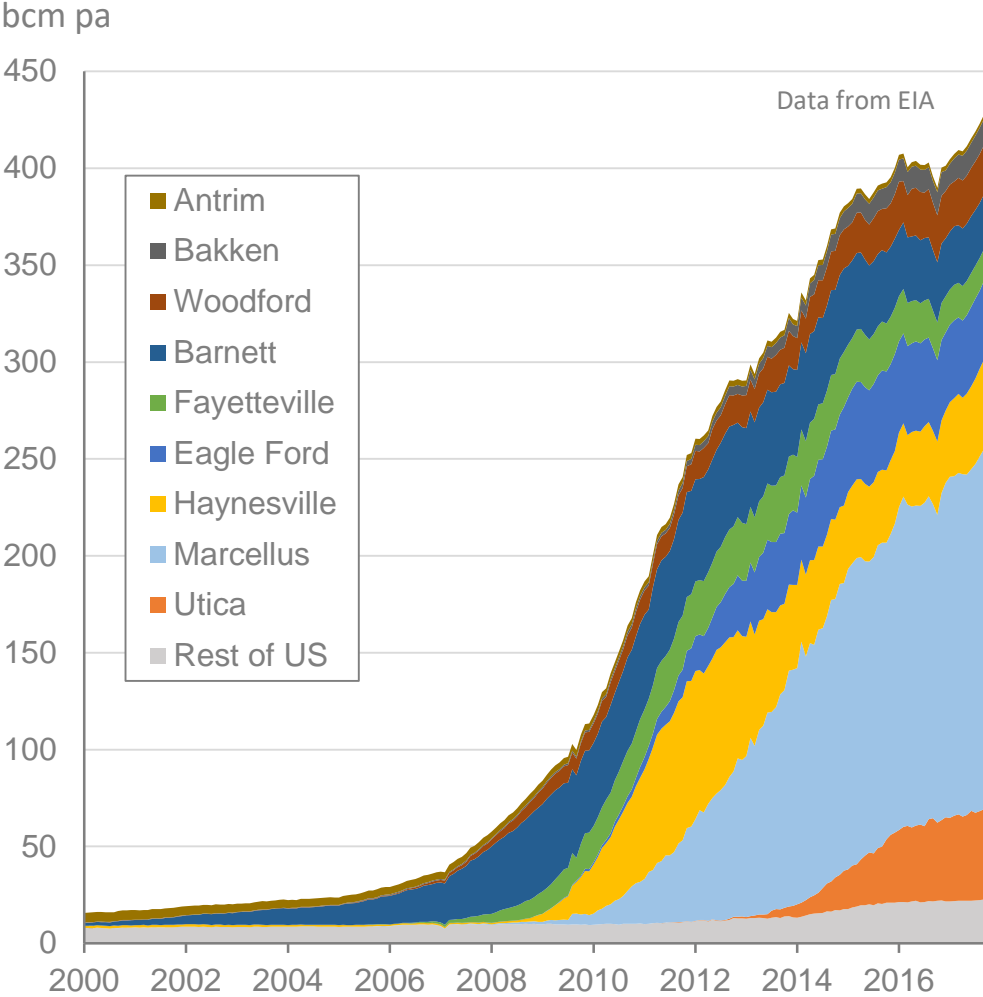


Gas Market – recent trends

Gas Prices (\$/million btu)



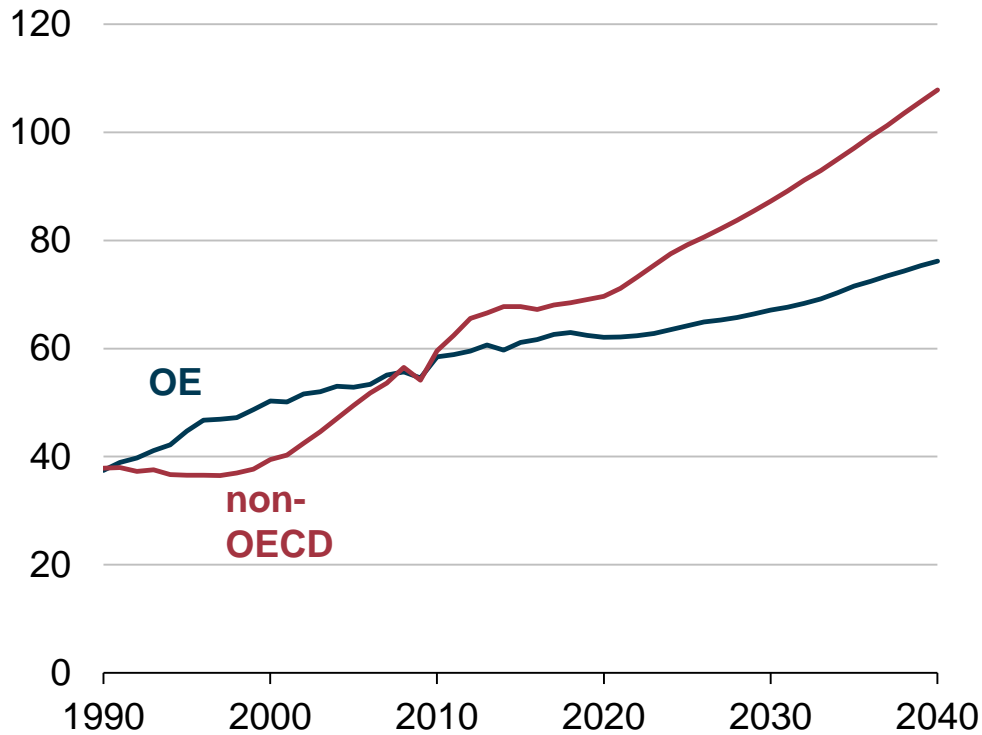
US Shale Production – 50% world gas growth



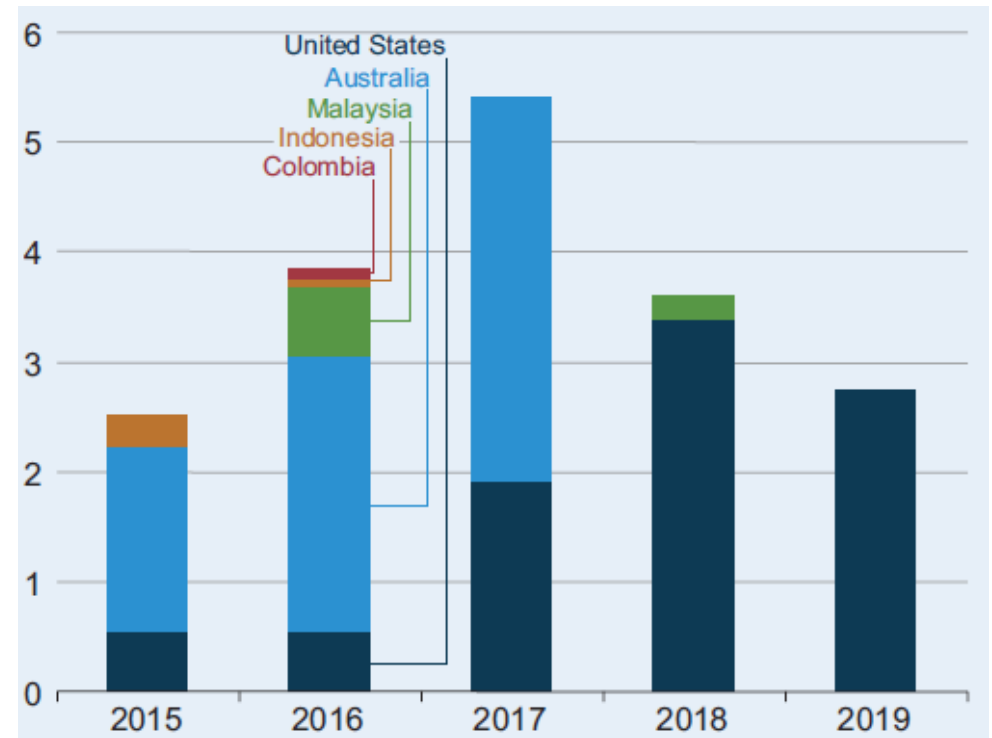
Global gas outlook

Gas consumption expected to grow strongly. Over next 5 years, spot price weakness likely as new LNG capacity comes on line and US starts exports

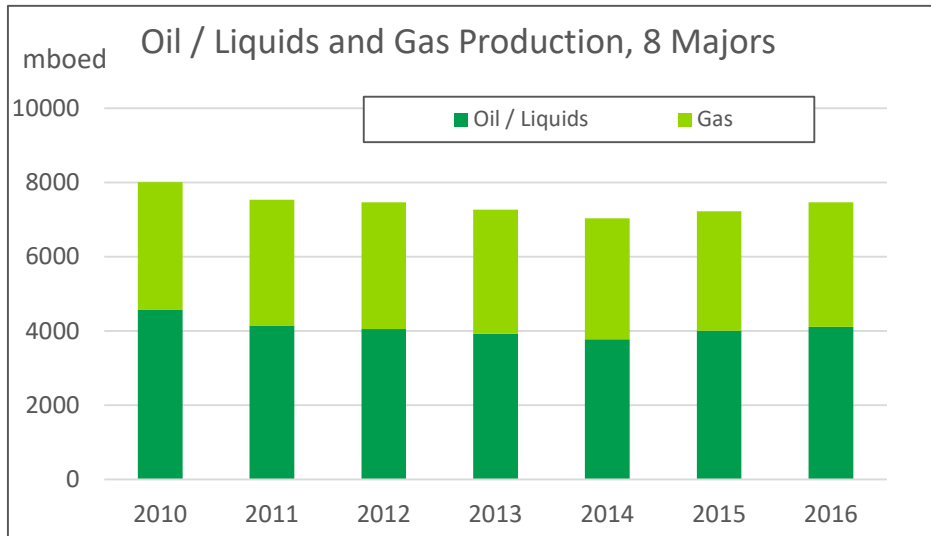
EIA World natural gas consumption Forecast
quadrillion Btu



Global LNG capacity additions, 2015 - 2019
bcf/d



Overall Production and Reserves Status

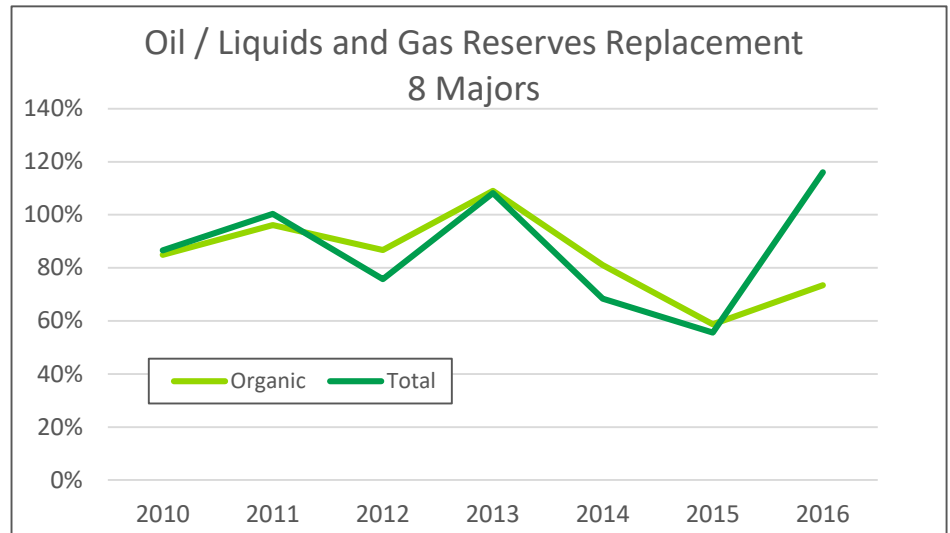
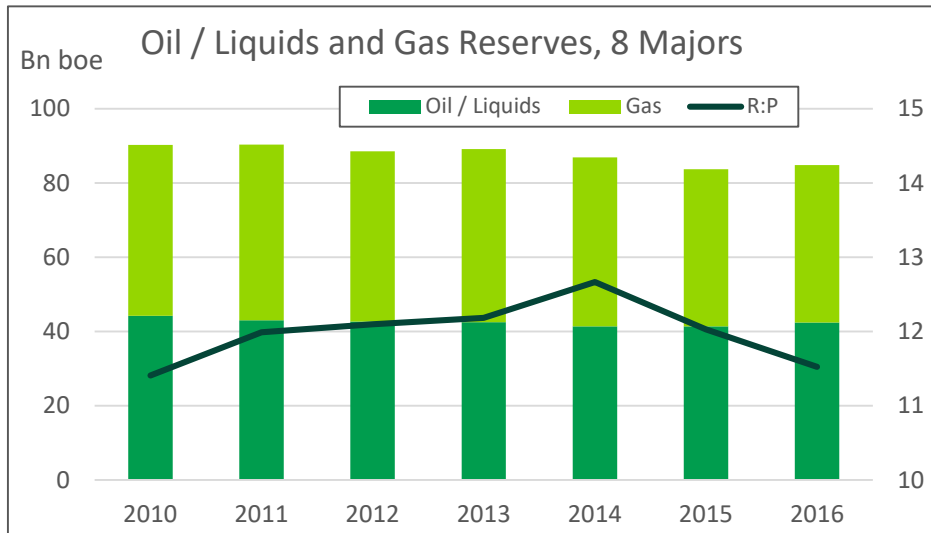


Majors show long term trend of declining production and reserves replacement

- Production sustained through activity focus
- Reserve to Production ratios falling since 2014 as fewer investments are being made

Data from 8 largest IOCs

- Exxon, Shell, BP, Chevron, Total, Statoil, ENI, Conoco Phillips
- Shell's purchase of BG completed in 2016 boosted total reserve replacement
- Proved Reserves excluding Bitumen and Syncrude
- Reserves to production ratio based on start year reserves / in year prodn



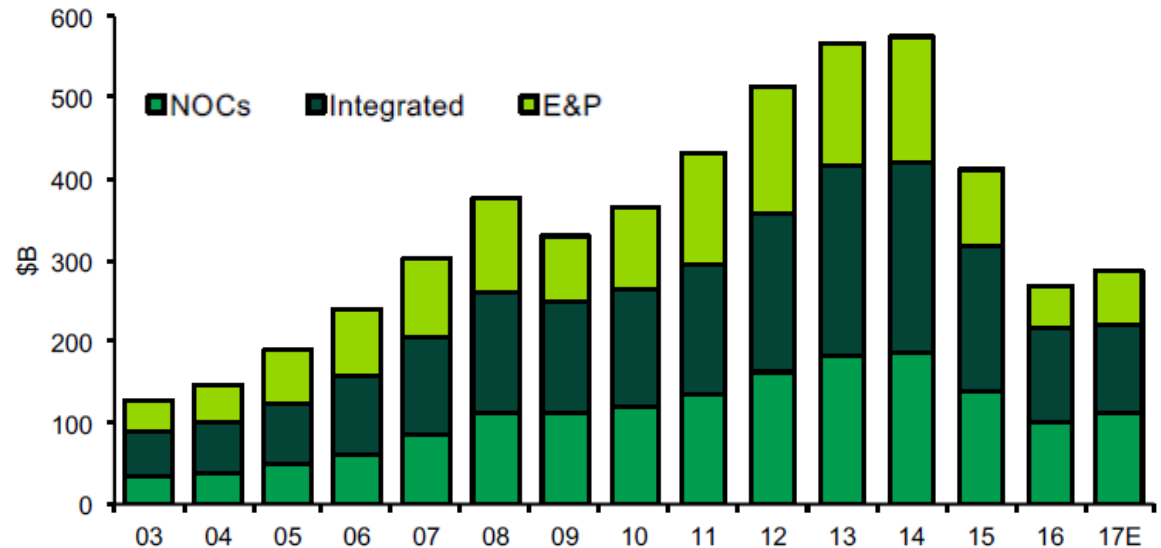
Source: First Alpha Energy Capital LLP, company data

Global spend & activity

Spend and activity has fallen

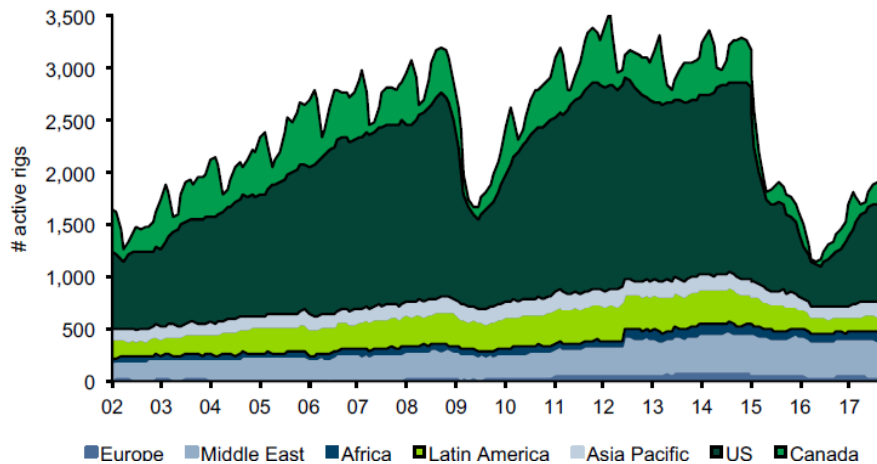
- Lower spending fall in NOCs
- Reduced contracting rates mean activity falls slower than spend
- Production has been sustained so far
- Question of how reduced investment impact will flow through to medium term production

Global upstream spending (organic)

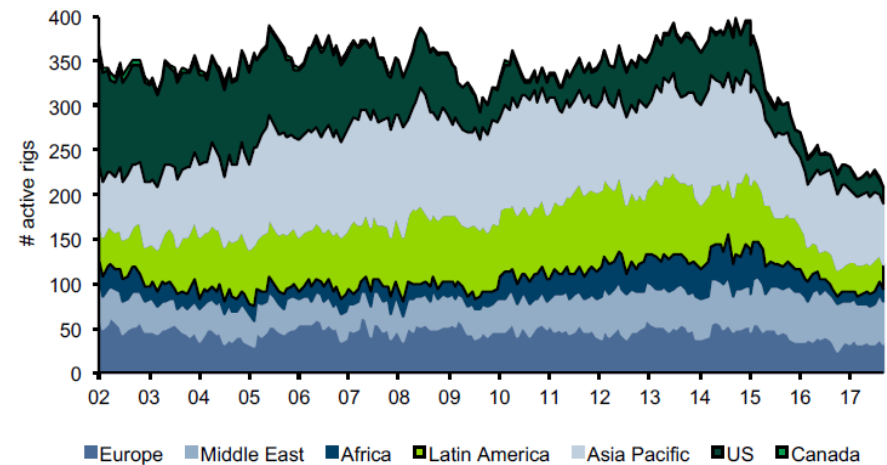


Source: First Alpha Energy Capital LLP, company data

Onshore Rig Count (Baker Hughes)



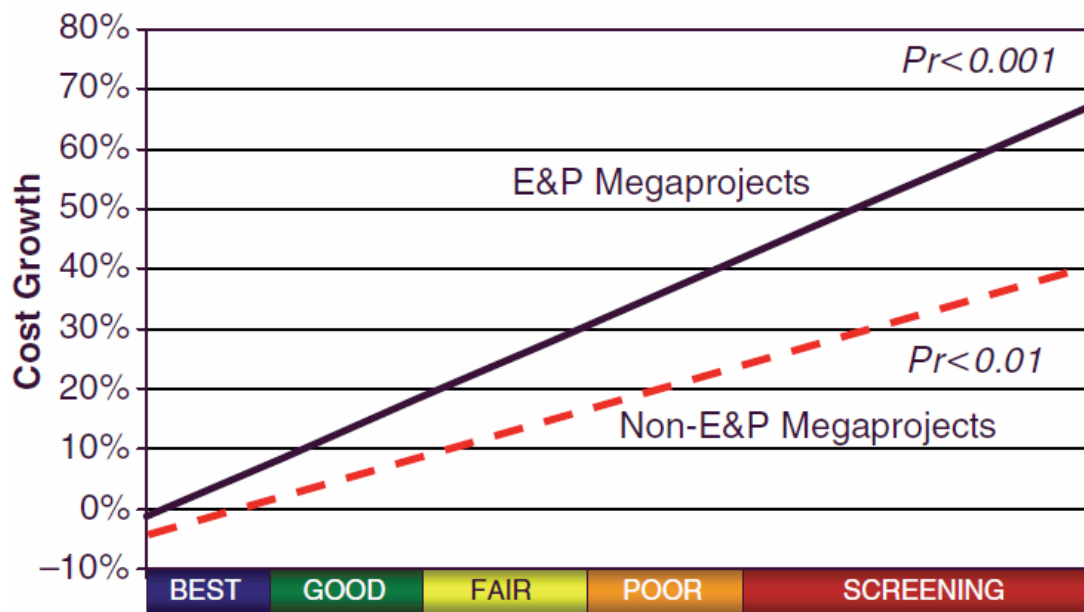
Offshore Rig Count (Baker Hughes)



E&P Major Project Delivery (global)

Majors need to materially improve project performance to remain competitive and replace reserves

Cost Growth vs Front End Loading



Asset FEL Index

↑
"Average" non E&P

↑
"Average" E&P

Analysis: IPA

70% of E&P developments delivered less value than planned; average loss of 35%

- average of 78% planned production delivered in first 4 years
- average cost overrun of 20% in real terms

In order of importance due to:-

- scoping decisions based on incomplete reservoir data
- capital cost growth (supply chain / integration)
- prioritising schedule over value

E&P Mega Project outcomes vs plan are also poorer than other sectors and E&P capital productivity has fallen

- Front End Loading (FEL) in E&P projects at "middle fair" level on average vs "upper good" for non E&P projects
- circa 60% of E&P projects are schedule driven than non E&P vs circa 30% of non E&P Projects

Global Picture – key points

Oil and gas demand will continue to grow but at slower pace than GDP

- falling energy intensity per unit GDP
- continued growth in renewables, particularly for power

Remaining oil and gas reserves continue to grow, more is being found than produced

- no shortage of resources globally, shale technology adding new volumes
- value driven by portfolio and development efficiency
- question is using resources in efficient and sustainable way

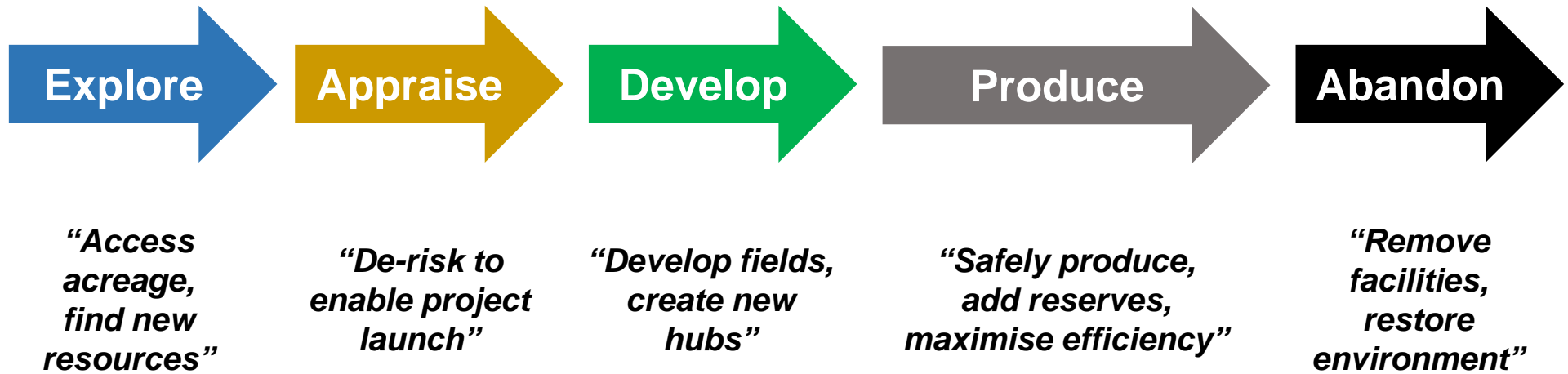
US shale production driving changes in both oil and gas

- 2015 was first time a country has added 1 million bpd capacity for 3 years in a row
- circa half of new global gas supply from US shale, becoming exporter
- Shale creates new dynamic; elasticity of supply constraining prices

Industry facing big challenges and changes

- material new technology driven supplies at time of slowing energy demand growth
- lower prices and volatility possibly a “return to normal”
- high cost / high tax areas are severely challenged
- no room for poor project or operating performance

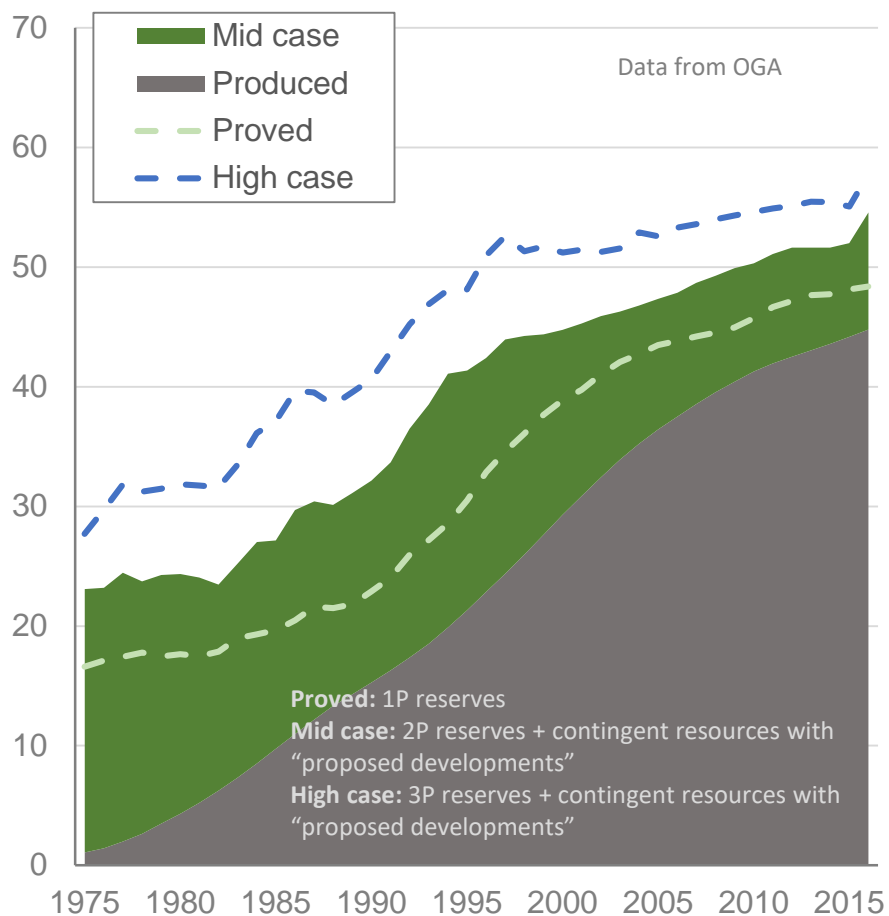
Stages of Field Life



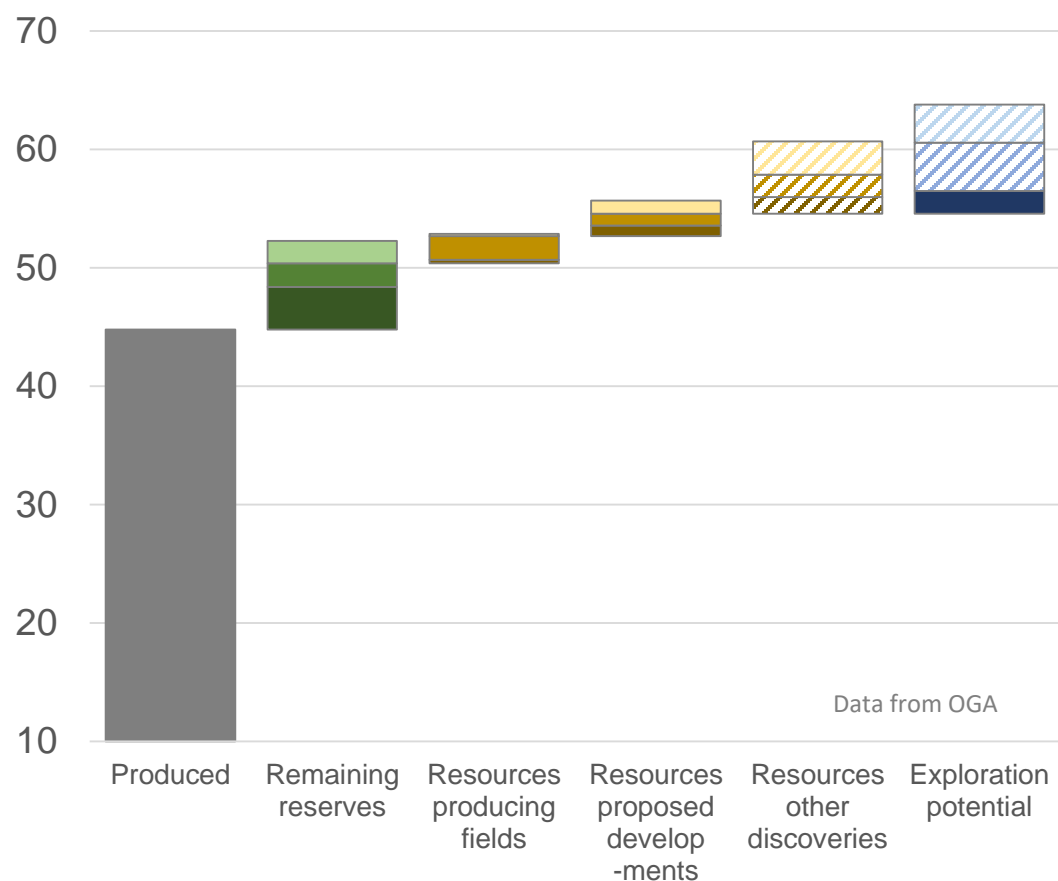
Historic UK Reserves and Production

Oil & Gas UK estimate 10 – 20 bn boe remaining reserves, resources and yet to find (excluding shale)

Production and Reserves (bn boe)

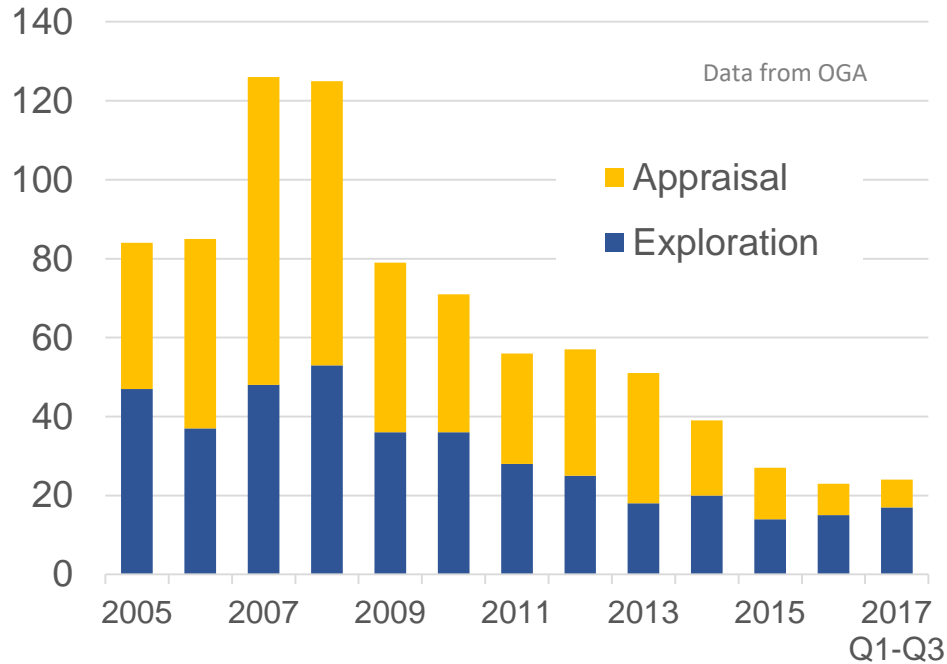


Production, Reserves, Resources & Yet to Find (bnboe)

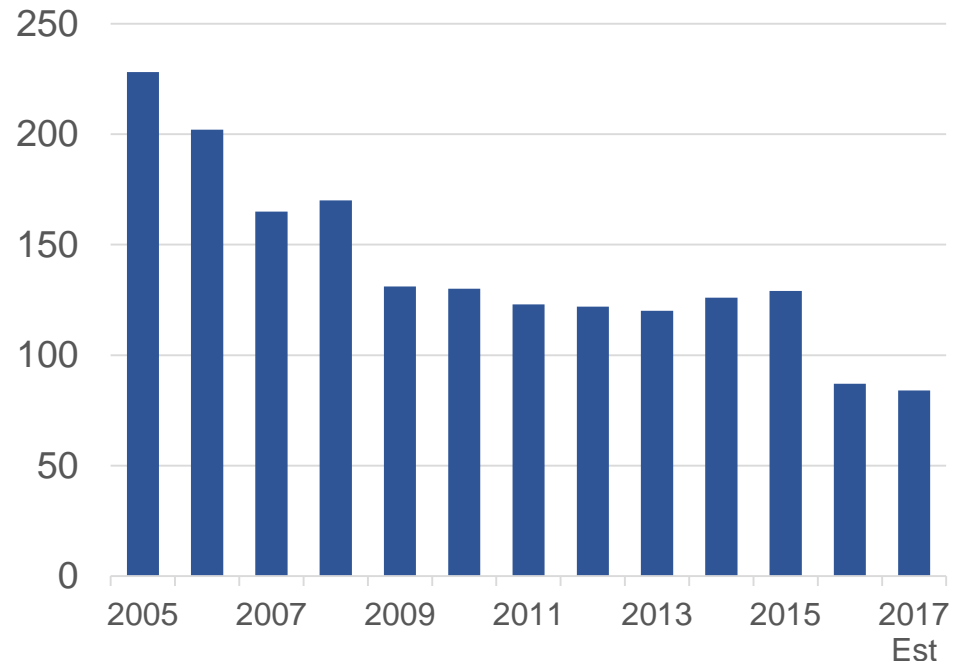


UK Drilling Activity

UK Exploration and Appraisal count low



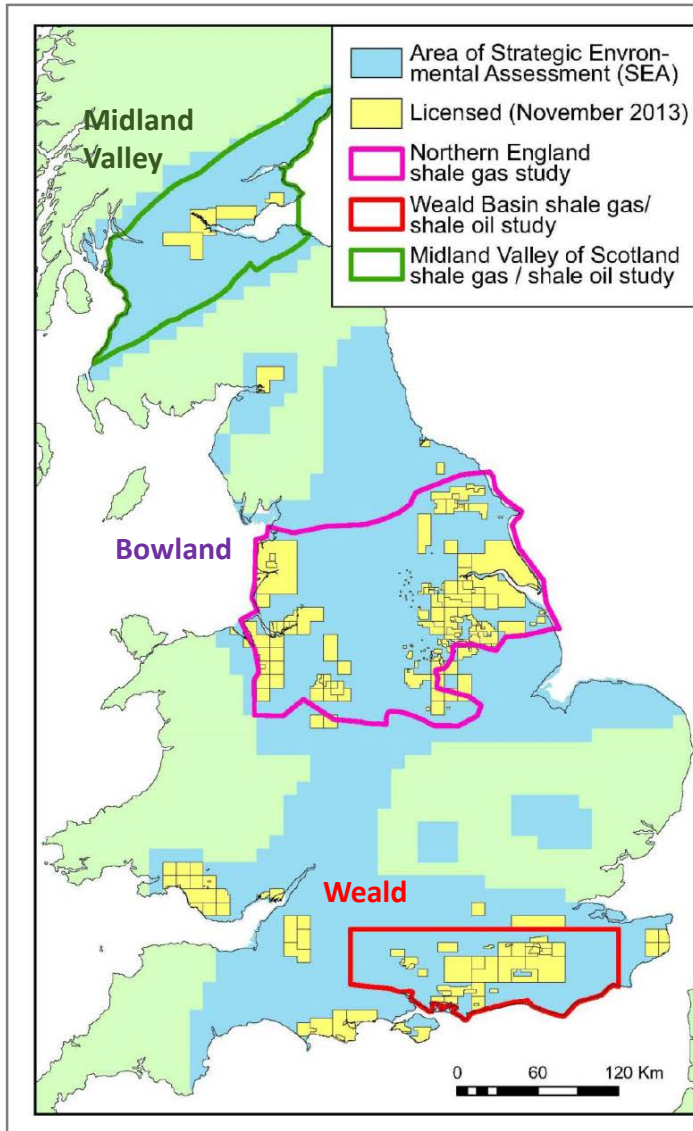
..... development drilling ongoing, but declines in 2016/17



OGA action to boost exploration

- £40m government funded seismic
- £5m regional studies (eg Palaeozoic)
- open datasets to support licence rounds
- “innovate” licences and separation between mature and frontier rounds

Unconventionals in the UK



Shale in place volumes (DECC/BGS studies)

	Gas in place (tcm)		
	Low	Central	High
Midland Valley	1.4	2.3	3.8
Bowland Shale	23	38	65
Jurassic Weald			

	Oil in Place (bn bbl)		
	Low	Central	High
Midland Valley	3.2	6.0	11.2
Bowland Shale			
Jurassic Weald	2.2	4.4	8.6

Source: OGA/|DECC

Significant volumes mapped

- viability and scale yet to be determined, appraisal at very early stages
- UK is different to the US, thicker sections, different properties, more complex geology

Also tight gas potential

- eg Carboniferous onshore

Regulatory frame

- protected areas defined for surface operations
- depth limits for fracking
- monitoring & disclosure
- fast-tracked planning
- Scottish moratorium

Local support & benefit

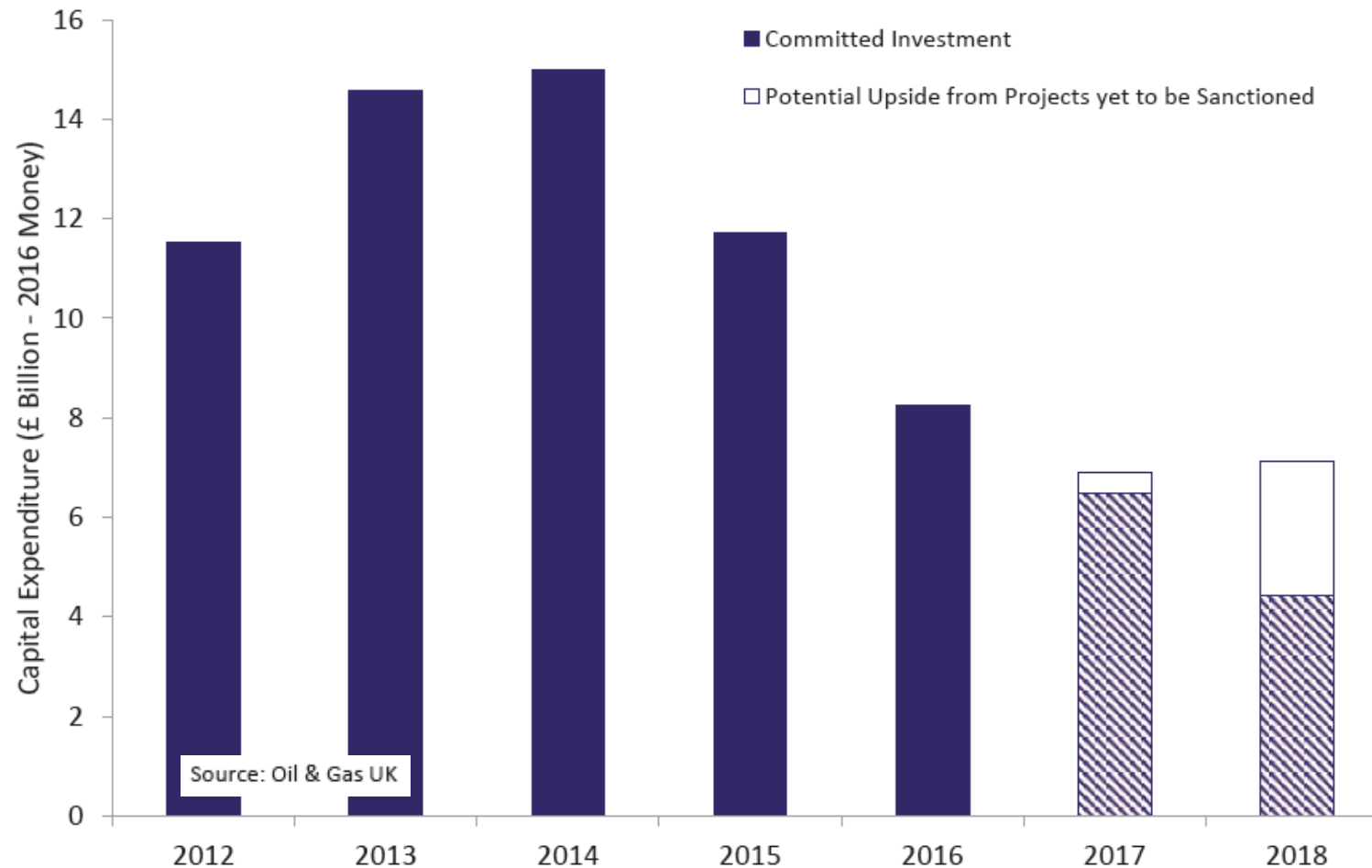
- need to build confidence and trust
- share benefit via income to landowners and local areas

Industrial capability

- will take time to build US style efficient and low cost operating base

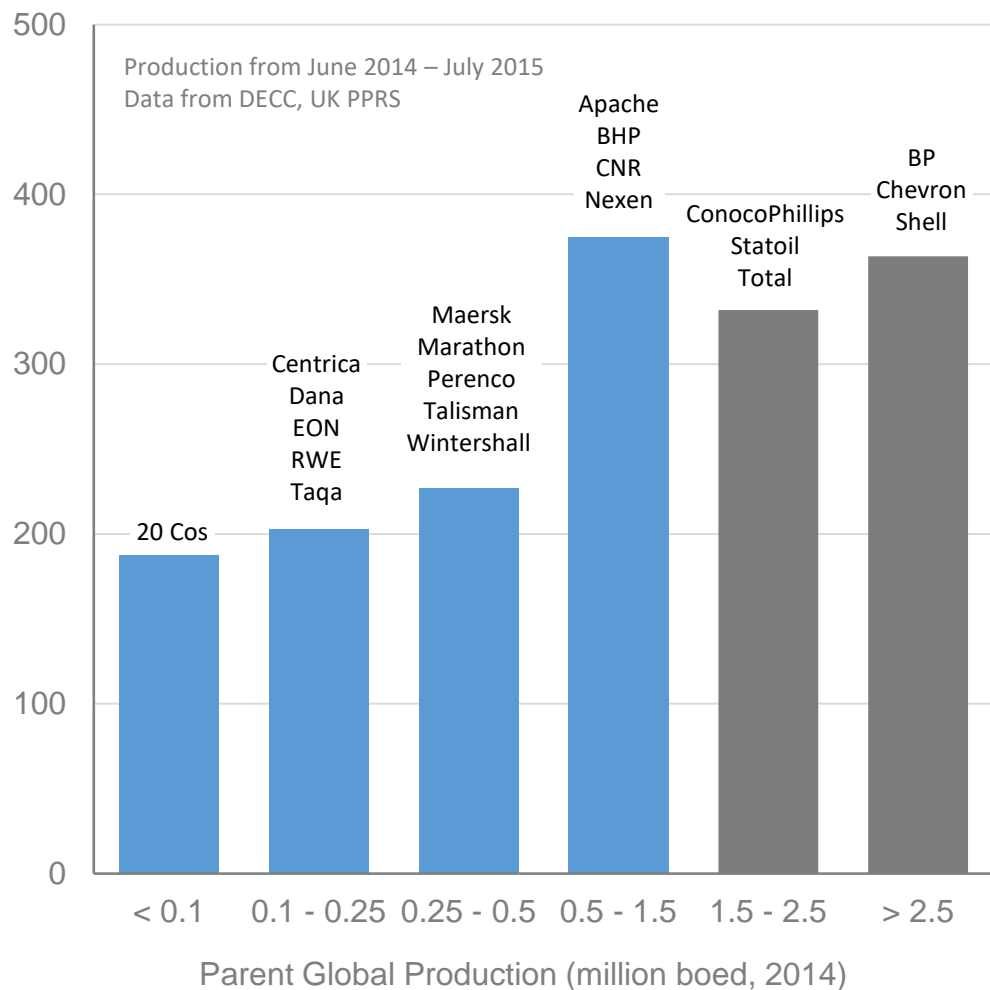
UKCS Capital Investment

Declining capital investment as operators seek to manage cash flow; falling unit development costs expected to stimulate activity (eg increased Private Equity fund activity)

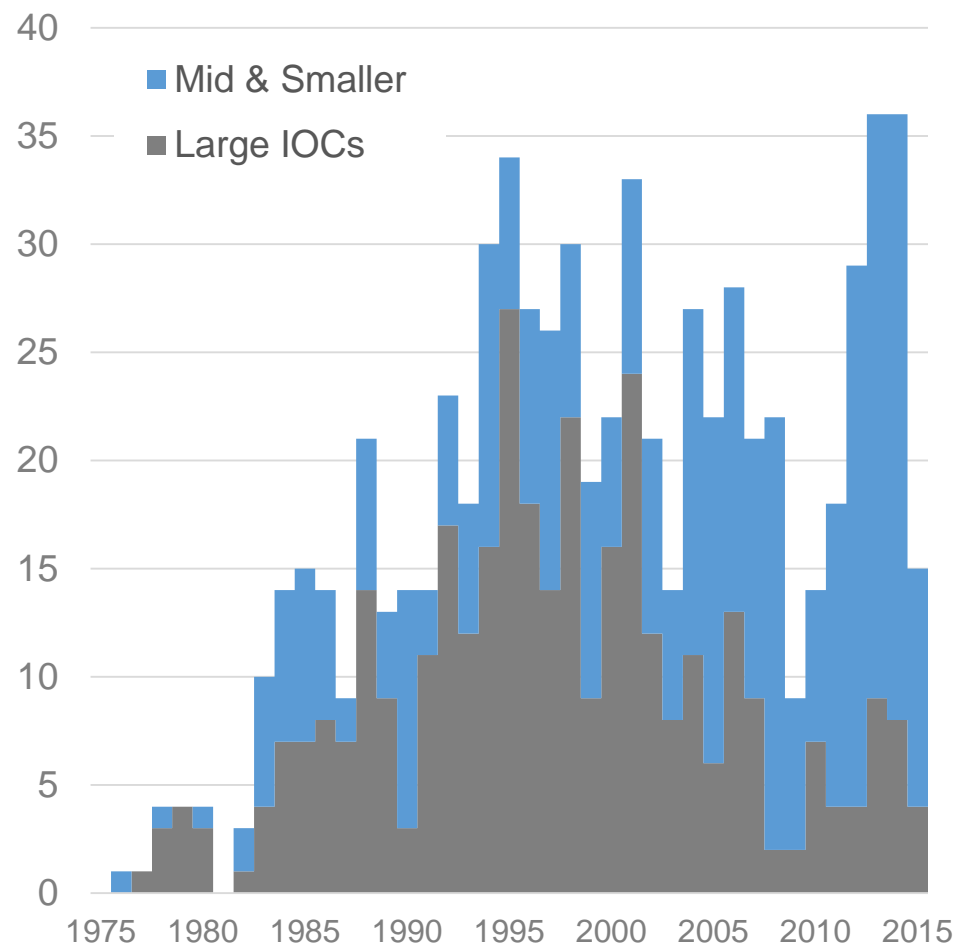


Growing role of mid sized Operators in the UK North Sea

UK Production by Parent Company Size



Field & Addendum Approvals by Company Size

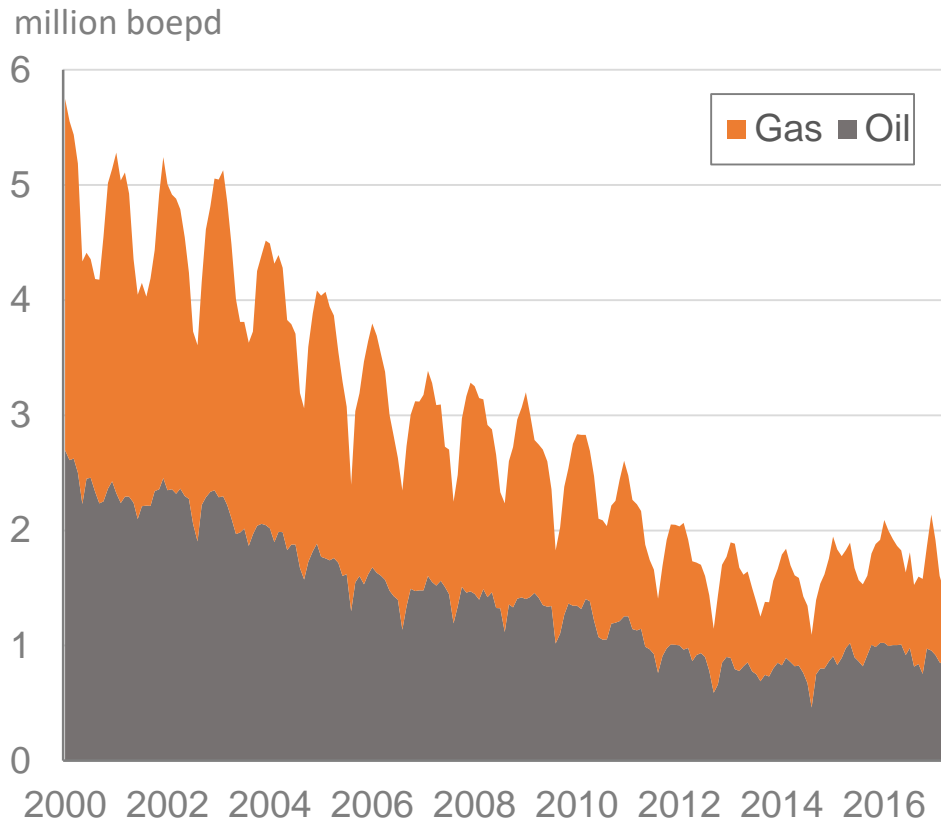


UK Operating Performance

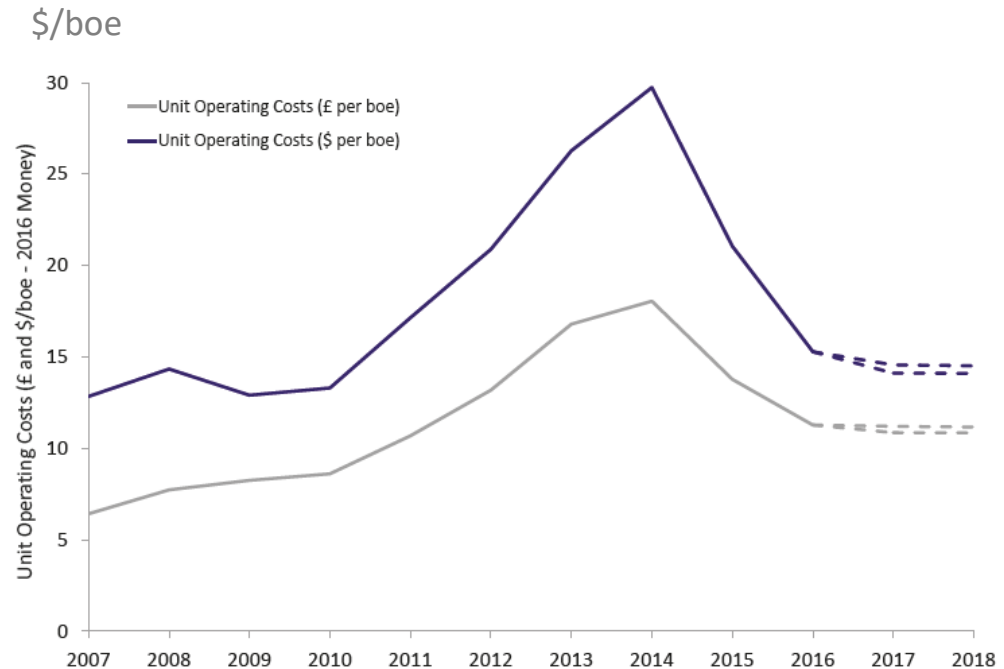
Strong recent production performance with 4.7% growth in 2016 due to new field start ups and operating efficiency improvements

Unit operating costs have halved in \$ terms since 2014 peak, but remain high vs other basins

UK Oil and Gas Production, 2005 – mid 2016



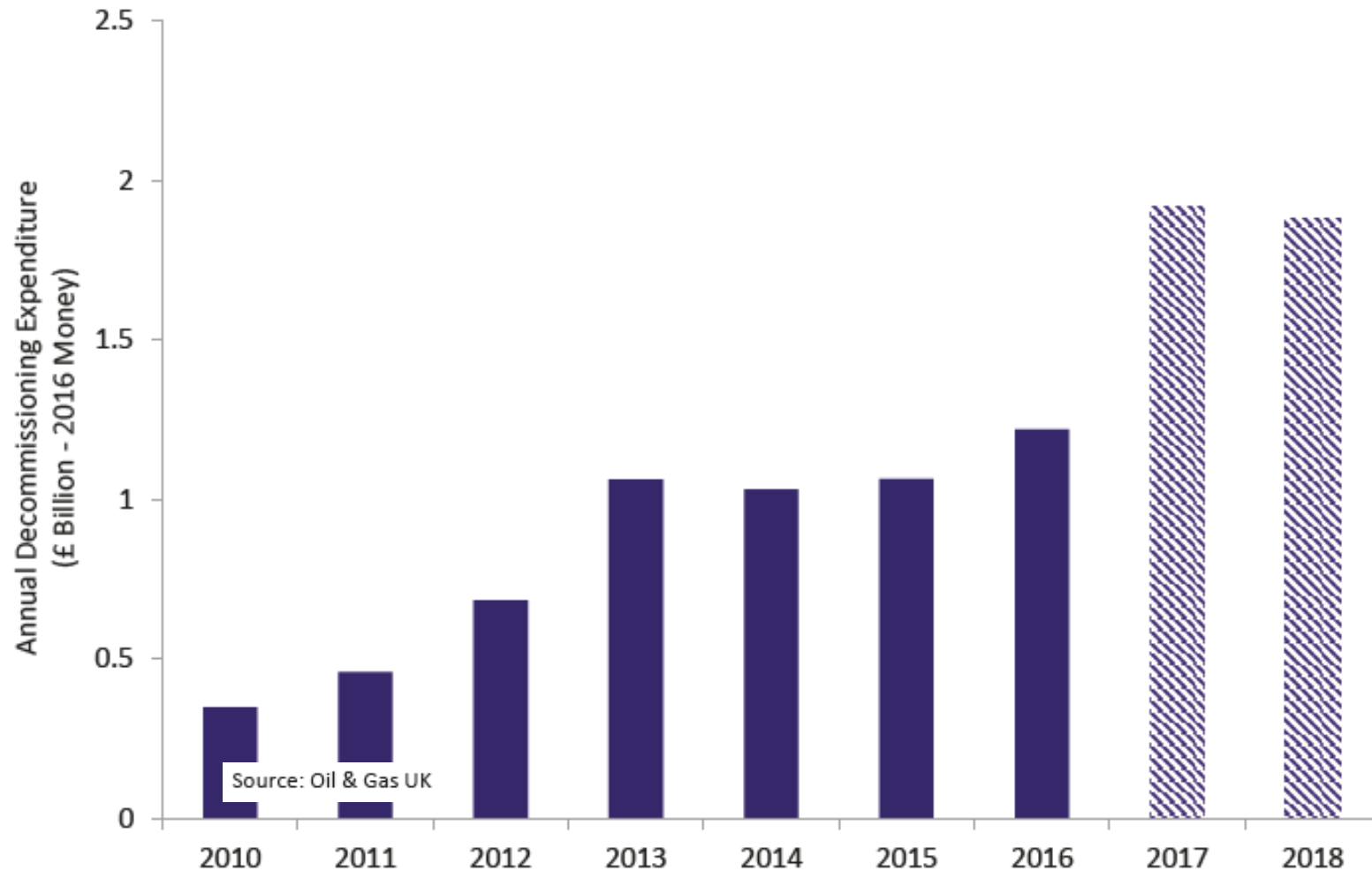
Unit Operating Costs, 2005 to 2017



Source: Oil & Gas UK, OGA

UK Decommissioning

Decommissioning activity growing, 14 fields ceased production in 2016, similar number expected in 2017 with ca 30 to 40 fields expected in 2018 and 2019



Stages of Field Life



UK Oil and Gas Authority established with objective of Maximising Economic Recovery

