## **SPE London Introduction to E&P**

# **Global Context**

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# **Global Context**

# • Industry structure

• what is E&P, who is involved

# Global energy mix

- demand and supply by energy source
- oil and gas resources and production
- transition to renewables

# UK challenges

- renewing exploration in the North Sea
- potential of shale and licence to operate
- maximizing economic recovery
- improving 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 💥
- BEIS
- BSEE

### **Operators**

### **Integrated Majors**

- ExxonMobil, Shell, BP, Total, Chevron

### E&P Focused

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

# National Oil Companies (NOCs)

Saudi Aramco,
Gazprom, NIOC (Iran),
Rosneft, PetroChina,
Equinor

## **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, Baker (GE)

### Seismic

- eg Western Geco (SLB), CGG, PGS

# 2014 Production, Largest 21 Companies





# **Primary Energy Consumption**





### Non OECD Driving Energy Growth

- 2018 non OECD demand growth increased driven by China and India
- China consumes 24% of global primary energy use, 4% growth pa
- India consumes 6% of global energy, over 5% pa growth long term (8% in 2017-18)

### OECD Energy Demand Flat

- Slow GDP growth matched by pace of falling energy intensity
- N America consumption 20% of global primary energy use, EU 12%

# **Energy Transition Challenge**



# Gec

### 2018 points

- Non fossil fuels hit high of 15.9% share
- Oil grew by 1.2%, gas by 5.3% and coal by 1.4% driven by GDP growth

### Replacing fossil fuels will take time

- Renewables are grew 16% pa since 2008, but are only 4.0% of total\*\*
  - Solar, 47% pa growth since '08
  - Wind 19% pa growth since '08
- GDP growth means energy demand will continue to grow
  - Fossil fuel growth will continue in the medium term
  - "peak coal / gas / oil" timing uncertain
- Industry challenge to reduce emissions
  - Switch from coal & oil to gas helps
  - Carbon capture emerging needs technical and commercial solutions

<sup>\*\*</sup> Renewables includes solar, wind, geothermal & biomass

# **Future CO2 Emissions Scenarios** (from BP)



### Scenarios give insight into impact of policy changes

Primary Energy Consumption by Fuel

- Evolving transition case reflects policies and technology developing at current pace
- Rapid transition case matches Paris climate goal to limit global temperature increase to 1.5 deg C

CO2 Emissions



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# **Oil and Gas Production**





### Million bpd Oil Production

Data to YE 2018 from BP Statistical Review of World Energy

Billion Cubic Meters pa Gas Production

# **Oil and Gas Proved Reserves**





Data to YE 2018 from BP Statistical Review of World Energy

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# US Oil Production 2007 to end 2Q 2019

# **Oil Price Drivers**



### Supply and demand more balanced in medium term, price outlook weak

- OPEC curtailing production to absorb continuing growth in US shale production
- Consensus for prices to remain weak into 2020 .... but instability in the Middle East or other areas (eg Venezuela, Libya) could drive short to medium term price increases
- Focus on improving returns in US shale lowering investment and activity, but technology continues to drive supply growth. Non OPEC production outside of the US is flat.



Historic data from BP Statistical Review of World Energy 2019; EIA forecasts from October 2019 Short Term Energy Outlook

# Gas Market – recent trends



US Shale growth making US a gas exporter

Gas Prices (\$/million btu)



# **Global Gas Outlook**

# GGC

### Strong non OECD growth driven by Asia

- Asian gas growth driven by industrialisation, power demand and coal to gas switching (eg China)
- US and Middle East (Qatar and Iran) contribute ca half of incremental production; LNG growth increases availability of gas globally



<sup>2018</sup> BP Energy Outlook © BP p.l.c. 2018

# **Global picture – key points**



- Oil and gas demand will continue to grow
  - transition to lower carbon energy will slow oil demand growth, pace uncertain
  - continued rapid growth in renewables, particularly for power generation
- 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
  - Over 2 million bpd oil production added in 2018, largest ever by one country in a year
  - circa half of new global gas supply from US shale, becoming exporter
  - Shale has created a new dynamic with more elastic supply but is only ca 10% of total
- Industry facing big challenges
  - climate change challenge; reducing emissions and improving sustainability
  - public and investor sentiment, particularly in Europe
  - material new technology driven supplies at time of slowing energy demand growth
  - lower price environment means no room for poor project or operating performance

# **UK Production, Reserves and Future Potential**



- Over 27 billion bbl oil equivalent produced to date
- Estimated 10 to 20 billion boe remaining (reserves, developable resources, exploration)



# **UK Drilling Activity & Exploration**



### UK Exploration and Appraisal count low ....



### OGA action to boost exploration

- £40m government funded frontier seismic
- seismic "mega surveys" released
- open datasets and funding for targeted studies / analysis to support licence rounds
- flexible "innovate" licences and separation between mature and frontier rounds

..... development drilling ongoing, but has yet to return to pre 2015 levels



# Unconventionals in the UK





### Significant volumes mapped

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

### Activity halted

- fraccing moratorium due to inability to operate within seismic limits
- UK limits are tightest in world by 2 orders of magnitude for "red light"

### Regulatory frame

- protected areas defined for surface operations
- depth limits for fraccing
- open monitoring & disclosure

### Public support & benefit

- need to rebuild confidence & trust
- government support unclear

### Industrial capability

• will take time to build US style efficient & low cost operating base

Central

2.3

38

Central

6.0

4.4

High

3.8

65

High

11.2

8.6

# **UKCS Capital Investment**



Declining capital investment as operators seek to manage cash flow; falling unit development costs are stimulating new activity (eg new entrants backed by Private Equity funds)





# **UK Operating Performance**



- Strong recent production performance due to new field start ups and ops efficiency improvements
- Unit operating costs have halved in \$ terms since 2014 peak, but remain high vs other basins



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# **UK Decommissioning**



Decommissioning activity growing; 40 to 50% spend on well abandonments.



# **Stages of Field Life – Current UK Status**





