



THE OXFORD
INSTITUTE
FOR ENERGY
STUDIES

A RECOGNIZED INDEPENDENT CENTRE OF THE UNIVERSITY OF OXFORD



Capital Cost Analysis (4)

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The Economics of Energy Corporations (2)

Outline of the course

Overall objective – understand how senior management use economic models to make investment decisions

1. Introduction to key themes in the global energy market
2. Introduction to financial modelling as a management tool
 1. Understanding some key concepts
3. Starting two models for an oil and a gas field – revenues and prices
- 4. Inputting the costs – capital expenditure**
5. Operating costs and paying the government
6. A power plant – a buyer and seller of energy
7. Calculating a discounted cashflow
 1. Why is it important
 2. How is it used to make decisions
8. Testing the investment decisions: running some numbers under different assumptions
9. Answering your questions



Key Cost Elements

Main assumptions

- Capital expenditure (initial investment)
- Operating expenditure (ongoing cost of operations)
- Transportation (getting the product to market)
- Taxes (operating taxes and profit tax)
- CAPEX, OPEX, Transport and Tax



Capital Expenditure - CAPEX

Key parameters

- Size of asset
- Location
- Complexity
- Competition for contractors / availability of local companies



Complex models are used by engineers

Project: SCEP Sample System Project ID: rsSAMPLE
Component Name: Root Component ID: 0000000000000000

Component Type
 New
 Modified Existing
 % Design Mod.
 % Code Mod.
 % Test Mod.
Actual Component DSI: 0

Component Cost Driver Attributes
RELY nominal DATA nominal CPLX nominal TIME nominal
STOR nominal VIRT nominal TURN nominal ACAP nominal
AEXP nominal PCAP nominal VEXP nominal LEXP nominal
MODP nominal TOOL nominal SCED nominal

Effective DSI: 14288 Mode: embedded G&A Rate: 0.00 %
OH Rate: 0.00 %

Comments:
This is the root component of the SCEP Sample System.

Phase	Man-Months	Cost (K\$)	Months	Staff
PD	6.3	32.4	2.7	2.4
DD	9.1	38.1	1.6	5.8
CUT	9.8	37.3	1.6	6.3
IT	9.8	46.7	2.0	4.8
Total	35.1	154.5	7.8	

Productivity = 407.3 DSI/MM Unit Cost = 10.8 \$/DSI

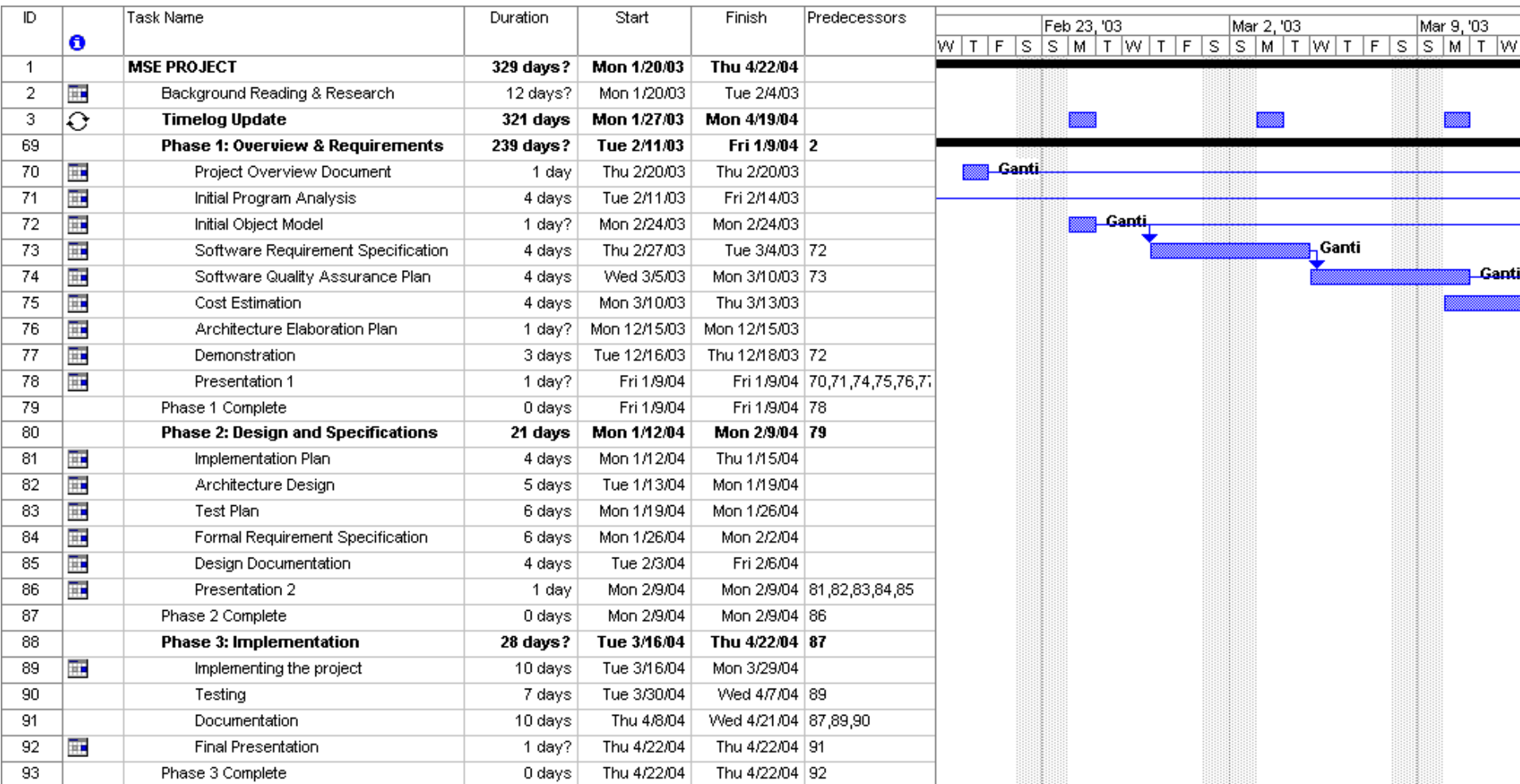
Project Navigation
Find Component
GO
New Sibling
New Child
Tools

Edit Project Edit Parameters Export Project Reports Help Close Project

- Cost estimates based on historical precedent and prices of key inputs today
- Steel price a key input, for example

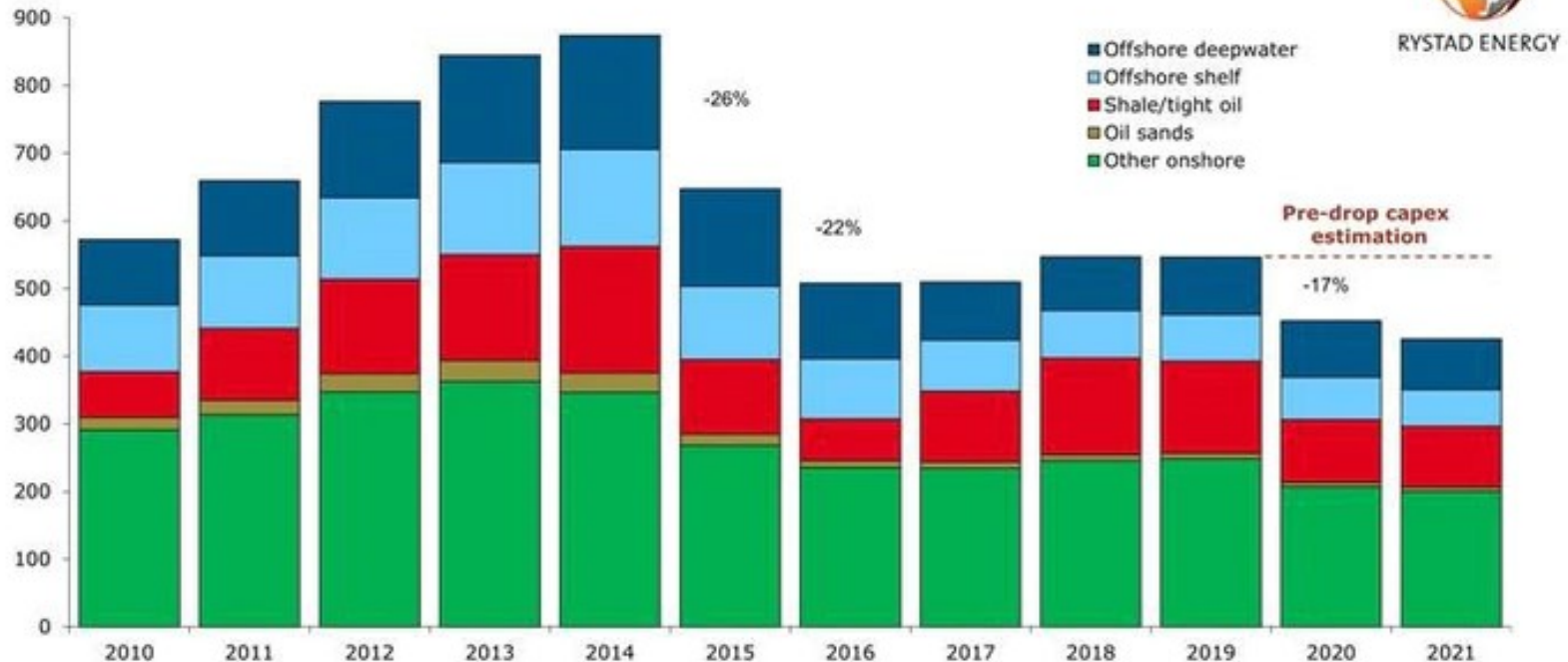


Timing and planning is vital, with any slippage being potentially very expensive



Oil price naturally linked to spending

Global E&P investments by supply segment
Billion USD



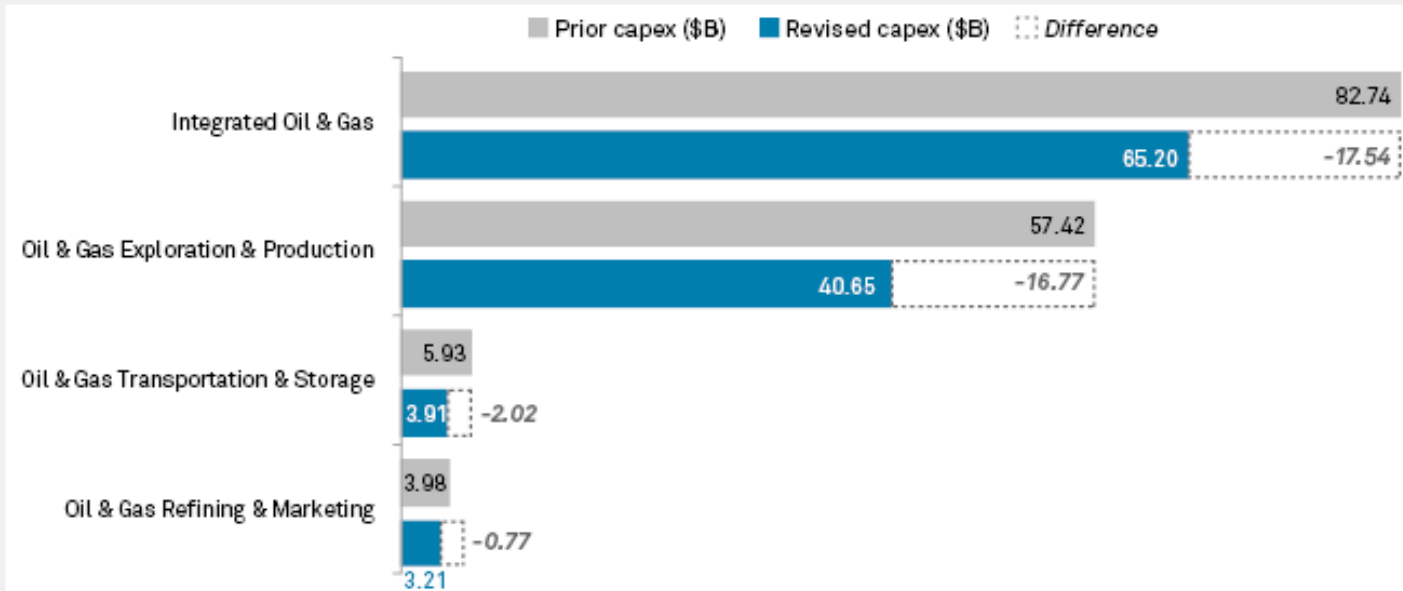
Source: Rystad Energy UCube

- Upstream costs fell sharply after oil price collapse in 2015/16
- 2020 has seen a further cut in spending



2020 saw costs slashed and a re-assessment of future plans overall

Oil & gas companies plan to slash more than US\$37B in 2020 capex, and more announcements are coming

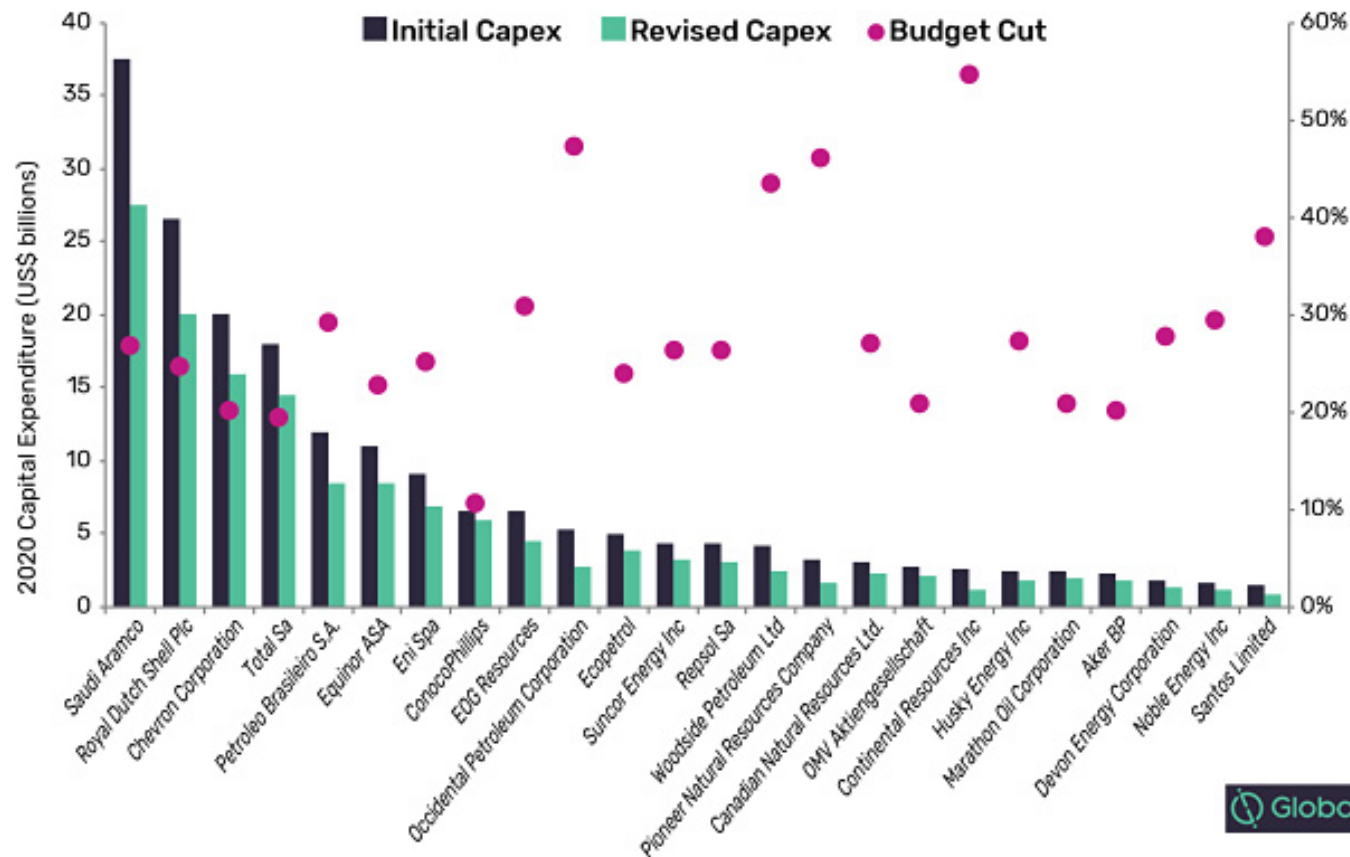


Based on announcements by select publicly traded companies as of March 25, 2020.
Source: S&P Global Market Intelligence

- Spending across the value chain has been cut radically
- In addition companies have started to question which oil projects will be viable in a world of energy transition



Companies have been forced to re-think spending plans and to focus on efficiency gains

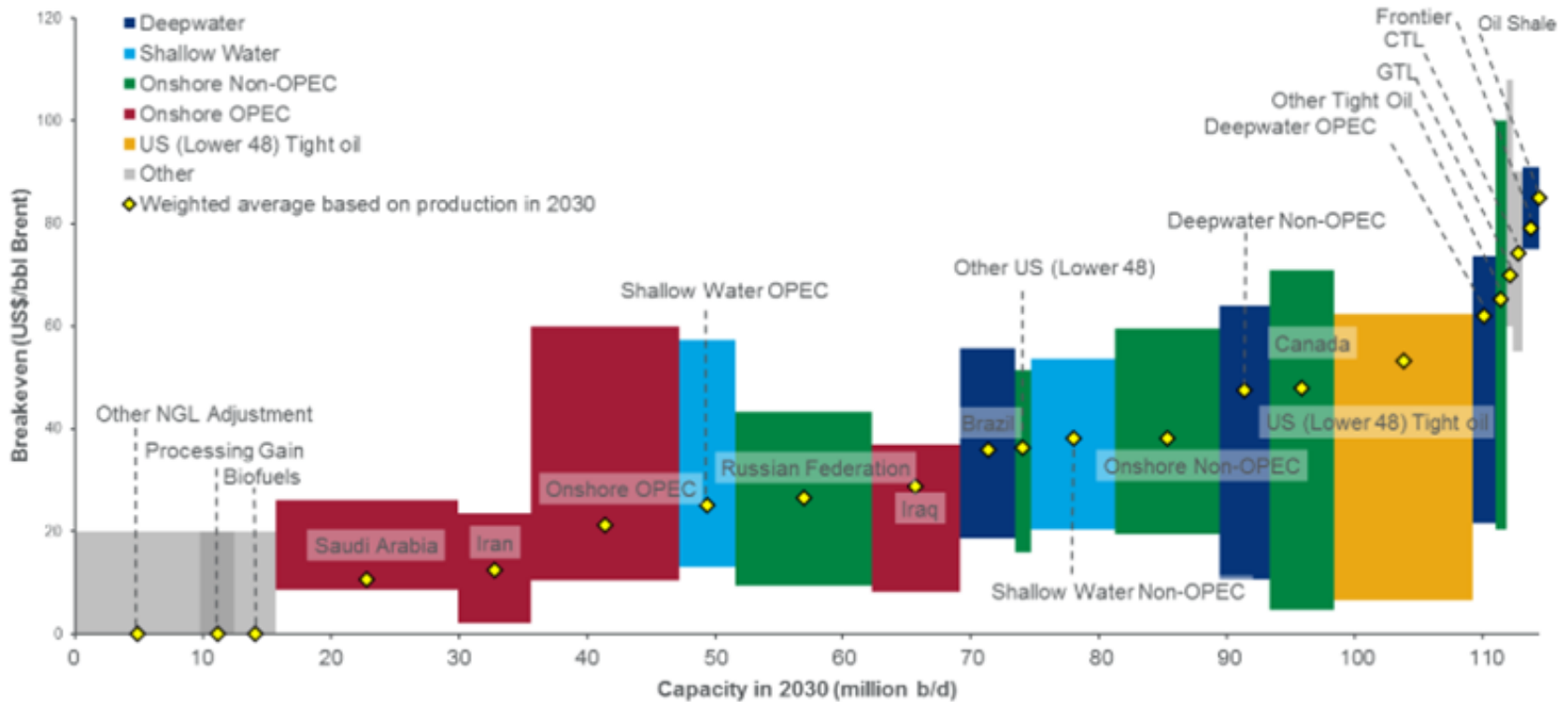


- As companies cut budgets they also look for efficiency gains which can reduce the impact on investment plans
- Often low oil prices catalyse technological innovation with long-lasting impacts



Where will breakeven prices be low enough to ensure survival and adequate returns?

Global liquids capacity in 2030 by breakeven



- The geography of projects is becoming increasingly important
- How can companies get access to assets in areas where the breakeven cost is low enough to guarantee profits?



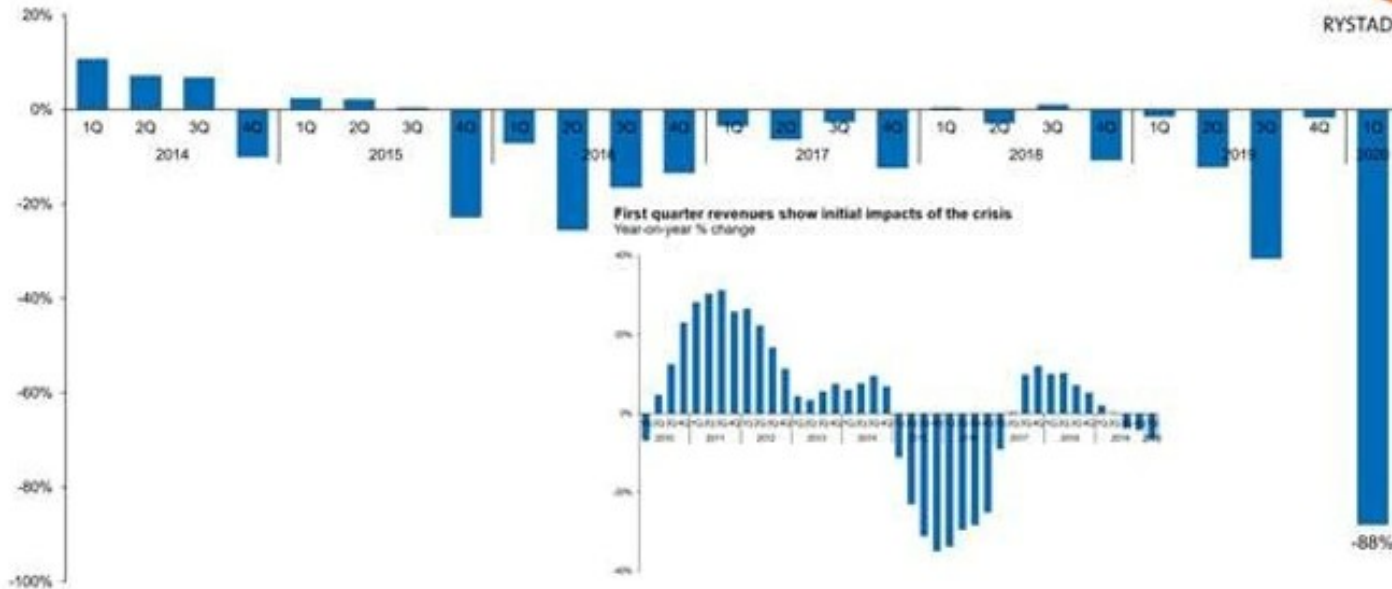
It is not just oil producers who have to worry. Service companies are hit hard too

Impairments fuel massive losses for service companies

Profit margin %*



RYSTAD ENERGY



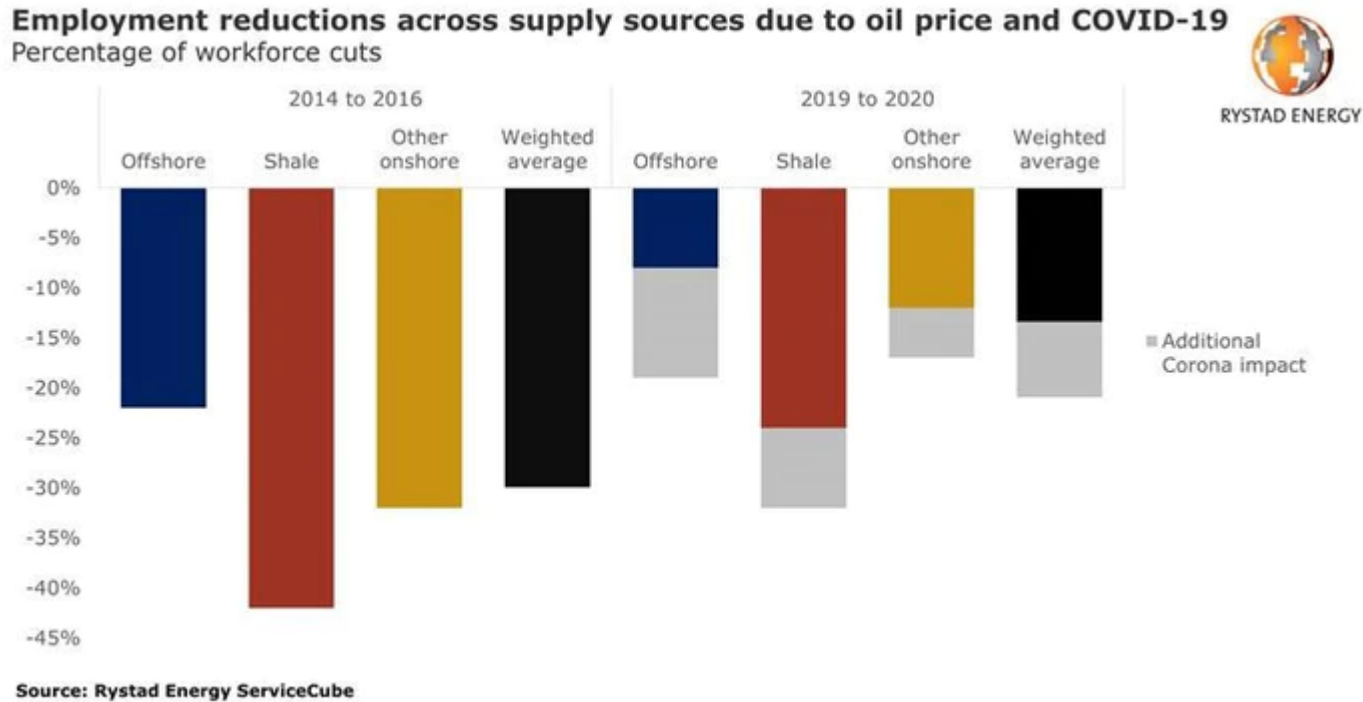
* Weighted average profit margins (defined as net income/revenue) on a sample of 50 public oilfield service companies.

Source: Rystad Energy ServiceCube, Bloomberg

- Companies like Schlumberger, Halliburton and Baker Hughes are vital for oilfield developments
- They have much of the industry expertise and equipment to hand
- They tend to suffer first in an oil price downturn as companies force through cuts in budgets



Job losses can cause long-term problems



- Jobs are often cut during a downturn, but now this could have radical consequences
- Will skilled workers return to the oil industry or look for employment elsewhere (e.g. offshore wind)
- Skills shortage is becoming a major problem for oil and gas sectors

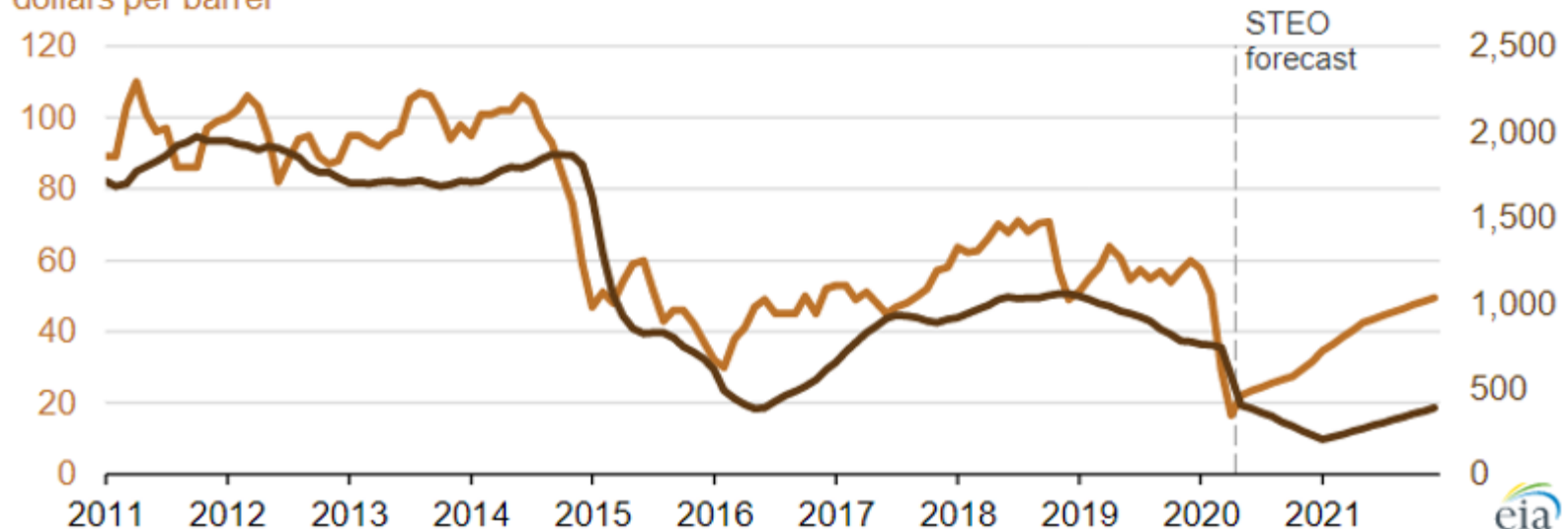


In the US the rig count falls in line with the oil price

West Texas Intermediate crude oil price and Lower 48 states excluding Gulf of Mexico rig count (2011-2021)

West Texas Intermediate crude oil price
dollars per barrel

rig count
number of rigs

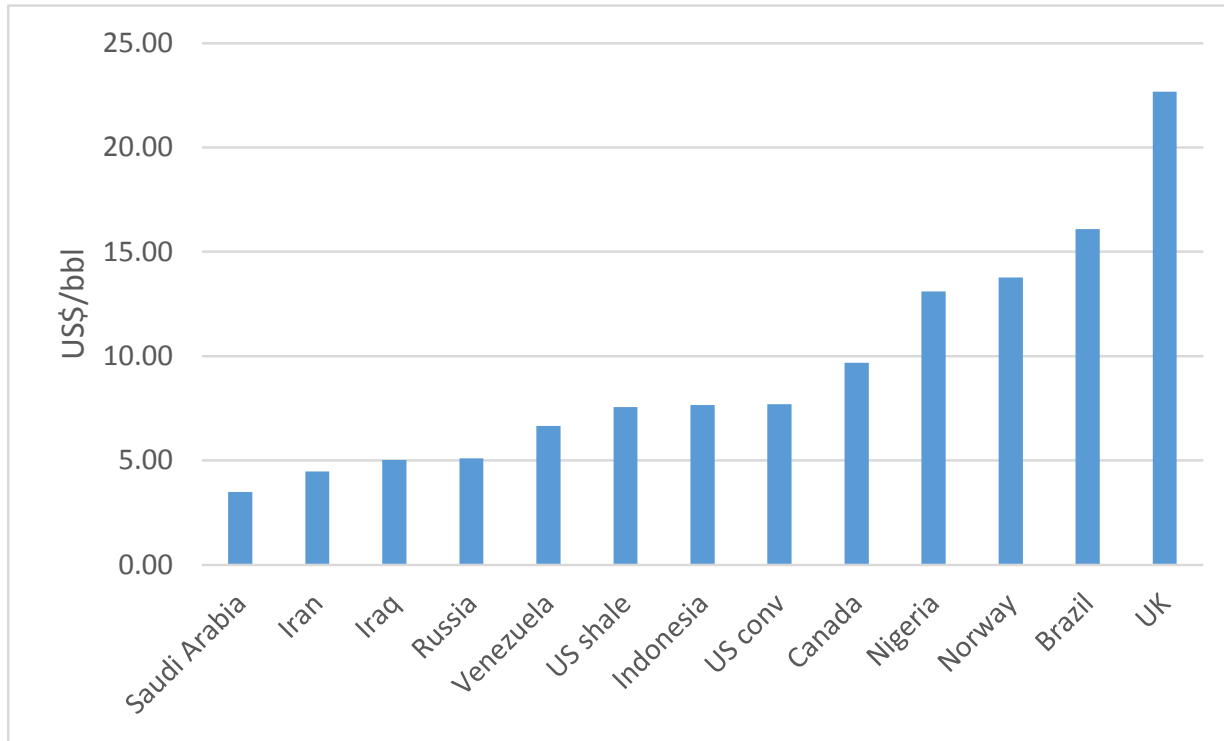


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook* (STEO)

- It can also recover quickly, but again only if workers stay in the industry
- Some retired workers are being offered huge pay packages to return to work as there are not enough young engineers and other scientists interested in the oil and gas sector



Comparison of capex by countries

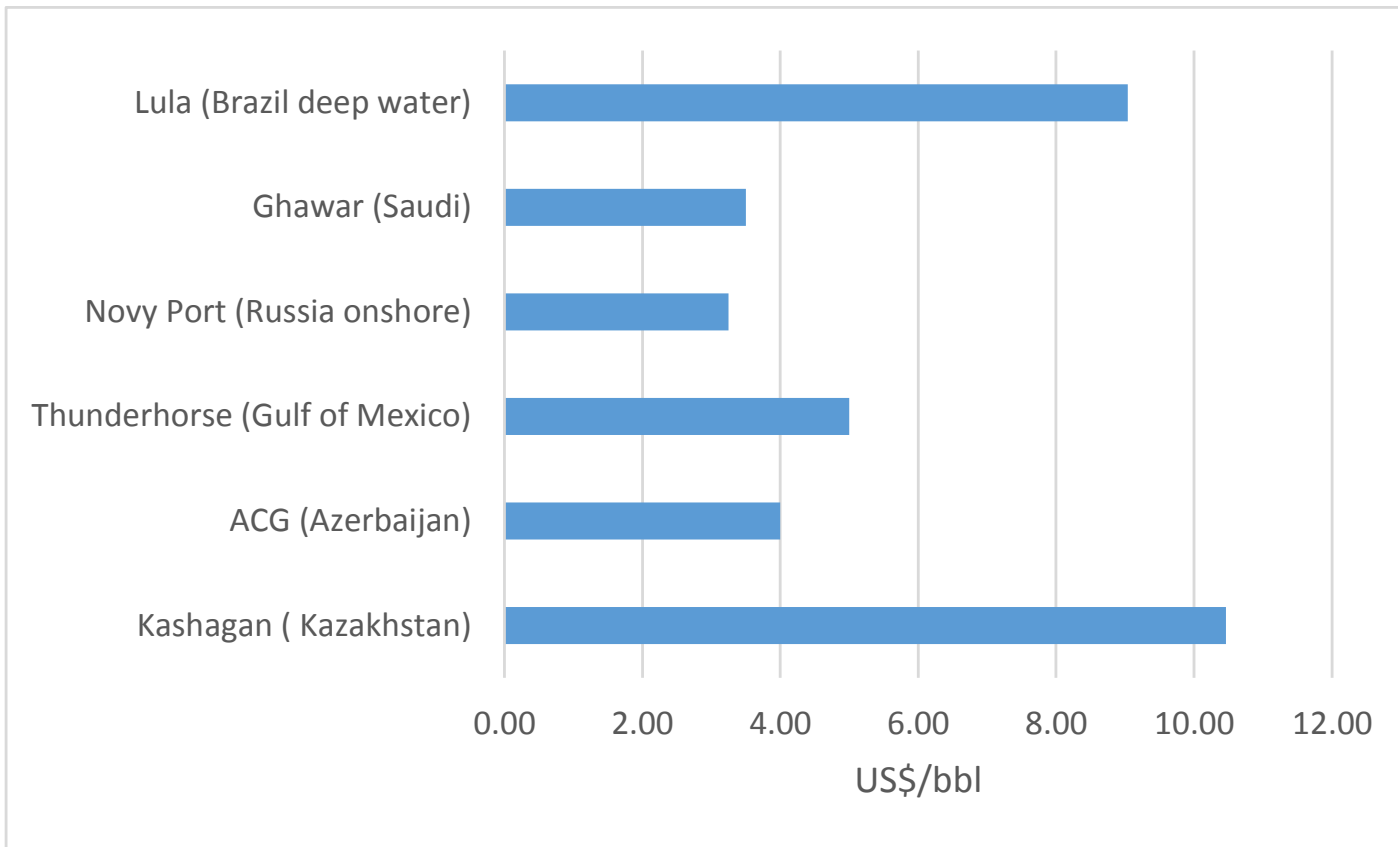


Source: Rystad Energy

- Low investment costs in Middle East thanks to huge reserves and easy conditions
- Highest costs offshore, especially in deep water



Comparison of field capex



- Specific fields exemplify the country trends
- Offshore fields are more expensive (Lula), as are those with complex geology (Kashagan)
- Onshore conventional fields (Ghawar, Novy Port) are lower cost

