North Sea Transition Authority

UKCS Decommissioning

Cost Estimate 2022

Contents

Executive summary

The total estimated cost of decommissioning UKCS upstream oil and gas infrastructure has fallen by a further £1.5bn to £44.5bn, representing an overall decrease of about £15bn (25%) since the baseline forecast and cost reduction target were introduced in 2017. Achieving a saving of this magnitude is good news for both industry and the Exchequer.

The scale of this reduction is also reflected in the final costs of completed projects, which are on average 20-25% lower than initially forecast.

Industry has kept the estimate moving on a downward trajectory every year since the North Sea Transition Authority (NSTA), formerly the Oil and Gas Authority (OGA), started tracking progress against the cost reduction target. However, it has not been possible to sustain the momentum of the first two years, when substantial decreases were recorded. The Covid-19 pandemic has undoubtedly had a negative impact on progress, and it will be challenging to achieve the ambitious 35% target set by the NSTA by the end of 2022.

Nonetheless, the UKCS oil and gas sector deserves credit for continuing to execute decommissioning projects commanding expenditure of over £1bn in each of the last two years, in the face of unprecedented logistical and economic pressures brought on by the pandemic.

Indeed, decommissioning comprised about 10% of the industry's total expenditure in 2021. Encouragingly, this points to a determination to carry out planned work and meet decommissioning obligations.

Executive summary

Decommissioning offers a long-term, sustainable opportunity for the UK supply chain, with investment expected to ramp up to a peak of £2.5bn per year over the next two decades and will contribute 25-30% of sector spend over the next four decades.

Industry continues to work hard to deliver cost-efficiencies by pulling the levers at its disposal, including effective planning, commercial transformation, infrastructure re-purposing plus testing and deploying new technology, all of which are key pillars of the NSTA's Decommissioning Strategy.

By maintaining this positive approach, the sector can achieve further cost reductions, though it must do so against a challenging global economic outlook. As well as inflation and increased energy prices, responding to the energy trilemma (secure, clean and affordable) is increasing demand on the supply chain, heightening the risk of cost increases.

The NSTA will continue to support industry by encouraging operators and suppliers to work in a collaborative way including formation of well decommissioning campaigns, which are are regarded as being more cost efficient and less carbon intensive. The NSTA is also creating much greater visibility of upcoming activities for the supply chain by harnessing data and digital solutions, such as the Energy Pathfinder portal, Decommissioning Data Visibility pilot project and the Suspended Wells application.

Furthermore, the NSTA believes that setting a target in 2017 helped to sharpen industry's focus on cost efficiencies, contributing to the significant 25% reduction by year-end 2021. With the current target due to expire at the end of 2022, the NSTA will provide fresh impetus by introducing a re-baselined cost estimate and new five-year cost target supported by Key Performance Indicators. These are being developed jointly with industry and will be effective from January 2023.

Note: *The calendar year mentioned within this report will generally refer to the year of spend/ activity year unless otherwise noted as being the reporting year.*

North Sea Transition Authority

£15bn

25%

Overall cost reduction since 2017 baseline despite **Covid-19** and **economic environment**

Actual spend for completed projects

20-25%

lower than initial forecast

Substantial **increases** in inflation, increased energy prices and a heightened risk of **upward cost pressure**

Supply chain investments up to

£2.5bn per year

over the **next two decades**

Greater visibility by harnessing data and digital solutions – **Energy Pathfinder** portal and **Decommissioning Data Visibility** project

1. Decommissioning forecast (like-for-like) & actual cost reporting

1a. Decommissioning cost progress & scope: like-for-like basis

While the Covid-19 pandemic continued throughout 2021, the forecast cost of decommissioning UKCS oil and gas infrastructure fell by £1.5bn to £44.5bn[1] (Fig. 1) reflecting a further 2% net reduction and a cumulative reduction of 25% to date (Fig. 2).

In addition, the full portfolio decommissioning costs, which reflect the scope of decommissioning for the period 2022–2060+, are now forecast at £46bn[2] (Appendix 1a, 1b).

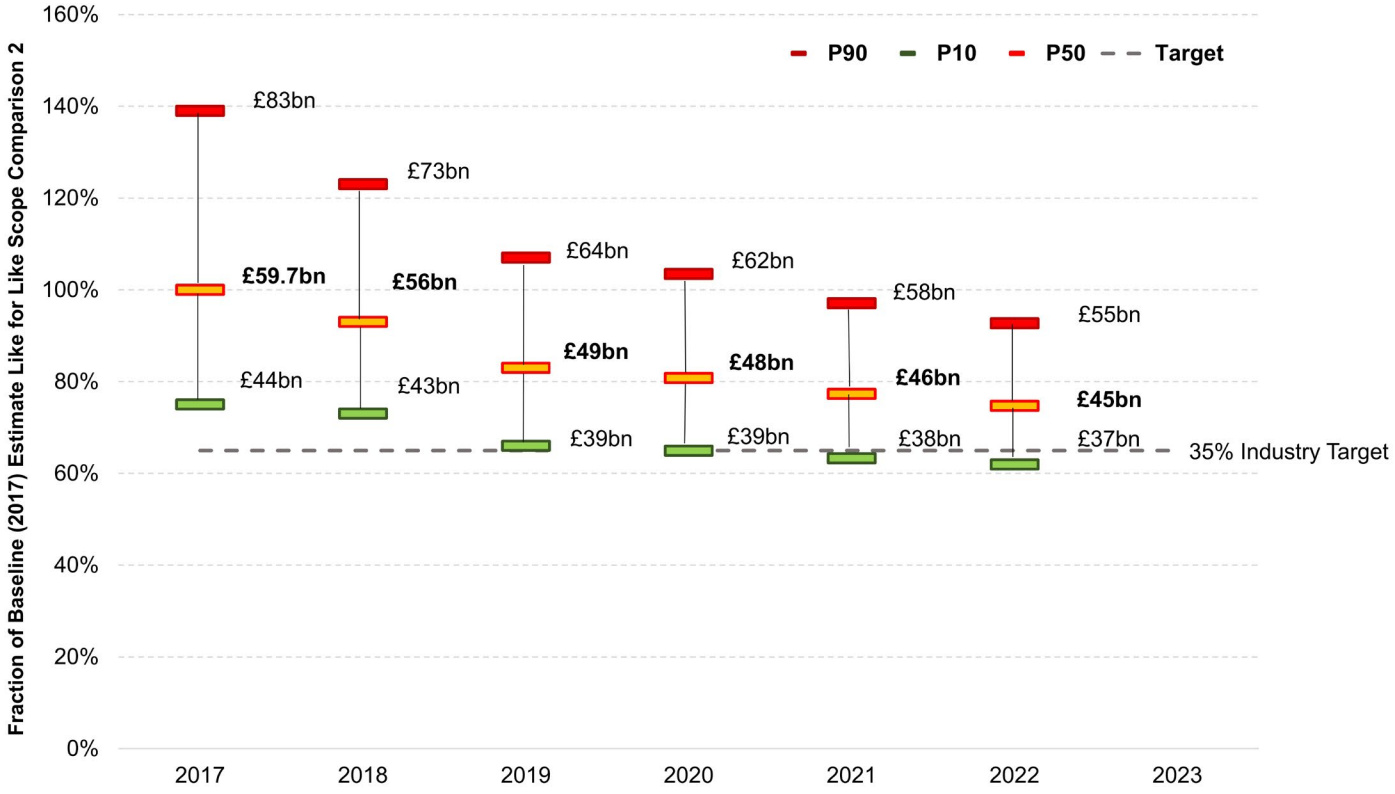
For reference the following are provided within report appendices

- The annualised decommissioning cost profile spanning full lifecycle of UKCS decommissioning (Appendix 2).
- The change in decommissioning forecast 2017-2022 by proportion of WBS category (Appendix 3)

[1] 2016 prices
[2] 2021 prices

Figure 1: Like-for-like cost trends

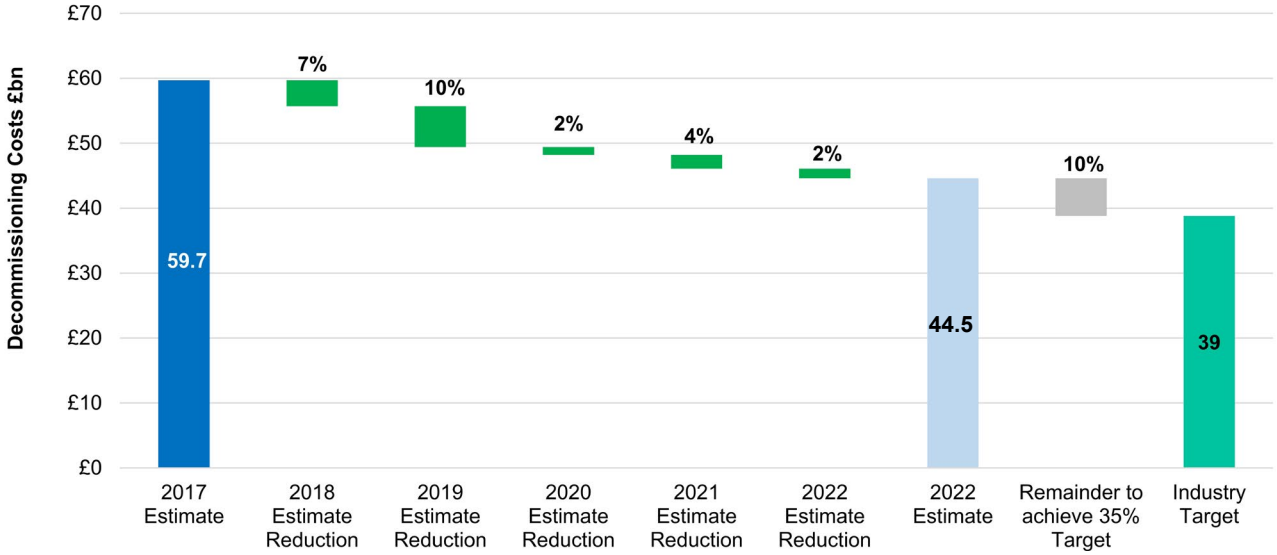
Probabilistic (P10; P50; P90) cost estimate (£bn) from 2017–2022[3] relative to industry target.



[3] Year of reporting based on prior year survey

Figure 2: Decommissioning cost reductions towards 35% target (like-for-like)

Progression towards 35% target (probabilistic, £bn) over period 2017–2022[4] reflecting annual % cost forecast reduction each year.



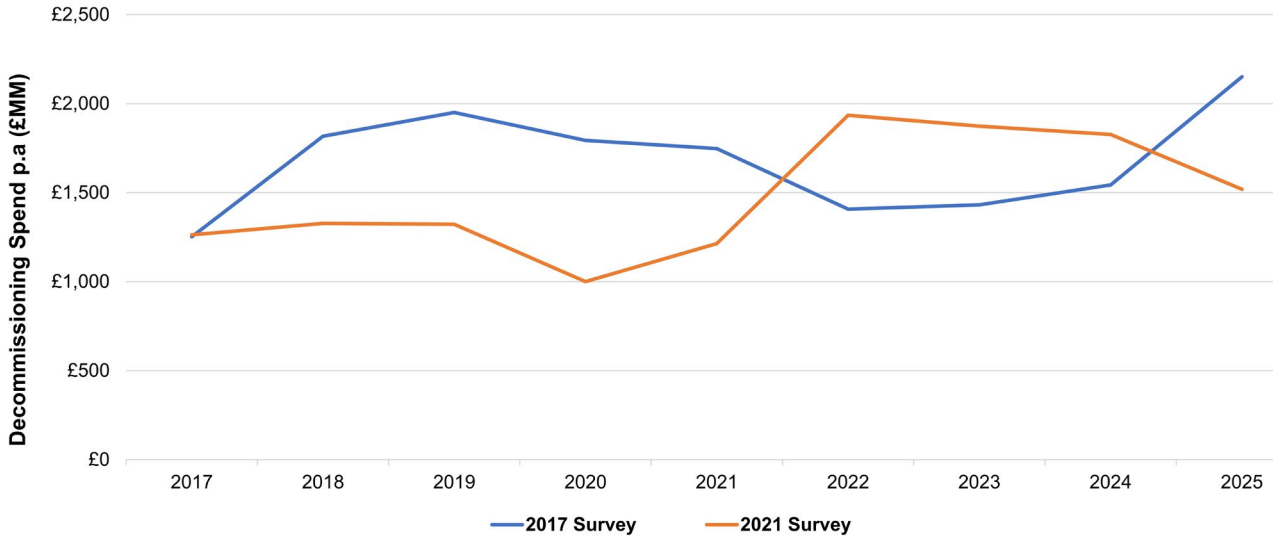
Despite a slowdown in the cost reduction trajectory, abandonment and decommissioning expenditure (AbEx) remains significant. In 2021, AbEx was £1.2bn with approximately10% of total 2021 UKCS oil and gas sector expenditure, compared with a forecast spend of £1.4bn.

Historically AbEx actual expenditure has consistently lagged behind the initial forecast estimate (Fig.3).

[4] Year of reporting based on prior year survey

Figure 3: Decommissioning actual / forecast cost profile[5]

Trend of initial forecast cost vs actual cost over reporting period.



The lower-than-planned spend can be broadly attributed to:

- Improved execution efficiency
- Deferred or delayed decommissioning execution as a direct/indirect result of Covid-19 and or unforeseen events or circumstances
- Prevalence of lower market conditions in some sectors of the decommissioning industry

[5] Basis: offshore UKCS scope only; deterministic

Whilst 2021 spend was lower than planned, decommissioning expenditure is forecast to ramp up, over period 2022–2024, to £1.5–£2bn p.a. (Fig.4a and Fig.4b) and anticipated to remain at these levels for the next two decades, peaking at £2.5bn p.a. during late 2020s. Decommissioning spend is forecast to become a significant cost centre for UKCS oil and gas sector consistently accounting for 25 to 30% of UKCS spend (opex and AbEx combined) over the next four decades (Fig.5).

Figure 4a: Decommissioning short-term cost profile

Short-term decommissioning cost forecast as reported 2020 & 2021 stewardship surveys.

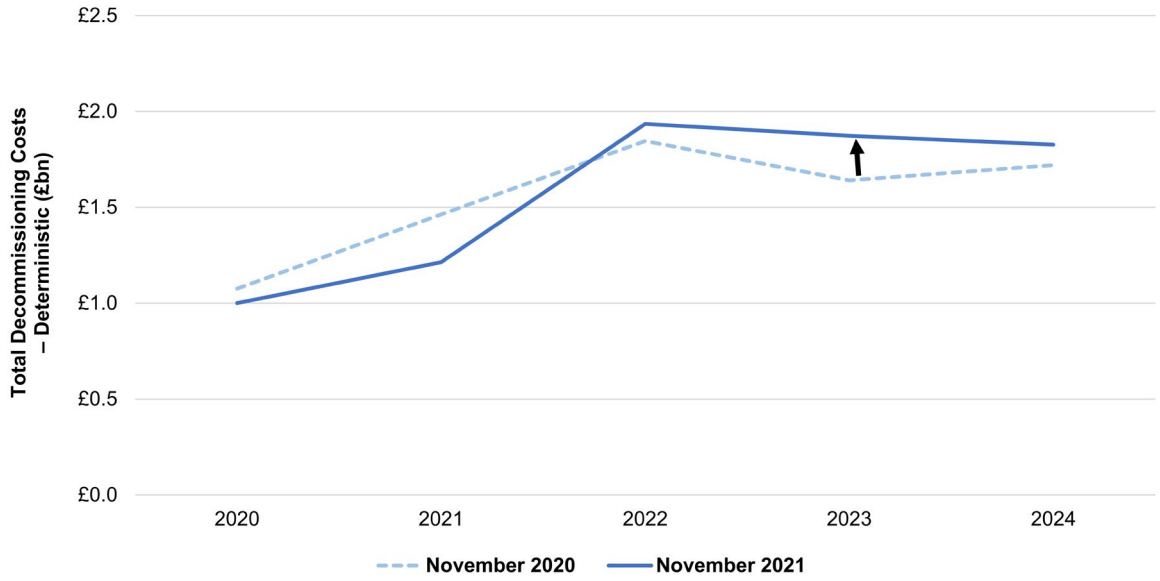


Figure 4b: Five year outlook of UKCS relative spend (%) by category

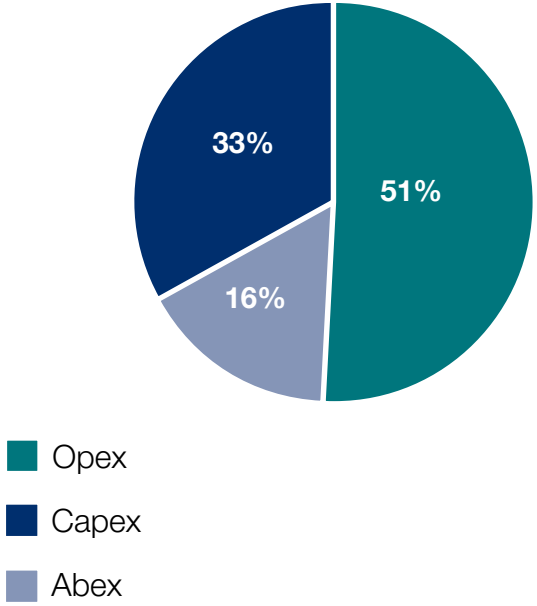
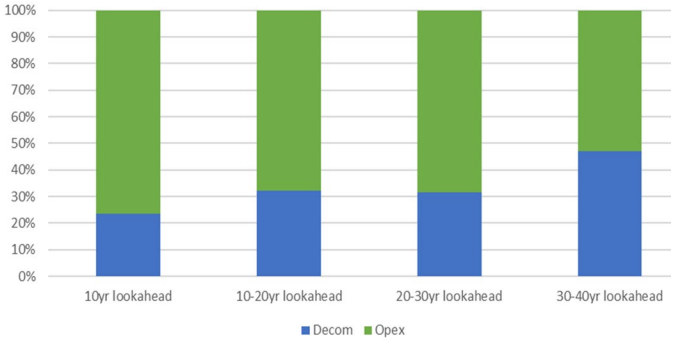


Figure 5: Decommissioning spend long-term profile

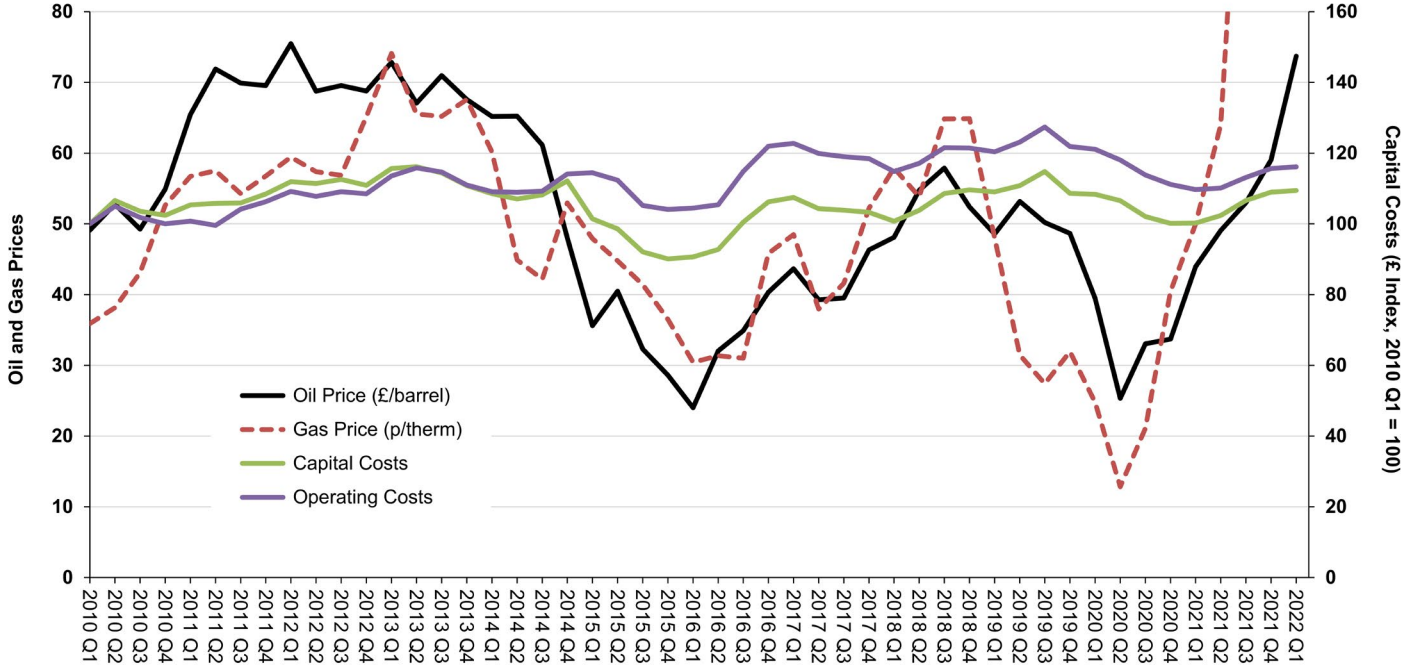
Long term UKCS decommissioning cost profile (%) relative to Opex cost forecasts



Industry achieved large cost reductions (17%) in the first two years of tracking against the target, but progress has slowed to 8% during the period 2019-2021. Combined with the possibility of inflation (Fig. 6a, Fig. 6b). in the market this will make it challenging to achieve the ambitious target cost reduction of 35% by end-2022 (reported 2023).

Figure 6a: Energy price cost profile

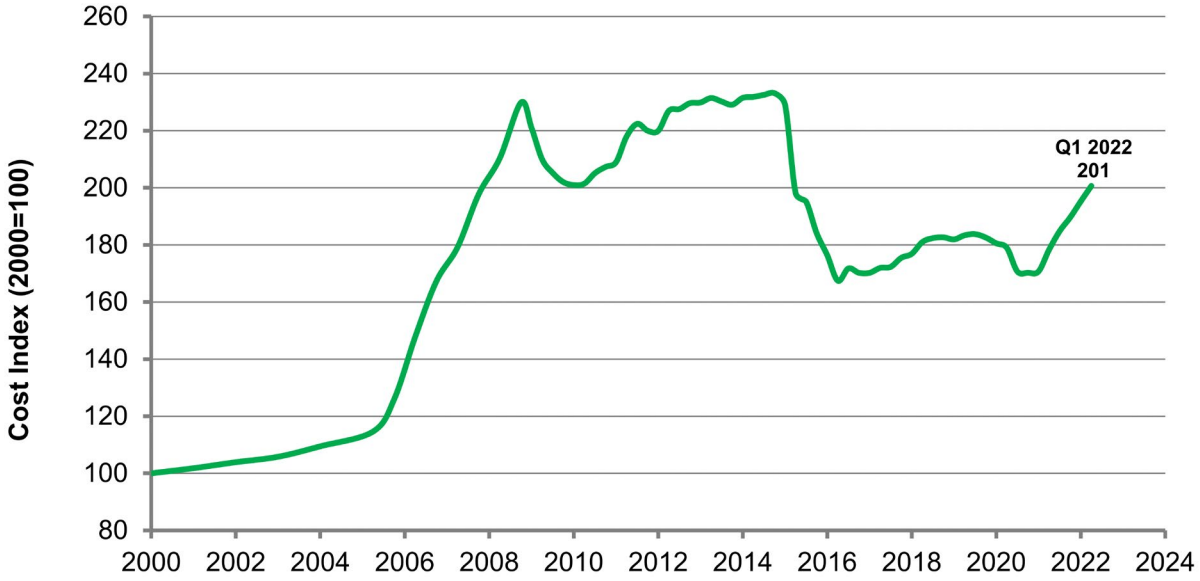
Trend of commodity (oil & gas) prices[6] over time.



[6] Source of data: https://ihsmarkit.com/info/cera/ihsindexes/index.html

Figure 6b: Upstream capital cost index

Upstream Capital cost Index[7] over time



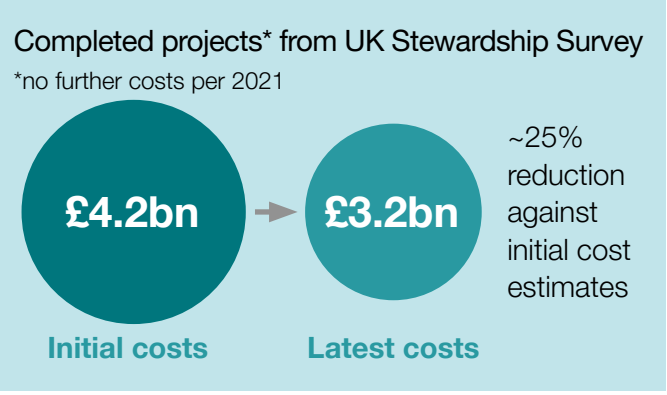
However, the magnitude and value of the cumulative 25% (£15bn) reduction achieved to date is admirable, reflecting the significant collective effort of industry over the preceding five years.

[7]Source of data: https://ihsmarkit.com/info/cera/ihsindexes/index.html

1b. Actual outturn spend

Consistent with the net reduction and saving reported in 2021, the actual cost performance[8] is about 25% lower than initial forecast, equating to a saving of approximately £1bn (Fig.7)

Figure 7: Actual costs (£bn) vs initial forecast



1c. Decommissioning executed during 2021

The actual scope executed during 2021 is summarised for the four material scopes and cost drivers below:

Wells: 78 platform and 14 subsea

Topsides removed: 5 (>53,000 Te)

Substructures removed: 3 (>10,000Te)

FPSO removals: 2

[8] Indicative only; does not reflect cost of all completed projects

2. Decommissioning forecast (like-for-like) movement 2020–2021

2a. Work Breakdown Structure (WBS) – material changes

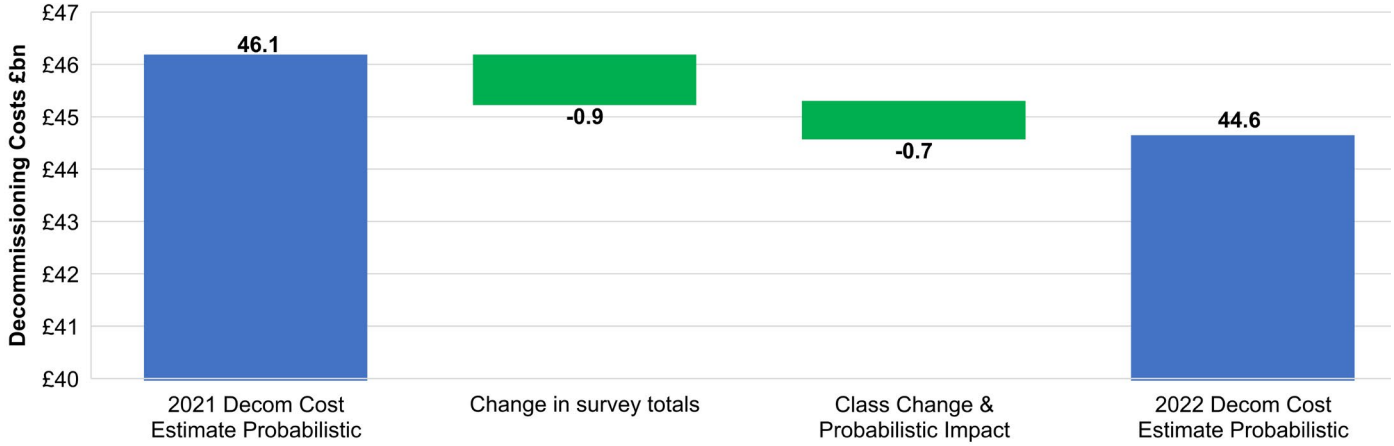
A net reduction in the forecast cost of decommissioning of £1.5bn (Fig.8) has been reported with changes in forecast attributed to:

- Over 50% of the saving being a function of change in WBS forecasts;
- Improved estimate classification (Section 3c)
.

Changes to the estimate classification continue to have a significant impact on the overall forecast, highlighting the risk of potential inconsistent interpretation of current AACE guidance artificially skewing the forecast. In conjunction with industry the NSTA propose to publish decommissioning specific supplemental guidance on determining cost maturity in 2023 as part of the ongoing work with industry to re-baseline the decommissioning estimate, effective January 2023.

Figure 8: Decommissioning cost estimate reductions (2021 – 2022[9])

Change in decommissioning cost estimate by cost category



[9] Year of reporting based on prior year survey

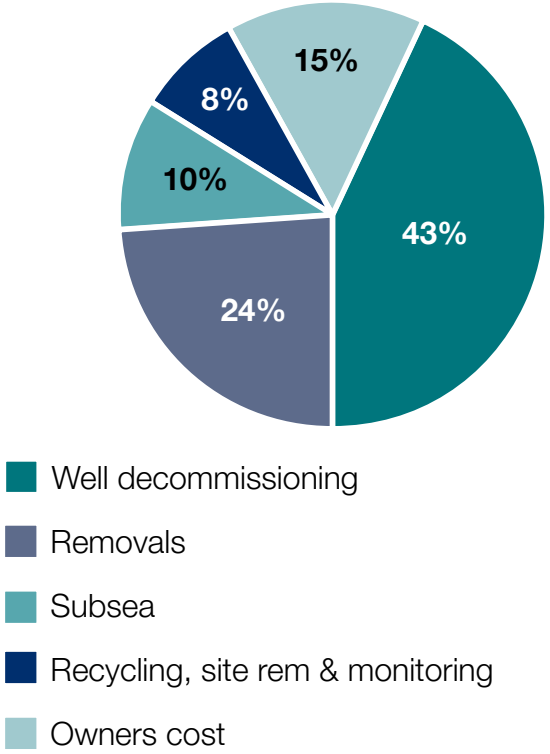
Offshore Energies UK (OEUK) has defined 11 WBS elements, of which four continue to make up more than 80% of the total decommissioning cost forecast (Fig.9):

- WBS 2: Post CoP running costs
- WBS 3: Well decommissioning
- WBS 6/7: Topsides/jacket removals
- WBS 9: Subsea infrastructure removals

Geographical sector proportions follow a broadly similar pattern (Appendix 4) to that of the UKCS as a whole.

Figure 9: Proportion of UKCS costs by WBS element

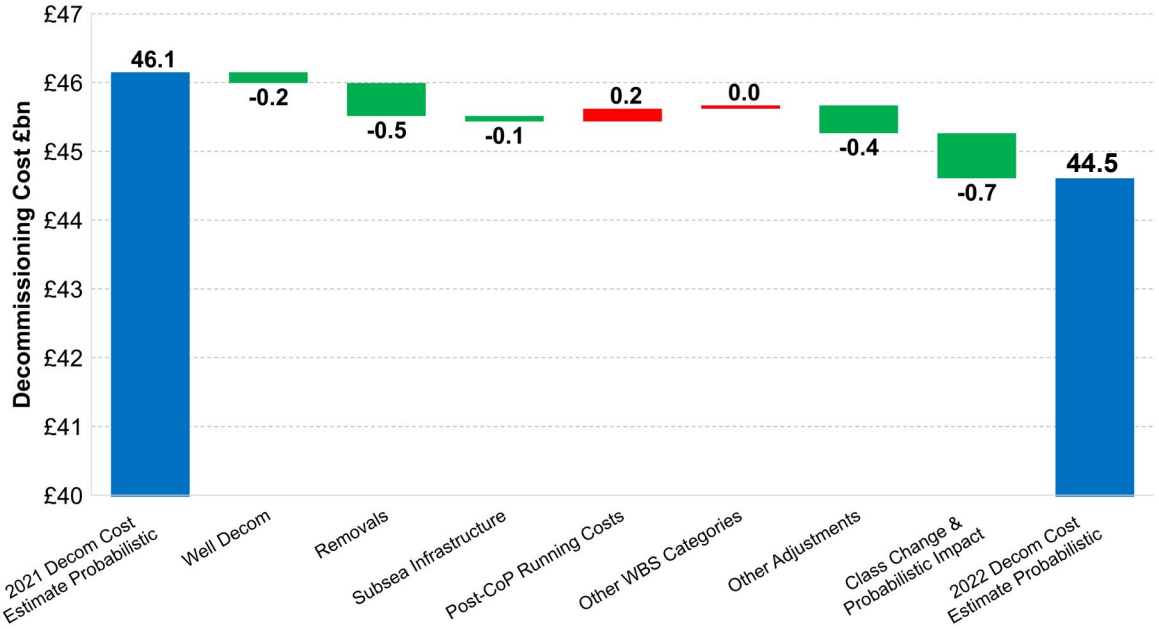
Relative proportion of forecast costs split by WBS for the UKCS



Forecasts decreased for three of the four primary WBS categories in a like-for-like scenario (Fig.10). Post-CoP running costs increased in both 2020 (+£0.4MM) and 2021 (+£0.2MM) and reflect an upward trajectory.

Figure 10: 2021 to 2022[10] Decommissioning cost estimate reduction categories

2020 to 2021 cost estimate waterfall by category (like-for-like, probabilistic, £bn)



[10] Reporting year

- Large reductions to well decommissioning cost forecasts in 2020 (-£1.3bn) were not sustained into 2021. The shift towards well decommissioning campaigns in 2021, with broader industry adoption during 2022 has the potential to leverage substantial reductions in the future
- The impact of having to decommission wells to the standard required for Carbon Capture and Storage (CCS) has not been fully quantified but presents a risk of future cost growth
- The upward trend in post-CoP running costs is counter to the reduction seen across all other WBS elements and should remain an area of focus

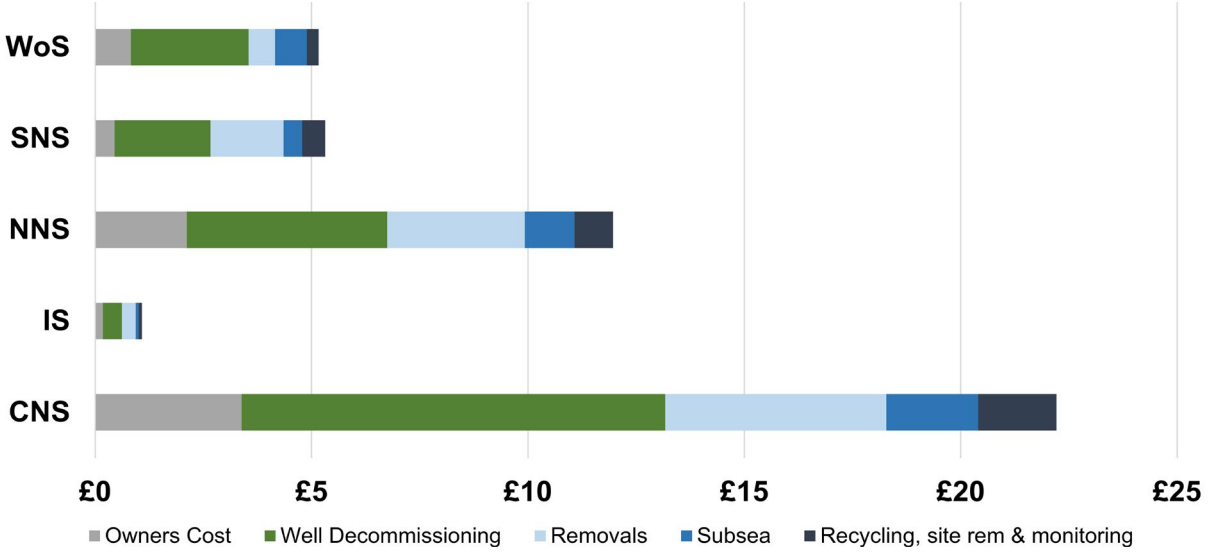
A further breakdown of change in cost forecast 2021–2022[11] is provided for reference (Appendix 5).

The spread of forecast costs by UKCS sector and WBS remains consistent with previous years (Fig.11).

[11] Year of reporting based on prior year survey

Figure 11: Full portfolio forecast cost (2022+) by region and WBS

Distribution of full portfolio forecast split by region and primary WBS elements



- Central North Sea infrastructure accounts for 50% of total decommissioning costs, with West of Shetland and the Northern North Sea combined contributing a further 40%
- Well abandonment remains the costliest element of decommissioning, at approximately 45% of total forecast
- Well abandonment combined with removals make up more than 70% of the forecast

Case study:
Efficient Decommissioning Execution

Much of the Southern North Sea production infrastructure consists of small, Normally Unattended Installations (NUIs), connected by pipelines to larger hub processing facilities. Due to their basic configuration, decommissioning of these NUIs typically need support from accommodation barges, drilling rigs, and heavy lift vessels.

One decommissioning contractor, Petrodec, is now implementing a radically different '1-visit' approach for NUIs, with well abandonment, pipeline isolation/ cleaning and removals are all being executed from a single jack-up rig, reducing operations time and costs. In addition, when the platforms design allows it, the topside removal is achieved by sliding the structure on skid beams onto the deck of the rig resulting in lower dependency of the removal operations to weather conditions.

Further efficiencies can be achieved by "harvesting" the jackets as a wider campaign.

NSTA Decom Team Comments

It is recognised that rig/vessels hire can be one of the most expensive elements in decommissioning execution. This 'one vessel approach' reduces the mobilisation / demobilisation costs, removes the need of hiring multiple vessels and allows for learning efficiencies to be realised through the work continuation by the same crew and using the same equipment.

This is a good example of efficient and cost effective decommissioning execution.

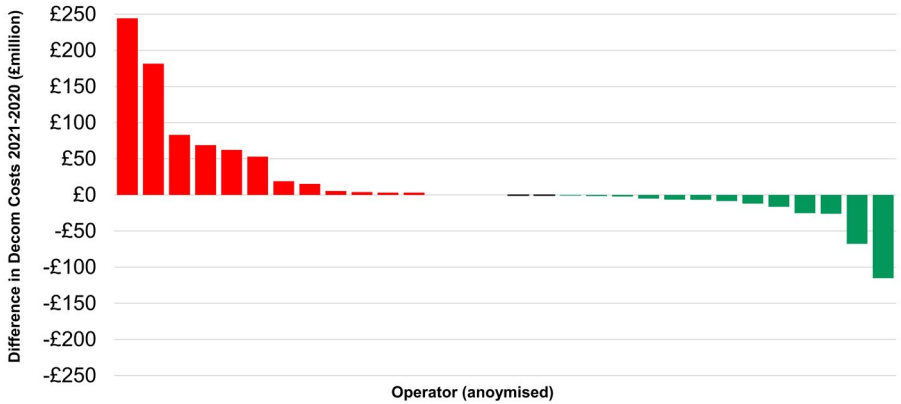
3. Decommissioning full portfolio and glidepath forecasts

3a. 2021 forward portfolio forecast

While the like-for-like forecast[12] reflects a net reduction of £1.5bn, the full portfolio decommissioning cost estimate for 2022 onwards increased by £0.5bn[13] (Fig.12).

Figure 12: Change in operator estimate 2021–2022[14] (2022+)

Change in forecast cost of Operators 2021–2022 decommissioning forecast estimates full portfolio 2022 forward (excluding adjustments)



[12] 2016 money
[13] Excludes adjustments and probabilistic risking; offshore UKCS scope only, 2021 money
[14] Year of reporting based on prior year survey

The increase is driven by a variety of factors, including:

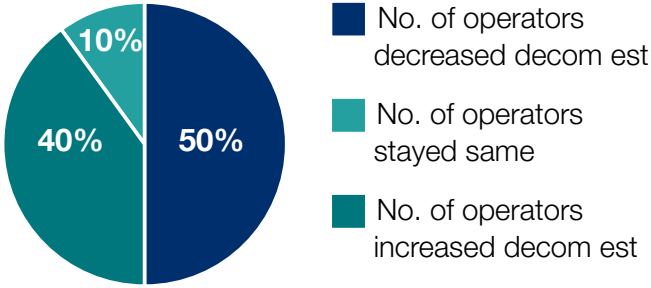
- Increases in post Cessation of Production (CoP) running cost accounting for approximately 50% of the full portfolio forecast increase
- Instances of changes to previous assumptions surrounding forecast CoP dates
- Higher commodity prices driving market activity and upward cost pressures
- Asset specific knowledge, increased definition of scope and asset conditions with transition from provisioning estimates to project based estimates over project lifecycle

Consistent with last year's survey, there continues to be an equal split between the number of operators forecasting increased costs and those whose forecasts are flat or have decreased (Fig.13a & Fig.13b). Increases continue to have a more material impact on the overall forecast.

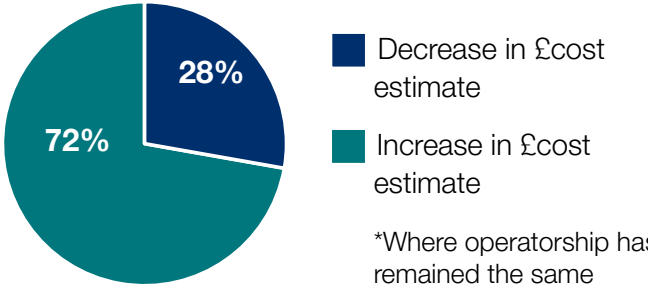
Figure 13a & 13b: Ratio of forecast changes and forecast impact

Change in estimate expressed in proportion of decreased to increased estimates

% of Operators with decreased v increased estimates from 2021*



Operator £ movements: ratio of decreased vs increase



*Where operatorship has remained the same

3b. Glidepath decommissioning costs

The NSTA decommissioning glidepath lays out the trajectory for decommissioning up-to six years prior to CoP.

As of 2021, more than 140 assets were on the glidepath and are forecast to command decommissioning spend of up to £10bn[15] equivalent to 29% of UKCS forecast total.

The variance in operators' decommissioning cost forecasts for glidepath assets spans a wide range from approximately +30% to -20% (Fig.14).

Figure 14: Change in operator glidepath forecast (%)
Anonymised change by Operator of costs on glidepath

[15] 2022+ deterministic UKCS offshore assets only

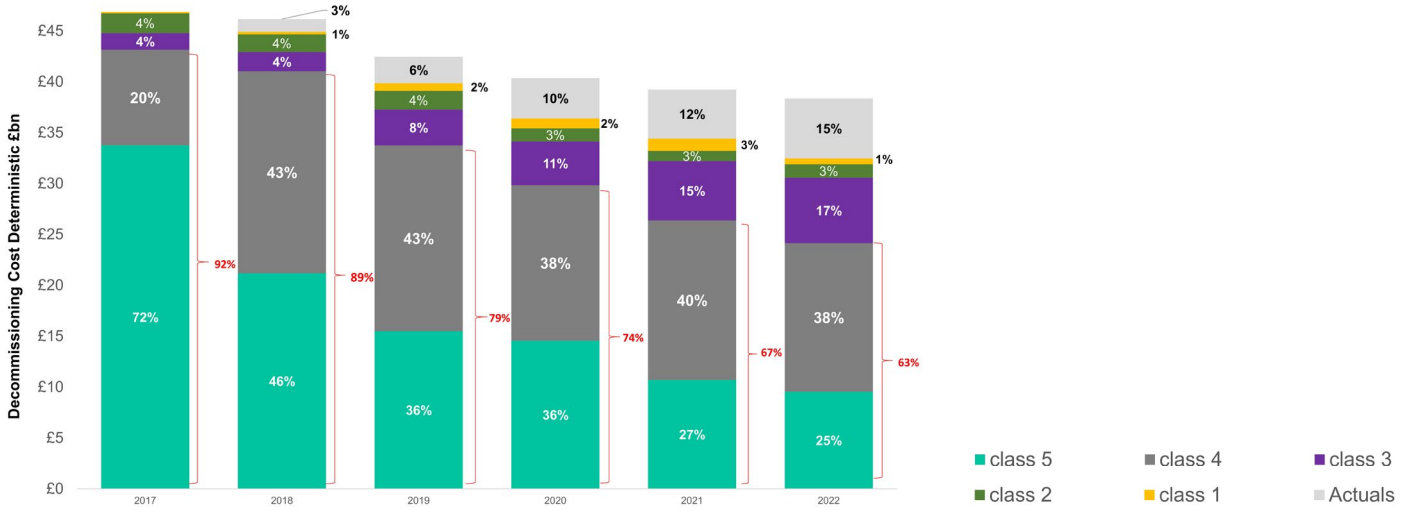
3c. Cost estimate classification

Cost estimate maturity (class 1-3) trend reflects a net improvement in maturity of all estimates.

- 37% of all estimates, independent of timing of expenditure, are identified as class 3 or below (Fig.15)
- 78% of all estimates within three years (spend for period 2022–2024) are class 3 or below (Fig.16)

Figure 15: Decommissioning cost distribution by estimate quality

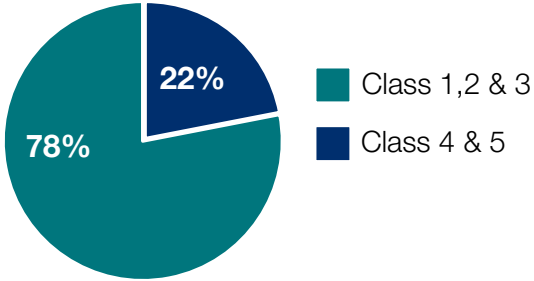
Class estimate improvement p.a. 2017–2022[16]



[16] Reporting year

Figure 16: Estimate quality for spend 2022–2024

Estimate maturity for spend 2022–2024



Increased cost maturity is consistent with increased front-end loading; project definition and preparation for project execution.

Case study:
Ninian North Topside Blowdown – 9 months in the planning, 10 seconds in the execution!

The Ninian North Topside structure arrived at Dales Voe in late 2020 via the Pioneering Spirit vessel operated by Allseas. The Veolia decommissioning team decontaminated the structure, removing all on-board hazardous materials to allow for demolition to commence.

The Ninian Topside platform was a 14,200-tonne steel structure, and due to it being loaded onto site on its jacket legs stubs, the cellar deck was circa 30m high, and the associated drilling derrick being circa 100m in height.

Due to the size and scale of the topside platform, the majority of the structural steel elements were beyond the cutting capability of a specialist demolition shear at the stated heights. This therefore eliminated the use of specialist demolition excavators/shears at its load-in height. The platform height, linked with the risks of working in a site environment that can experience strong winds and rain, led to working at height being deemed an unacceptable risk for the site team.

The Veolia PM team therefore designed a collapse method using explosive cutting charges to initiate a controlled collapse of the topside platform. This innovation was the result of months of planning (approx 9 months) coordinated with the client team and other key stakeholders.


3/3 NINIAN
NORTHERN

The 'controlled collapse' method significantly reduced the risk to the workforce by designing out working at height. Extensive planning with key stakeholders over several months enabled the explosive collapse of the platform legs to bring the structure much closer to the ground. By 'blowing' out the jacket legs from under the topsides, it could be brought to ground using a controlled collapse technique.

The driver for this approach was to reduce working at height for the site team, adopting a best practice approach in line with the Working at Height Regulations 2005. By reducing the height of the platform, Veolia eliminated over 90% of crane lifts, and promoted specialist 'remote' demolition techniques. We successfully removed any requirement to place people on the platform at height to fully demolish the rig.

They also removed the need for all lifting operations which would normally be associated with this type of activity. There was a reduction of felling structures from significant height which has reduced noise, dust and vibration impact.

On 5th June 2021, the platform was successfully collapsed without incident.

Ultimately, this demolition resulted in achieving the main aim of no accidents, no harm to personnel or damage to the environment. In addition to this success, team also safely demolished this platform ahead of schedule with additional significant cost savings from reduced weather downtime which would ordinarily be lost through wind speed restrictions when working at height.

It was important to Veolia to recover and recycle the maximum amount of materials as possible, this was achieved with great success as the recover/recycle rate for the project was over 97%. This vision was in support of the Veolia ethos and supports the offshore industry with their own vision for sustainability.

Veolia Peterson partnership provides a full decommissioning service including decontamination, deconstruction, waste management, and environmental services together with associated integrated logistics, marine, and quayside services. The partnership has been providing onshore decommissioning services for over 12 years and achieved 'excellent' environmental assessment ratings in the process. These services are offered by the partnership from their Dales Voe and Greenhead Base yards in Lerwick, Shetlands.

The controlled collapse of a topside platform initiated by explosive cutting charges was a first for the UK demolition industry, and due to its success the project was nominated for a Decom North Sea Decommissioning Award.

4. Well decommissioning

4a. 2021 progress and forward projections

The UKCS has approximately 870 inactive / suspended (all well categories) wells[17]. Although 92 wells were reported in the NSTA Stewardship Survey as being fully decommissioned (i.e. AB3 status) the overall number of suspended wells has increased by more than 100 compared to the same period in 2021.

87% of subsea wells were decommissioned as planned in 2021 but the reported figure for platform wells was significantly lower at less than 50% of plan (Table 1).

Additionally, the average cost per platform well was 30% (£1MM per well) higher than planned.

While only approximately half of the originally forecast scope of platform wells were reported as fully decommissioned as planned last year, this underplays the extent of well decommissioning activity and the work to partially decommission wells (AB1/AB2)[18] is not reflected in the figures.

The reasons cited for the discrepancies between planned and actual platform activity and costs were:

- Delays in well decommissioning due in large part to Covid-19 pandemic
- Plan instability
- Shift in well decommissioning strategy to phased and batch execution to optimise schedules and minimise cost

[17] Data as of July 2022
[18] AB1: A wellbore where the reservoir has been permanently isolated. AB2: All required permanent isolation barriers have been installed and verified (including environmental barriers)

– Initial phase of decommissioning, up to AB1/AB2 status, for groups of wells; followed by final phase of well decommissioning, to AB3 status, taking place at a future date with more cost efficient forms of execution

It is encouraging to see batch and campaign operations being employed across the industry.

This shift is fully aligned with the principles of the NSTA Decommissioning Strategy and the NSTA will explore the potential to collect additional data to improve visibility on phases of decommissioning, including abandonment (e.g. AB1/AB2) status to better align with current industry decommissioning practices.

Table 1: Well decommissioning plan vs actual 2021

Reflects the planned vs actual well decommissioning scope for 2021 for both platform and subsea wells alongside the corresponding forecast and actual cost

2021 activity	Platform wells		Subsea wells	
	AB3 planned (actual)	Cost £MM planned (actual)	AB3 planned (actual)	Cost £MM planned (actual)
CNS	15 (1)		14 (10)	
IS	0		0	
NNS	64 (39)		0[19] (0)	
SNS	81 (38)		2 (4)	
WoS	0		0	
Grand Total	**160 (78)**	**484 (344)**	**16 (14)**	**151 (147)**

[19] Corrected for 2020 survey input error

Open water suspended wells

The number of outstanding open water wells is 171[20] with the earliest of these wells dating back to 1970s.

Agreeing decommissioning plans for the remainder of wells within this category remains a key priority for the NSTA, and the NSTA continues to work with industry to this end.

4b. Well decommissioning costs

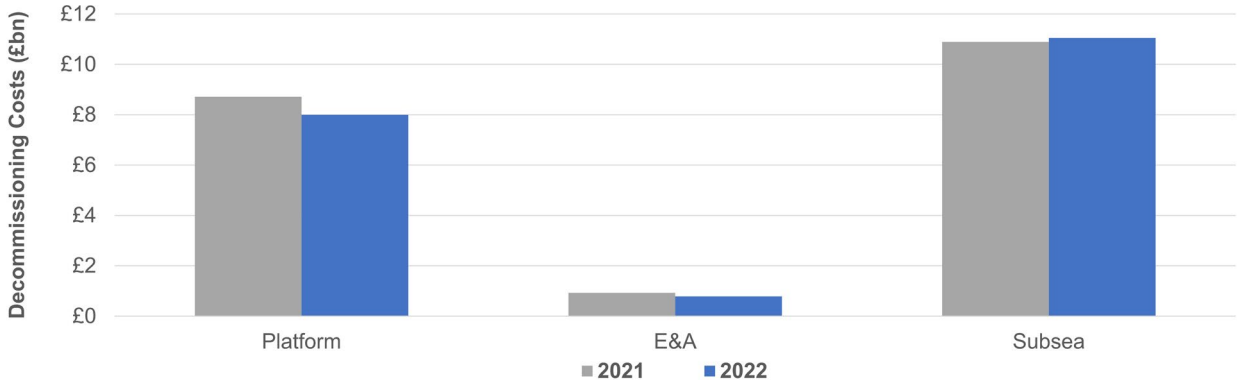
On a like-for-like basis the forecast cost of well decommissioning continues to decrease, but the scale of reduction has reduced. Well decommissioning accounts for a net reduction from last year, of £0.2bn.

This slowdown is attributed to Covid-19, competing demand for decommissioning resources from other energy sectors (e.g. offshore wind) and market inflation.

On a full portfolio basis, the forecast cost of decommissioning the remaining (majority) UKCS well stock (Fig.17) remains at £20bn.

[20] July 2022

Figure 17: Full portfolio well decommissioning forecast (£bn)
Well decommissioning cost by type



4c. Wells decommissioning lookahead

Inactive development wells

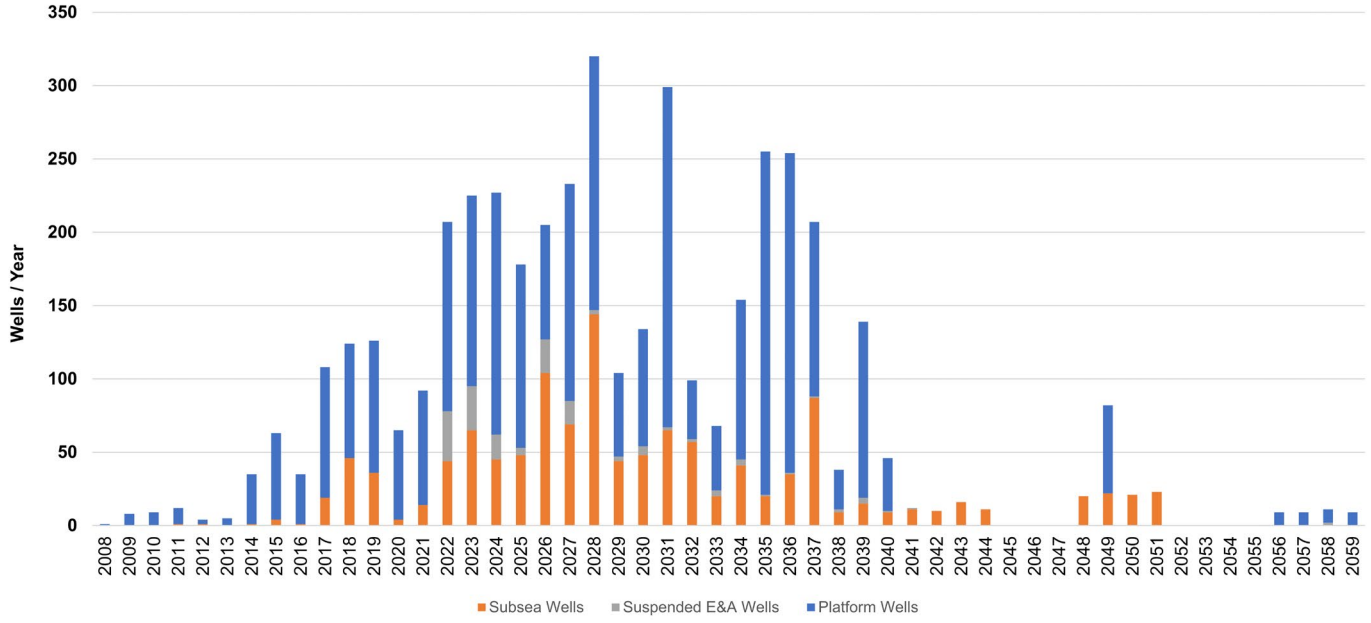
The UKCS has approximately 700[21] inactive development (suspended platform and subsea) wells. Over the next five years (2022–2026) a further 1000 wells are forecast to become inactive. Both the short-medium term and long-term outlook for inactive wells reflects a substantial volume of work to come and provides UK supply chain with opportunity for continuity and consistency of work for up to two decades at an average rate of 150–200 wells p.a. (Fig.18). The forecast inactive well decommissioning cumulative profile included for reference (Appendix 6).

[21] Data as of July 2022

NSTA expects operators fulfil their commitment to decommission inactive wells in accordance with current guidance[22] and no later than the established regulatory deadlines and milestones.

Figure 18: Forecast inactive well decommissioning profile

Inactive UKCS well decommissioning profile over time



[22] Inactive well guidance

The UKCS Suspended Well Stock interactive application and the NSTA Decommissioning Data Visibility pilot project, launched in 2021, are key to improving the visibility of inactive well stock awaiting decommissioning for the supply chain.

Carbon capture & storage and wells

With the award of six UKCS carbon storage licences to date, and the NSTA's launch of the UK's first licencing round in June 2022, the size and scale of CCS across the UKCS continues to grow in support of the 2050 net zero target.

The number of wells required to be re-used for CCS and the extent to which well decommissioning costs will increase, as a consequence of higher well abandonment standards and/or increased scope, has not yet been fully quantified or accounted for in the 2022 forecast projections.

With the rate of reduction in well decommissioning costs having slowed, alternate means to achieving further cost reductions are now needed, including

- Mainstream adoption of collaboration and campaigning
- Increased deployment of existing commercially available technologies
- Accelerated qualification and commercialisation of new well P&A technologies

Campaigns and collaboration

Last year, there was a marked increase in the aggregation of inactive wells and the formation of multi-field/operator decommissioning campaigns, which have obvious potential to drive efficiencies and lower costs. There were clear signs in the first half of 2022 that the adoption of campaigns is becoming a mainstream way of working.

The Energy Pathfinder portal gives the supply chain much more visibility of future UKCS decommissioning work and collaborative opportunities.

Technology

Several new or improved technologies have been brought to bear in the decommissioning of facilities (topsides and jackets) making a significant impact on cost efficiency and contributing to the cost reductions reported on the facilities scope.

Although the deployment and value that technology has brought in driving down the cost of well decommissioning has grown over recent years, the full potential has not yet been realised and technology best practice and innovation have a key role to play in achieving further substantial cost reduction.

Working with the Technology Leadership Board (TLB), the Net Zero Technology Centre (NZTC) has recently launched an industry collaboration initiative aimed at accelerating the pace at which well P&A technology is qualified and commercialised. The aim is to have six technologies qualified and adopted by 2025 focused on:

- Alternative barrier materials (e.g formation barriers, alloy fusion plugs)
- Inspection and verification technologies (e.g thru tubing logging, ultra-sonic logging tool)
- P&A enabling technology (e.g rigless well P&A systems, thru tubing abandonment)

Case study:
Wells decommissioning and collaboration/innovative contracting

In September 2021, Repsol Sinopec awarded a multi-million-pound contract to Aberdeen-based Well-Safe Solutions to execute the decommissioning of all wells in its Buchan and Hannay fields.

This is the first fully-inclusive well decommissioning contract of its kind and enables Repsol Sinopec and Well-Safe Solutions to manage efficiencies, share operational knowledge and streamline costs.

The schedule control provided as part of this contract enables Well-Safe to deliver its Plug & Abandonment (P&A) Club approach, helping to deliver a campaign-based methodology aligned with the North Sea Transition Authority's Decommissioning Strategy.

The project is divided into two phases, covering P&A activities for 14 wells in total. Phase one execution commenced with Well-Safe Guardian mobilised to the field in January 2022. The J2 (Buchan field), H01 and H02 (Hannay field) wells were safely and efficiently plugged and abandoned, with a strong operational focus on preserving the safety of personnel, the environment and the rig. Phase two is likely to commence in early 2023 and will complete the remaining well P&A activities in approximately 12 months.

5. Cost reduction progress 2017–2021 recap

5a. Cumulative cost reduction & actual spend

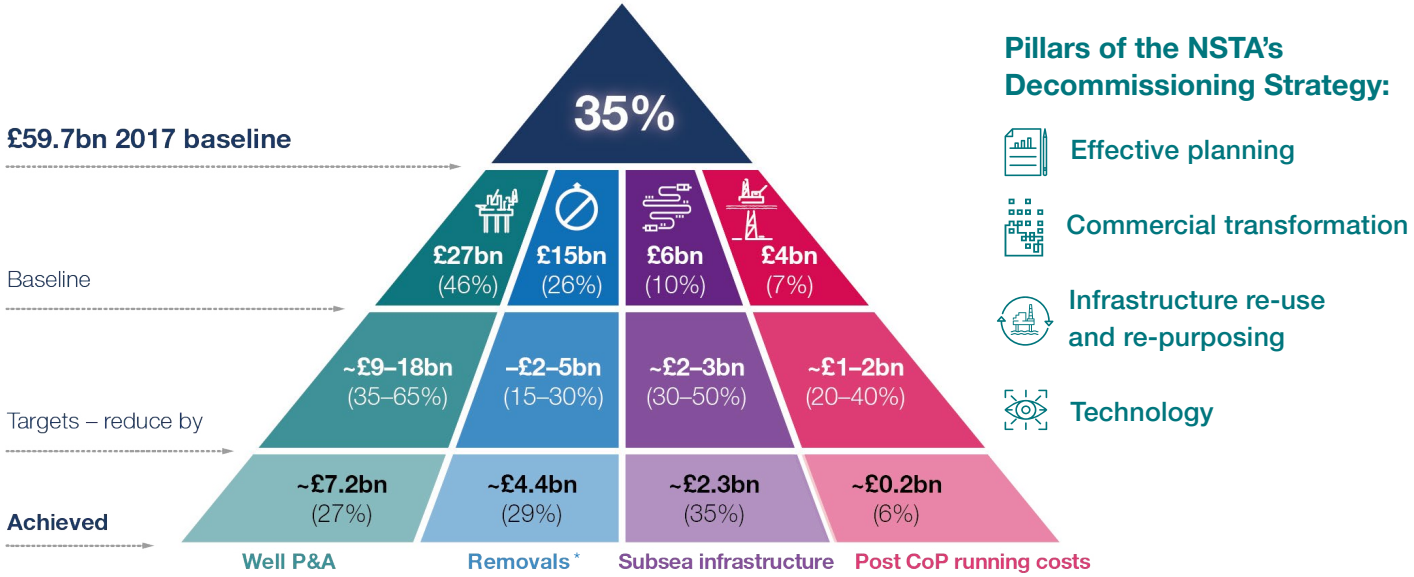
Industry has made substantial cost reduction progress since the baseline cost (£59.7bn)[23] and 35% target were established in 2017. Progress highlights include:

- Cost reduction of about 25% equating to a saving in the realm of £15bn as of year-end 2021
- Cost to the Exchequer of tax relief and refunds reduced
- Actual spend of more than £6bn liquidated

[23] 2016 prices

Progress against the 2016 baseline forecast for the four WBS elements making up the majority (80%; £52bn) of forecast decommissioning costs is set out below:

Figure 19: Decommissioning cost reduction targets by WBS
to achieve the ambitious 35% target set by the NSTA by the end of 2022.



* Removals include topsides removal, jacket removal, topside prep and isolation and cleaning

5. Cost reduction progress 2017–2021 recap

Well decommissioning (46%)[24]

Well Decommissioning costs have reduced from an initial baseline forecast of £27bn to £20bn (27% reduction).

- **396 platform**
- **119 subsea wells**
- **33 open water suspended wells** (estimated)

Infrastructure removals[25] (26%)

Forecast cost of removals has fallen from £15bn to ~£10bn (29% reduction).

- **36 topsides removed (total weight 164,000Te)**
- **4 FPSOs removed**
- **31 substructures removed (total weight 58,000Te)**

Subsea infrastructure (10%)

Cost of subsea infrastructure decommissioning has fallen from £6 to ~£4bn (> 30% reduction).

Post CoP running costs (6%)

The reduction in post CoP running costs over five years has remained modest with a reduction of £0.2bn from a baseline forecast of £4bn plus an upward trend being observed over past two years.

[24] % of 2016 baseline
[25] Includes costs associated with Prep, Removal & Make safe

To provide more focus on the post CoP running costs, a number of new metrics are now being reported by the NSTA or considered for inclusion under the re-baselining and reporting of the cost estimate, e.g.:

- The NSTA's Decommissioning Benchmark Report includes a metric for "time from CoP to cold stack", which is a function of time taken to complete platform well P&A
- A ratio outlining the proportion of platform wells decommissioned either before or after CoP is being considered for inclusion as part of the update of the cost estimate and targets for commencement in January 2023.

Case study:
Northern Producer Offstation Project

Northern Producer arriving at Kishorn Port, Wester Ross

Following deterioration in the oil price in '20/'21, the Northern Producer Floating Production Facility ('FPF') and Dons Fields were rendered sub-economic. Production was also impacted by gas deficiency due to the decision to COP and decommission the upstream Thistle asset.

With close collaboration between EnQuest and partners Ithaca and vessel owner Northern Offshore, a COP date of 1 March 2021 was set, with key work identified in order to achieve this. Effective and proactive engagement with key stakeholders and regulators was critical to the success of this project. Regular discussions were undertaken with multiple regulators to assess permit and consent requirements and align with project timeframes which was particularly problematic given SEPA's IT system breach during December 2020.

Following COP, the project team progressed with the following scopes to support disconnection of the FPF and removal from field:

- *Infield Pipeline Cleaning & Flushing*
- *Export Pipeline Cleaning & Flushing*
- *DSV Disconnection of Wells & Pipelines*
- *Riser Cutting & Disconnection*
- *Hydrocarbon Freeing of Topsides & Interval Vessel Cleaning*
- *Preparation for Tow/Asset Disconnection*
- *500m Zone Clearance & Pipeline Remediation*

Following commencement of COP, the Northern Producer FPF was handed back to Northern Offshore in just 45 days on 19 April handsomely beating its P10 and P50 target dates of 21 April and 28 April respectively. Following removal from the field, the Northern Producer FPF was disconnected from the mooring system and safely towed to Kishorn for cold stack arriving on 26 April where rundown activities commenced prior to the departure of the asset team.

The prompt and efficient removal and decommissioning of the Northern Producer FPF enabled post COP OPEX to be minimised and with the field being gas deficient, a significant reduction in diesel consumption and subsequent carbon emissions.

Clearance of the 500m zone is continuing, with two out of the three campaigns completed with the following work undertaken:

- *Pipeline cutting complete*
- *Mattress recovery and return to shore*
- *11 x risers and flexible flowlines removed and returned to shore*
- *Mid Water Arch removed and returned to shore*

The final vessel campaign is planned for September where the previously cut pipeline sections will be recovered and ends remediated with structures and oil field debris removed. Upon completion of the 500m zone clearance, over trawl surveys will be performed in order to reinstate access to fishing. This will conclude the Dons Fields decommissioning and Northern Producer Offstation Project.

6. Decommissioning lookahead 2022–2031

6a. Forecast and scope

The forecast UKCS decommissioning spend over the forthcoming decade (2022–2031) is £20bn[26], or up to an average of £2bn p.a. While market volatility is inevitable, decommissioning offers the certainty, predictability, scale and longevity to support the development of a sustainable market.

Innovative commercial models and efficient execution models are key levers in mitigating fluctuations in pricing and it is encouraging to see industry make progress in these areas with proportionate and equitable sharing of risk. However, further evolution in the way that industry approaches and manages decommissioning is required.

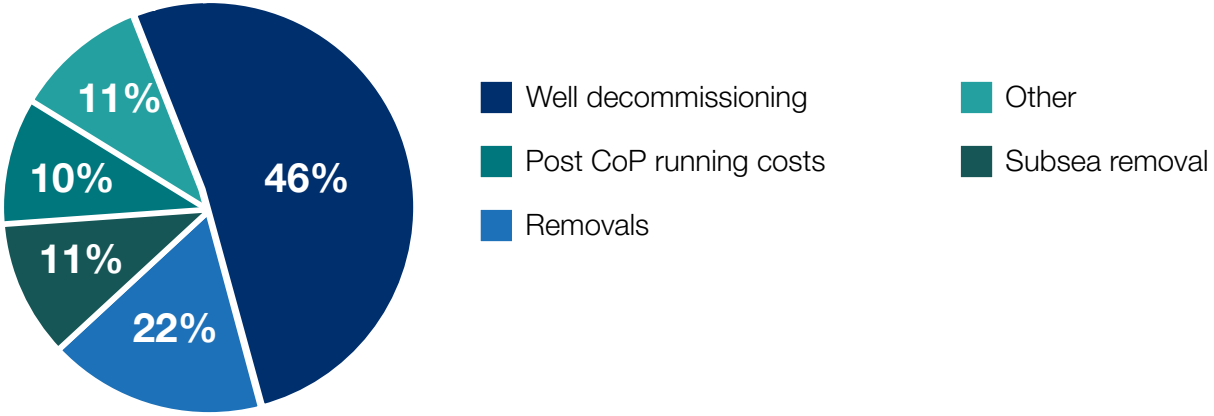
It is also recognised that the more operators opt to outsource decommissioning work the greater the opportunity is to sustainably grow skills, knowledge, and lessons learned within the supply chain leading to lower cost and deliver cost efficient outcomes.

While the British energy security strategy[27] provides a positive outlook for the supply chain with potential opportunities for diversifying service offerings and expanding into sectors such as offshore wind, it is critical to the delivery of UKCS decommissioning obligations that these opportunities complement decommissioning rather than replace it.

[26] Offshore UKCS asset costs only; inclusive of cost for E&A well abandonment (deterministic)
[27] BEIS, British energy security strategy (April; 2022)

The medium term forecast spend (Figure 20) across the four main WBS categories and cost drivers remains consistent with the short term outlook.

Figure 20: Decommissioning forecast (2022–2031) by primary WBS element



Decommissioning work to be executed over the next decade includes:

Wells: 1317 platform, 676 subsea and 139 open water suspended wells

Topsides removals forecast 126 (900,000Te)

Substructures removals forecast 126 (560,000Te)

FPSO removals forecast 14

The average cost of well decommissioning over the coming decade is forecast to be significantly lower than the average actual cost in the last five years (Table 2).

Table 2: Forecast cost reduction in well decommissioning 2022–2031

Forecast cost change in well decommissioning relative to preceding five year reporting period

	2017–2021 (£MM)	2022+ (£MM)	Net change (£MM)	Forecast reduction
Platform wells	4.3	2.8 – 3.0	-1.3	-30%
Subsea wells	11.0	7.9 – 8.2	-2.8	-25%

6b. Cost estimate re-baseline and new target (2023+)

It is widely recognised that the introduction of the baseline cost estimate and 35% cost reduction target, expiring at the end of 2022, has heightened awareness and brought more scrutiny and focus to UKCS decommissioning costs. The forecast has materially reduced (£15bn to date) and the decommissioning landscape is changing to align with the priorities outlined in the NSTA Decommissioning Strategy, including:

- Decommissioning planning
- Commercial transformation
- Supporting net zero by 2050
- Technology improvement

Data submitted through the 2022 NSTA Stewardship Survey will be used to provide a final measurement of progress against the 35% target and will be reported in summer 2023.

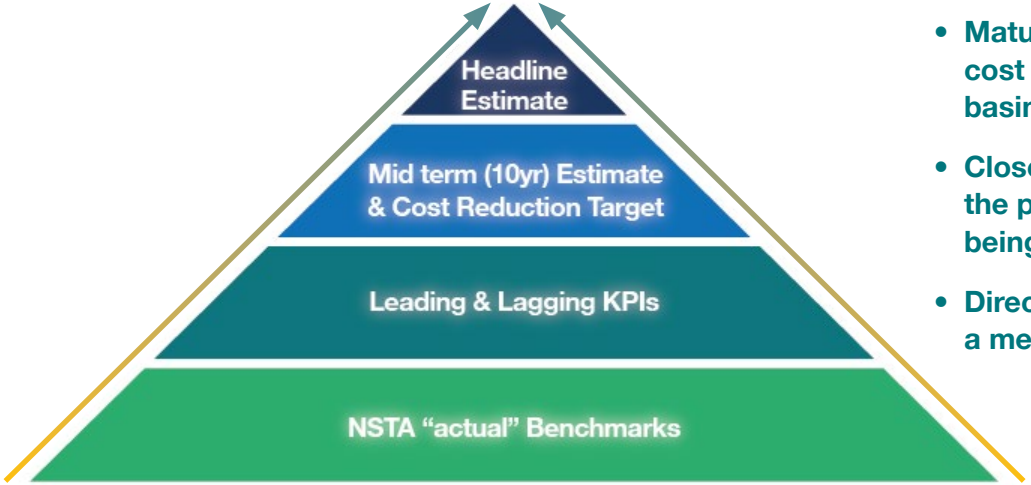
To maintain focus, the cost forecast will be updated and re-baselined from January 2023, along with the launch of a new cost target, developed with industry, plus supporting Key Performance Indicators (KPIs) aimed at tracking actual spend, decommissioning readiness and cost performance improvement.

A new target will be set for the coming five year cycle, respecting and acknowledging the medium-term economic outlook and market pressures.

The framework for the re-baselined estimates and target (Figure 21) reflect input from key stakeholders and is an evolution of the current model. It is founded upon principles of:

- Maturity/confidence in forecast cost of decommissioning basin for full scope and lifecycle
- Closer alignment with the practices and procedures being applied by industry
- Direct influence over costs in a medium (10 year) time frame

Figure 21: Re-baseline decommissioning cost estimate framework



- **Maturity/confidence in forecast cost of decommissioning the basin's full scope and lifecycle**
- **Closer alignment with the practices and procedures being applied by industry**
- **Direct influence over costs in a medium (10 year) time frame**

6c. Risks and opportunities

Industry efforts to decommission UKCS infrastructure more cost efficiently are subject to to a range of risks and opportunities, including:

Risks

- Geopolitical instability, macro-economic pressures and economic policies, including:
  - Direct and indirect impact of global and UK inflation on the energy sector and decommissioning
  - Energy Profits Levy (EPL) on investment decisions
  - Global finance and exchange rate
- Maintaining a steady and predictable UKCS decommissioning workload
  - Energy trilemma (secure, clean and affordable)
  - Availability and competition for transferable skills and resources
- Socio-environmental pressure
  - Increase in decommissioning scope (change to current regulatory conditions)
- Net zero, re-use and re-purposing
  - Increased cost of well decommissioning to protect reservoirs for future use (e.g. CCS)
  - Cost of carbon offsetting energy revenue leading to sub-economic assets and decommissioning plan instability/change

Opportunities

- Collaboration and commercial transformation
  - Mainstream adoption of decommissioning campaigns
  - Broader (e.g. with other related UKCS energy sectors) and deeper (e.g. adoption of less traditional E&P contracting models) collaboration
- Technology
  - Acceleration of technology deployment
- Decommissioning long term horizon
  - Longevity of scope and opportunity to supply chain market
  - Reduction in decommissioning cost of pipelines and facilities to be repurposed

North Sea Transition Authority

NSTA continues to support industry, setting **new cost-efficiency target**

Re-baseline estimate & target to be launched in **January 2023**

Four decades of spend to come with **£20bn forecast** over coming decade 2022-2031

Decommissioning is a **crucial part** of **energy transition**

NSTA supports sector, promoting **well P&A campaigns**

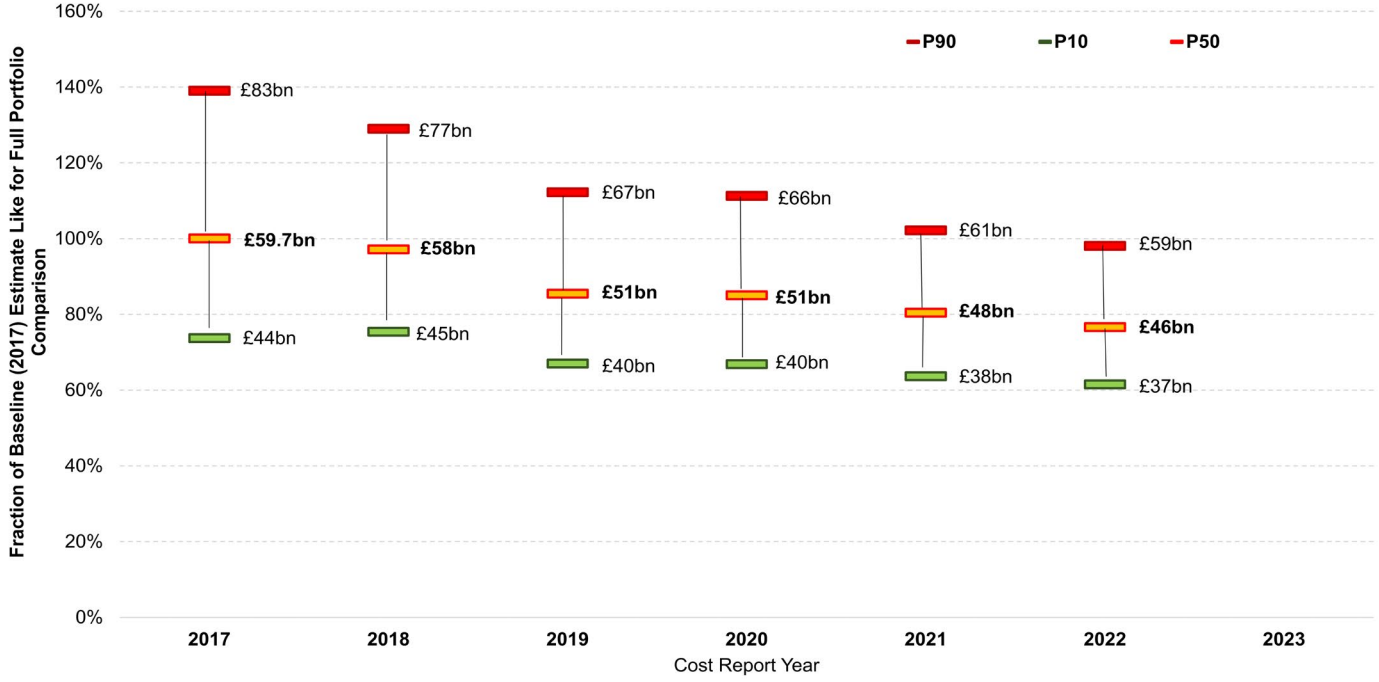
Money saved can be spent on **exploration, production and emissions reduction**

Pillars of the **NSTA Decommissioning Strategy** still valid and appropriate

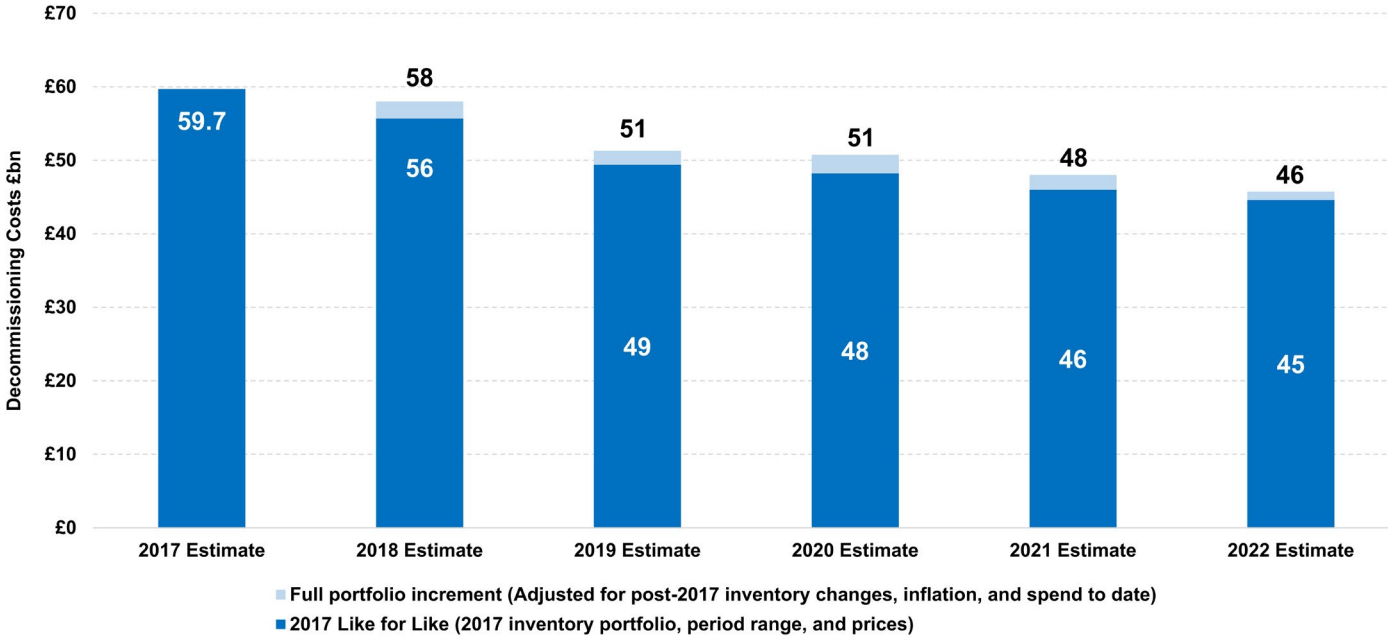
Appendices

Appendix 1a: Full Portfolio: forecast period per reporting year

Progression of full portfolio (2022+) decommissioning cost forecast (£bn p.a.) over preceding 5 years

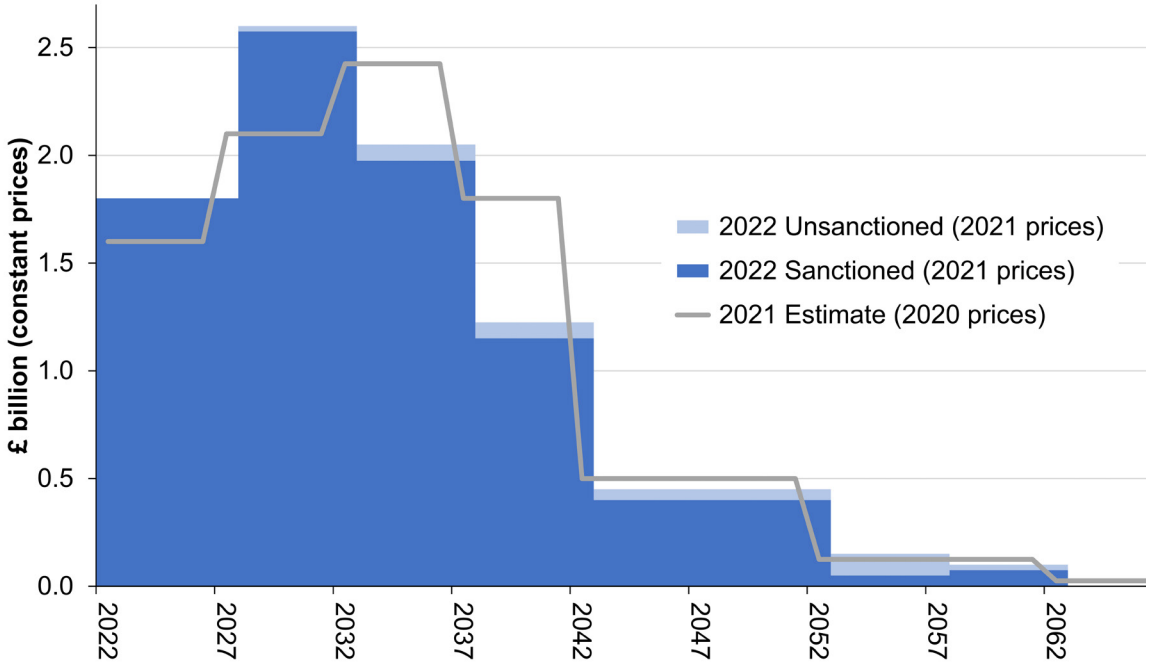


Appendix 1b: Combined like-for-like and full portfolio forecast change 2017-2022 *Decommissioning Estimate Change (probabilistic £bn)*



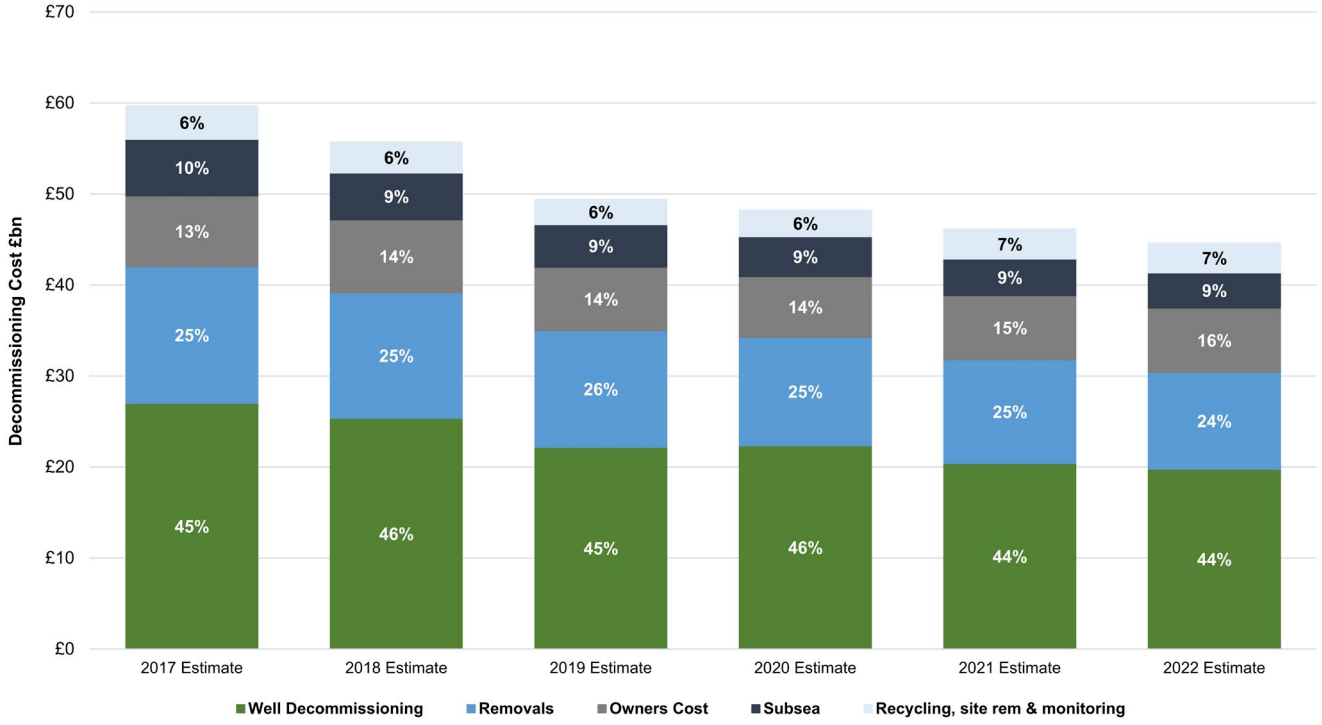
Appendix 2: HMRC cost profile

Projected annual UKCS decommissioning cost forecast (£bn) for full lifecycle of decommissioning



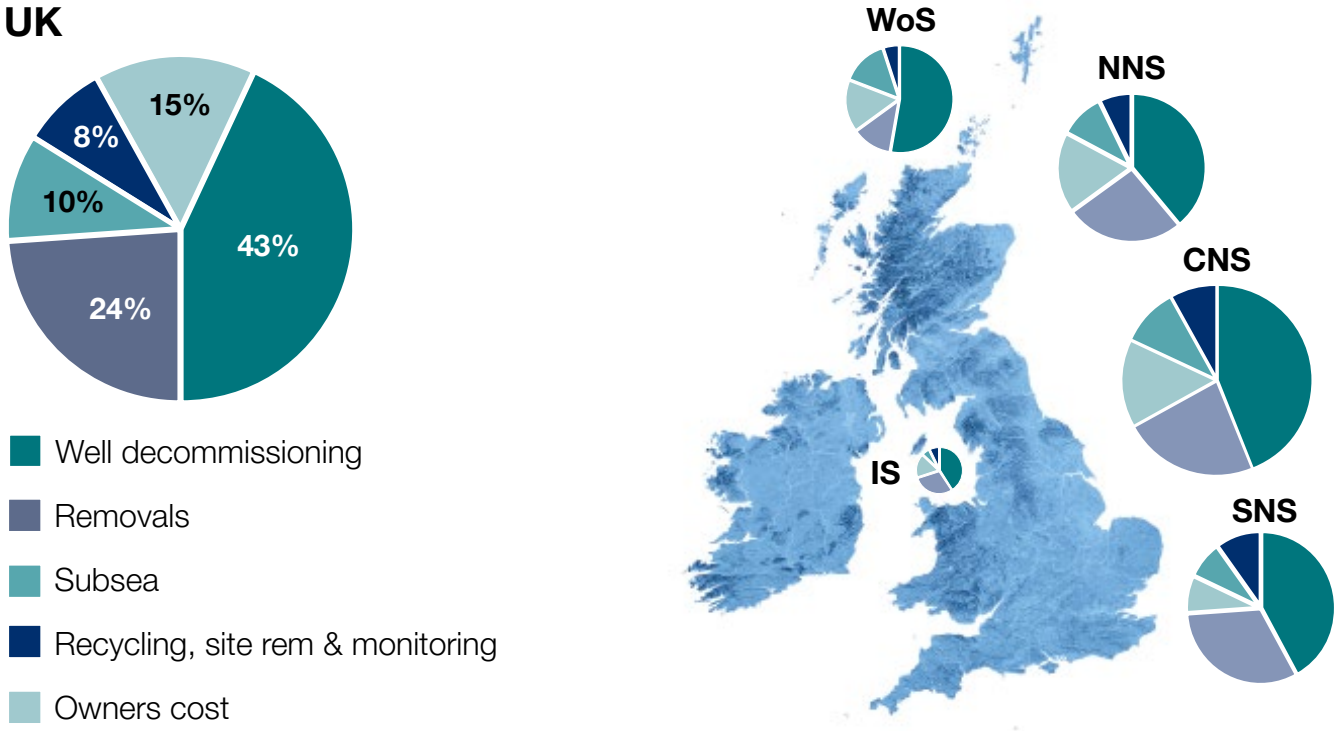
Appendix 3: 2017-2022 estimate change (like-for-like)

Change in decommissioning forecast 2017-2022 by proportion of WBS Category



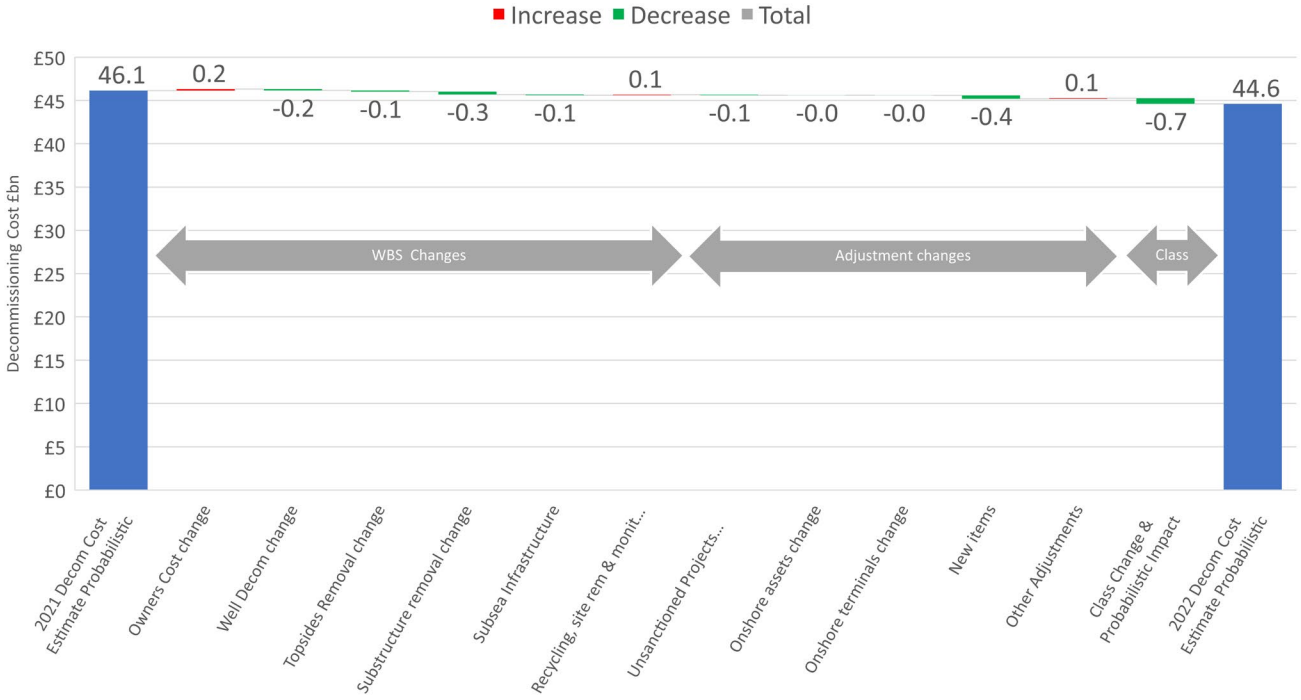
Appendix 4: Geographical cost split by WBS

Geographical sector distribution of scope & cost for primary WBS cost elements



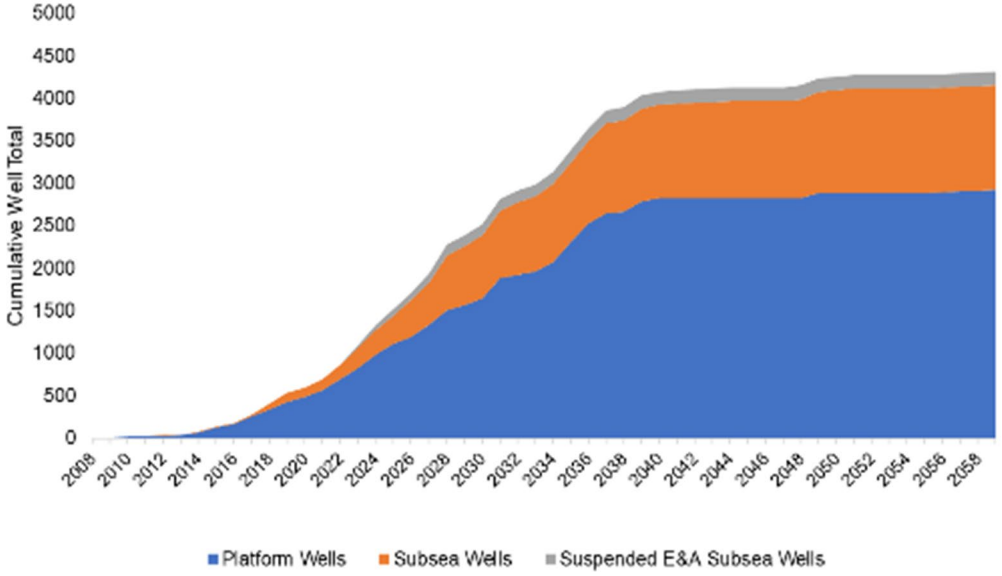
Appendix 5: 2022 forecast change by WBS

Detailed breakdown, by WBS, of change in decommissioning cost estimate forecast



Appendix 6: Well decommissioning cumulative profile

Aggregate well decommissioning profile, expressed as cumulative profile over time, split by well categories of platform, subsea and suspended E&A wells



Glossary of terms and definitions

AACE – Association for the Advancement of Cost Engineering

AbEx – Abandonment and Decommissioning Expenditure

CCS – Carbon Capture & Storage

CNS – Central North Sea

CoP – Cessation of Production

E&A – Exploration & Appraisal

EPL – Energy Profits Levy

IS – Irish Sea

£MM – UK pounds (millions)

NNS – Northern North Sea

NSTA – North Sea Transition Authority

NZTC – Net Zero Technology Centre

OEUK – Offshore Energies UK

SNS – Southern North Sea

TLB – Technology Leadership Board

UKCS – UK Continental Shelf

WBS – Work Breakdown Structure

WoS – West of Shetland

Definitions

2017 base line:

2016 NSTA UKCS Stewardship Survey and portfolio formed basis of 2017 decommissioning cost estimate

Like-for-like estimate:

Adjusted for inflation and aligned on a like-for-like basis with the original portfolio

Full portfolio:

The remaining decommissioning cost for the updated full portfolio (i.e. the latest view of remaining inventory, as from the beginning of each report year)

Glidepath forecast spend:

- Total spend, independent of year of spend, attributable to entity on glidepath
- Glidepath period for current reporting period is 2022–2027

Scope

The scope of the cost estimate is based upon the decommissioning of all UKCS infrastructure including:

- Facilities and development wells still in place and yet to be decommissioned
- All infrastructure and development wells currently undergoing decommissioning, excluding work performed prior to 2017
- All sanctioned facilities and wells not yet in place
- Proposed project developments, not yet sanctioned or built
- All intra-field pipelines and export lines
- Suspended open water exploration and appraisal wells
- Onshore terminals

Methodology

The NSTA 2021 UKCS Stewardship Survey was used as the data source, with decommissioning cost inputs provided by all operators for all current and proposed offshore facilities, pipelines, development wells, suspended open water exploration and appraisal wells and onshore terminals. Data was collected using the Offshore Energies UK (OEUK) Work Breakdown Structure (WBS).

The NSTA's approach, unchanged from previous years, has been to develop a probabilistic cost estimate which takes into account the wide range of uncertainties in estimates submitted by operators.

Estimate classes in the survey were requested with reference to the Association for the

Advancement of Cost Engineering and AACE guidance followed for selecting the values from these ranges (Table 3).

Table 3: AACE Classification of estimates (simplified)

Estimate Class	Expected Accuracy Range Typical variation in Low and High ranges at an 80% confidence interval	
	Low	High
Class 5	-20% to -50%	+30% to 100%
Class 4	-15% to -30%	+20% to +50%
Class 3	-10% to -20%	+10% to +30%
Class 2	-5% to -15%	+5% to +20%
Class 1	-3% to -10%	+3% to +15%

The estimate is comprised of various elements, where not all components have the same level of estimate definition. The estimate classification was requested from the operators responding to the UKCS Stewardship Survey and no adjustments were made to these operator self-assessments.

The estimate raw data has been collected using the OEUK Decommissioning WBS.

Where required, GDP deflation factors have been applied using a deflation factor for 2021 of 2.66%.

North Sea Transition Authority

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