North Sea
Transition
Authority

UK Oil and Gas Reserves and Resources

as at end 2023

Contents

1. Introduction and executive summary

Oil and gas will remain a part of the UK energy mix as we transition to net zero; managing the declining production will remain important[1].

Managing the basin's declining production to maximise value from the United Kingdom Continental Shelf (**UKCS**) is still vital to meet our energy demands as long as they exist, as well as reducing reliance on imports.

The purpose of this annual report is to provide an estimate of the UKCS's remaining recoverable petroleum Resources.

The report finds:

- The NSTA's estimate for Proven and Probable (**2P**) UKCS Reserves as at end 2023 is 3.3 billion barrels of oil equivalent (**boe**), 0.2bn boe lower than as at end 2022.

- In 2023, 424 million boe (**mmboe**) were produced, and 250 million boe net were added to 2P Reserves, which equates to a reserve replacement ratio of +59%. New Field Development activities across the industry were more than in 2022, with 310 mmboe matured by the granting of consent to 5 new field developments and 2 Field Development Plan Addenda.

- The UKCS's Contingent Resource level is significant with a central estimate of discovered undeveloped Resources of 6.1 billion boe. Much of this resource is in mature developed areas and under consideration for development. The maturation of Contingent Resources presents a significant opportunity for the UKCS's petroleum Resources. This will require substantial investment in both new field developments and incremental projects.

- In aggregate, UKCS petroleum Reserves and discovered Resources both remain at approximately 70% oil and 30% gas, when expressed in oil equivalent terms.

- The limited exploration drilling of six wells discovered less than 100mmboe in 2023[2]. A key part of exploration stewardship is now to progress the attractive opportunities within the Prospective Resource portfolio into drill-ready Prospects, and into subsequent Discoveries.

- The Mean Prospective Resources in mapped Leads and Prospects are estimated as 3.5 billion boe, unchanged from the end of 2022. This is supplemented by an additional mean prospective resource of 11.2 billion boe estimated to reside in Plays outside of mapped Leads and Prospects.

[1] https://www.nstauthority.co.uk/media/9028/nsta-february-2023-production-projections-plus-ccc-and-desnz-demand-projections-v3.xlsx
[2] Note that this figure is subject to revision as a result of future appraisal activity.

2. UK Reserves and Resources

The NSTA estimate for remaining UKCS recoverable petroleum Resources, include Reserves, undeveloped Resources and undiscovered petroleum Resources. A total of some 47.3 billion boe of oil and gas had been produced from the UKCS by the end of 2023.

The NSTA's current central estimates given as at the end of 2023 are summarised in Table 1 below (estimates as at the end of 2022 are given in parentheses).

Table 1 – Oil and gas Reserves and Resources central estimates as at end 2023 (end 2022) in billion boe

Reserves	2P
Reserves	3.3 (3.5)
Contingent Resources	**2C**
Producing fields	1.6 (1.6)
Proposed new developments	1.5 (2.0)
Marginal Discoveries	3.0 (2.9)
Prospective Resources	**Mean**
Prospects and Leads	3.5 (3.5)
Plays	11.2 (11.2)

Note: The classification of reserves and Resources is explained in Appendix B.

Ranges for these estimates are shown in sections 4 and 5.

Overall oil and gas Reserves as at the end of 2023 showed a decrease compared to end 2022. This is a result of production of around 424 mmboe in 2023 not being offset by additions to the Reserves base as a result of Field Development Plan (**FDP**) approvals or additional reserves adjustments for producing fields.

Contingent Resources showed a decrease compared to end 2022. This is due to the five new fields being promoted out of Contingent Resources to Reserves, offset by over exploration successes and revised estimates of existing fields from operators.

The mean Prospective Resources in mapped Leads and Prospects are estimated as 3.5 billion boe. This is supplemented by an additional mean Prospective Resource of 11.2 billion boe estimated to reside in Plays outside of mapped Leads and Prospects.

Note: Definitions of terms, and an explanation of how the NSTA categorisation compares to the Petroleum Resources Management System (PRMS) of the Society of Petroleum Engineers (SPE), are given in Appendix B. Reserves and Resources for developed fields and fields where development projects are under discussion were compiled from data provided by operators – these data have not been audited by the NSTA.

Proven, probable and possible reserves and Resources for a large number of individual fields and Discoveries have been aggregated to provide the totals shown. Note that figures for prospective (i.e. not yet discovered or "yet-to-find") Resources are naturally subject to a higher degree of uncertainty than those for discovered Resources. There will also be varying degrees of uncertainty in how much of the Contingent Resources will ultimately be developed.

Summing the overall estimates of the four categories of Resources (Reserves, Contingent Resources, Prospective Resources associated with mapped features and play-level Prospective Resources) does not imply any particular levels of probability that those volumes will ultimately be produced.
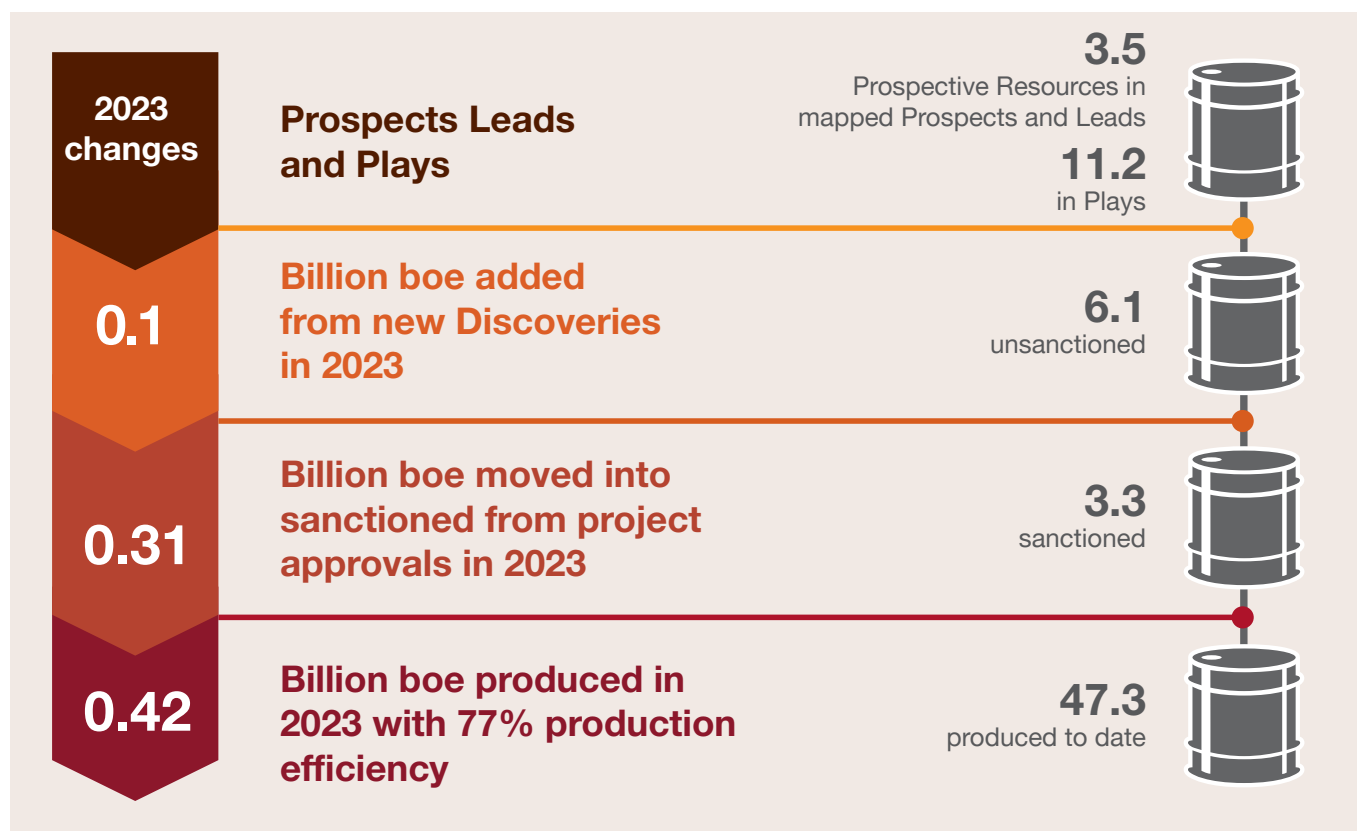
3. Oil and gas Reserves and Contingent Resources progression

3.1 UKCS Reserves and Resources progression in 2023

Figure 1, below, illustrates the progression of Resources and Reserves between the major categories during 2023.

- Four new Discoveries from exploration successes in 2023 added a little less than 100 mmboe to the Contingent Resource base.

- Five new Field Development Plans consented to in 2023 and two FDP addenda (**FDPAs**) for incremental projects in producing fields resulted in just 310 million boe movement from Contingent Resources to Reserves.

- Production during 2023 of around 424 mmboe resulted in a reduction in (remaining) Reserves.

Figure 1: Reserves and Resources progression

| 2023 changes	Prospects Leads and Plays	3.5 Prospective Resources in mapped Prospects and Leads 11.2 in Plays
0.1	Billion boe added from new Discoveries in 2023	6.1 unsanctioned
0.31	Billion boe moved into sanctioned from project approvals in 2023	3.3 sanctioned
0.42	Billion boe produced in 2023 with 77% production efficiency	47.3 produced to date

(Numbers in billion boe as at end 2023)

3.2 Reserves progression

Reserves reduced from 3.5 billion boe as at end 2022 to 3.3 billion boe as at end 2023. This was a result of:

- Production during 2023 of 424 mmboe

- Five new Field Development Plans consented to and two FDP Addenda for incremental projects in producing fields in 2023 resulted in 310 million boe movement from Contingent Resources to Reserves.

- A net decrease in the Reserves estimates for producing fields of 60 mmboe. This was due to downward revisions in some fields and life of field reductions (CoP acceleration), but offset by some positive additions from other in-field activities, improved field performance and life of field extension (CoP deferral).

Figure 2: 2P reserve changes from end 2022 to end 2023
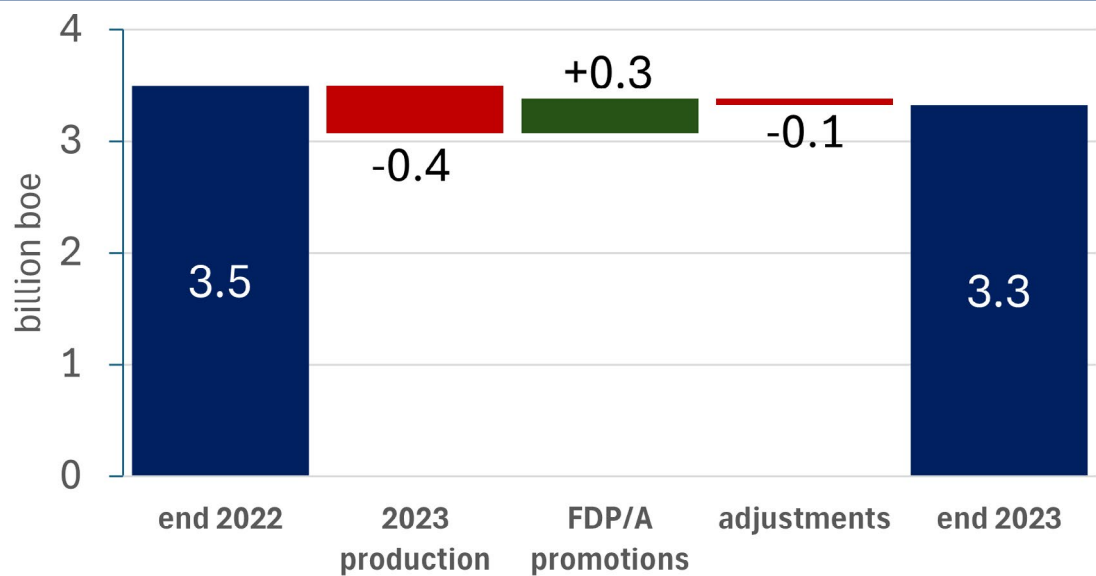
3.3 Contingent Resources progression

The UKCS's Contingent Resources represents a significant opportunity to progress discovered Resources to development. There was a 0.4 billion boe decrease in the central estimate of total Contingent Resources during 2023, the overall estimate now being 6.1 billion boe. There were a number of changes within the Contingent Resources categories, as a result of:

- Five new Field Development consented to and two FDP Addenda for incremental projects in producing fields in 2023 resulted in 310 million boe movement from Contingent Resources to Reserves.

- Four new Discoveries from exploration successes in 2023 added a little less than 100 mmboe to the Contingent Resource base.

- 6 more Discoveries being progressed by operators, and exploration success offset by revised estimates of existing fields from operators.

Figure 3: 2C resource changes from end 2022 to end 2023
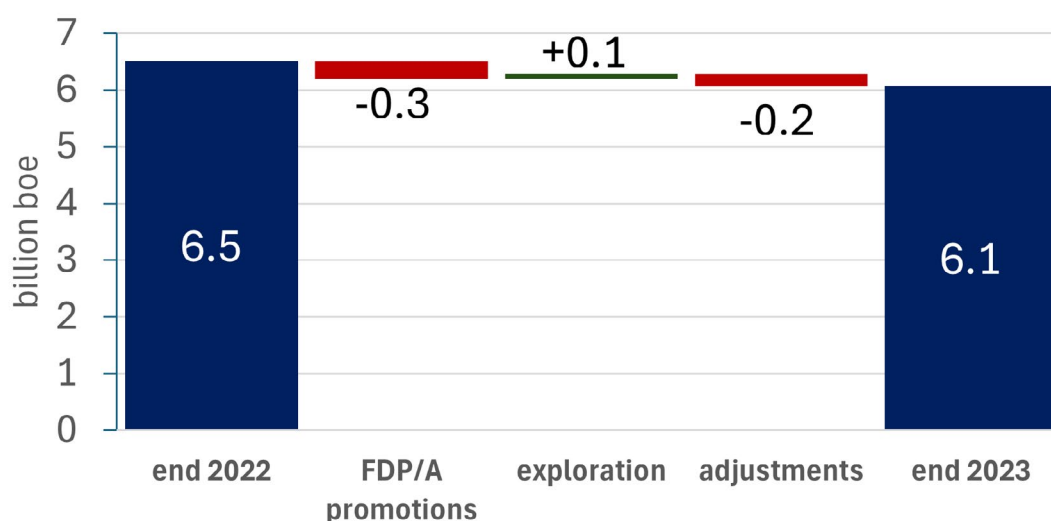
3.4 Production and Reserves replacement trends

Reserves replacement ratio

This provides an indication of how current production levels are being replenished through the maturation of Contingent Resources and exploration Discoveries into Reserves.

The underlying Reserves replacement ratio in 2023 was +59%. 310 mmboe of Reserves were removed as a result of five Field Development Plans and two Field Development Plan Addenda consents, while 60 mmboe were added by operators. This compares to production of 424 mmboe in 2023.

Replacement of Proven and Probable Reserves by Resources maturation remains an issue.

Figure 4 on page 8 shows how 2P Reserves and the Reserves replacement ratio have changed over the last 14 years. It can be seen there is a large variation in the Reserves replacement ratio from year to year, partly as a result of oil price fluctuations. The negative Reserves replacement ratio in 2015 was a result of the NSTA re-categorising certain types of projects from Reserves to Contingent Resources. Prior to 2015, DECC and its predecessors included in the Reserves category projects that had not yet been sanctioned but were expected to be sanctioned in the near future. This is permitted under the SPE PRMS (the "Justified for Development" category). However the NSTA now includes projects in the Reserves category only where the project has been sanctioned by the participants and the NSTA has issued a Development and Production Consent.

Figure 4: Oil and gas 2P Reserves replacement

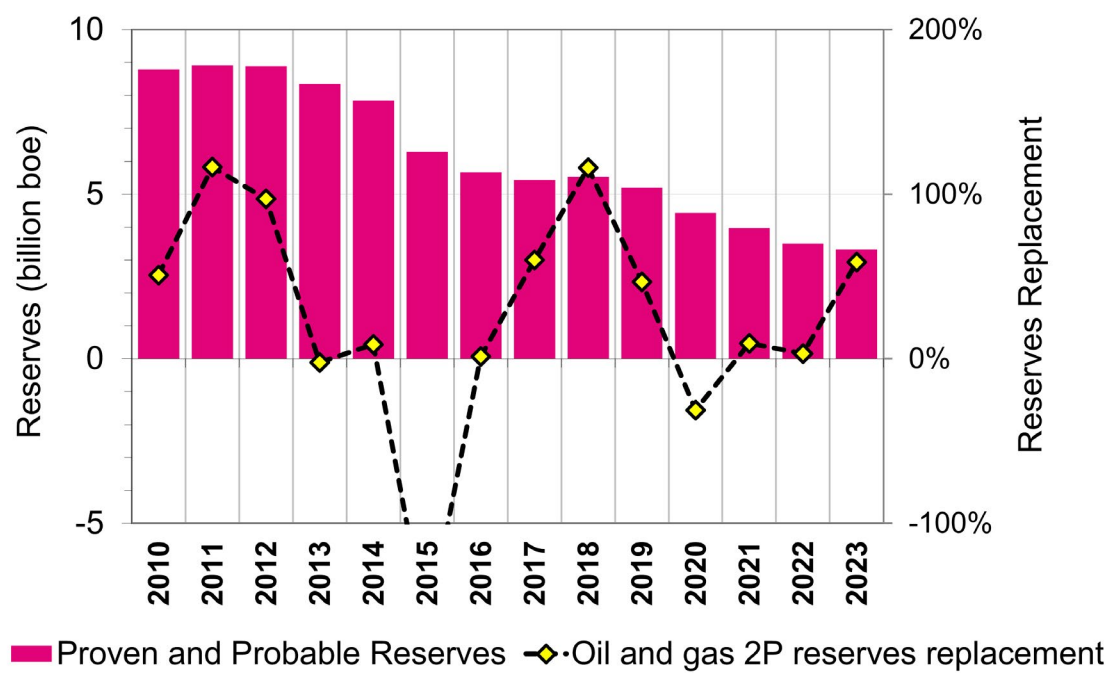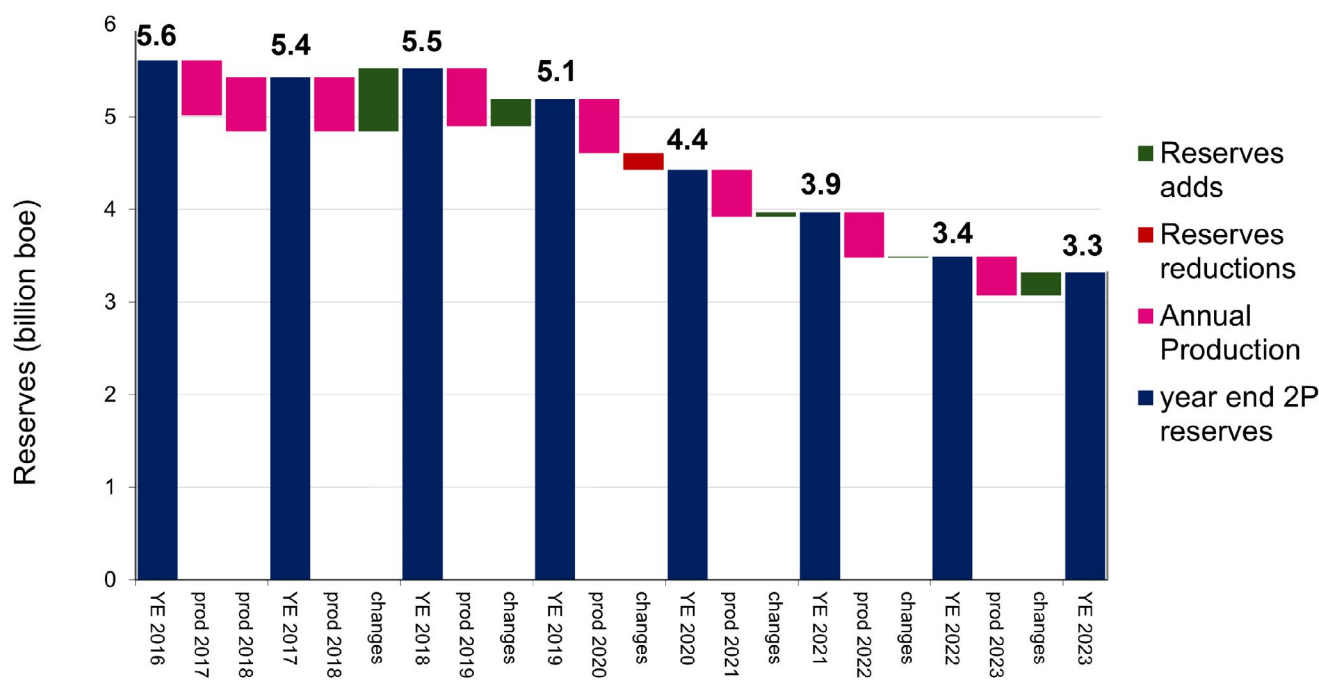Proven and Probable Reserves   Oil and gas 2P reserves replacement

Figure 5 below shows how production and the central estimate of Reserves have changed in the last 8 years. As can been seen, UKCS Reserves have decreased significantly over this period as production has exceeded gross Reserves addition.

Figure 5: 2P Reserves and production 2016 to 2023

3.5 Estimated Ultimate Recovery historic trends

Estimated Ultimate Recovery (**EUR**) is defined as production (to date) plus (remaining) Reserves. Figures 6 and 7 shows how the EUR from the UKCS based on known Reserves (Proven, Probable and Possible) has evolved over time for oil and gas fields, respectively.

EUR increased significantly from 1970 to 1990, indicating that exploration success was adding to the Contingent Resource base and significant Contingent Resources were being matured to Reserves. However, in recent times the trend has reduced considerably and now is almost flat, because of low maturation of Contingent Resources to Reserves and the low level of Discoveries.

It should be noted that the drops observed in EUR in 2015 are because of the change in the NSTA's approach to defining Reserves described earlier in this section.

Figure 6: Oil Estimated Ultimate Recovery vs time (to end 2023)
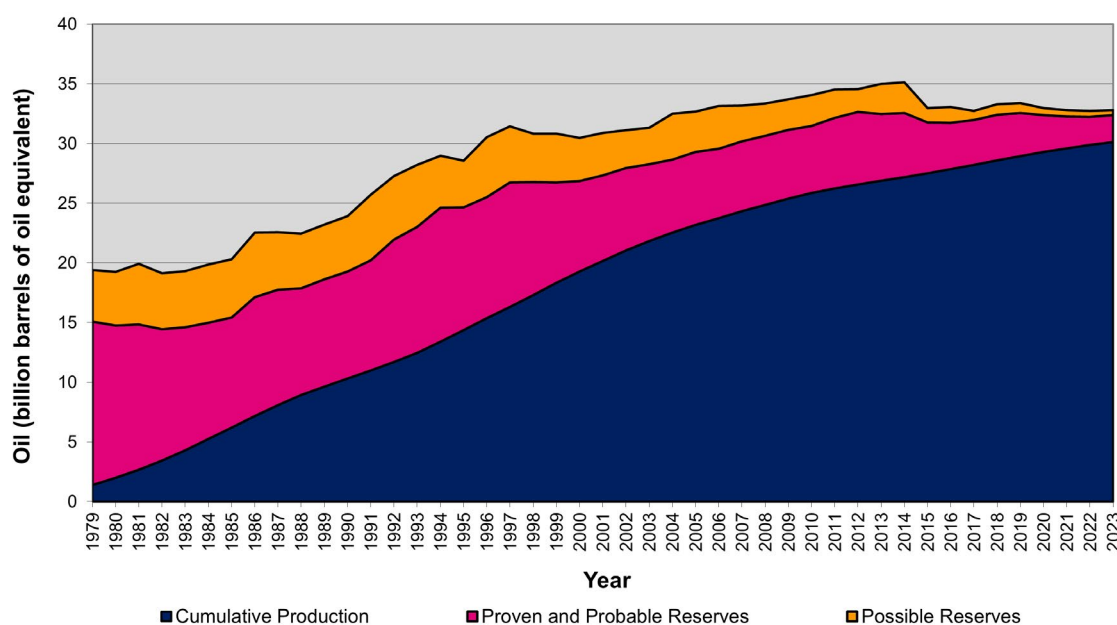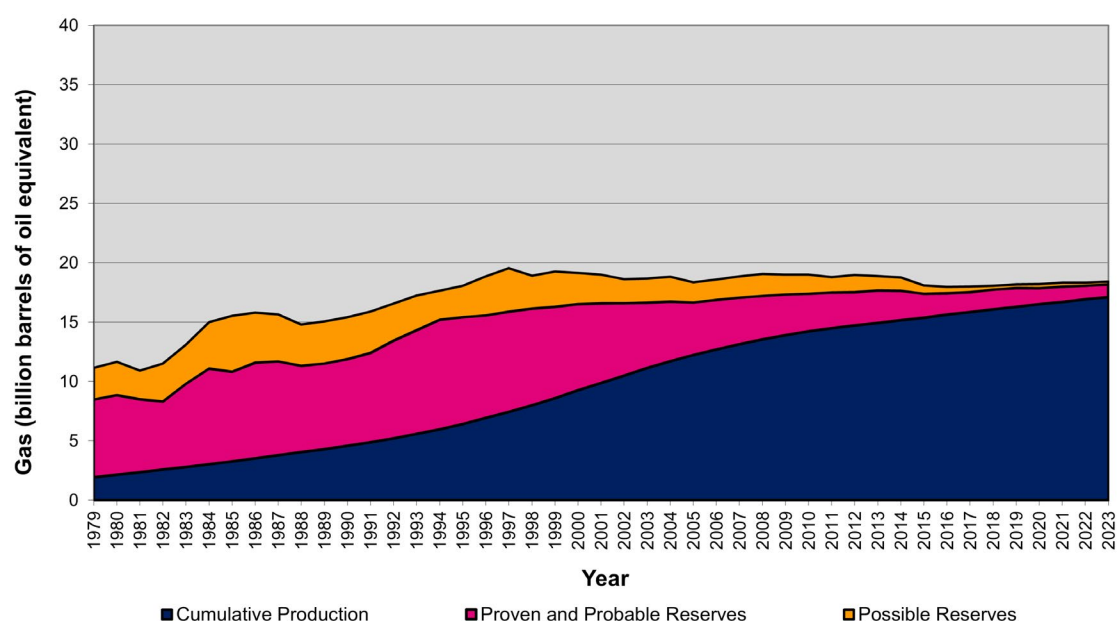

Figure 7: Gas Estimated Ultimate Recovery vs time (to end 2023)

4. Detailed breakout of oil and gas Reserves and Contingent Resources

In this section, ranges for the estimates of oil and gas Reserves and Contingent Resources are presented. The gas Reserves and Contingent Resources for proposed new field developments are categorised according to whether they are "dry gas", "gas from gas condensate fields", or "associated gas from oil fields". The oil and gas Reserves and Contingent Resources are also split out by area (Northern North Sea (**NNS**), Central North Sea (**CNS**), Southern North Sea (**SNS**), East Irish Sea (**EIS**) and West of Shetland (**WoS**)).

4.1 Ranges for oil and gas Reserves and Contingent Resources

Oil and gas Reserves can be classed into three categories (Proven, Probable and Possible, or 1P, 2P and 3P) depending on the level of confidence that they will eventually be produced (see Appendix B for definitions). Contingent Resources can similarly be classed as 1C, 2C, 3C depending on confidence level.

The following tables indicate the split of petroleum liquids and gas Reserves and Resources and the 1P/2P/3P and 1C/2C/3C ranges according SPE PRMS definitions as given in Appendix B. Proven, Probable and Possible Reserves and Resources for a large number of individual fields and Discoveries have been aggregated to provide the totals shown. Summing the overall estimates of the three categories of Reserves and Resources does not imply any particular levels of probability that those volumes will ultimately be produced. The ranges tabulated below should be considered as indicative of the various underlying uncertainties.

UKCS remaining Reserves and Contingent Resources are both approximately 70% oil and 30% gas when expressed in oil equivalent terms. It should be noted that the split of oil and gas in the total production during 2023 was approximately 56% oil and 44% gas, an increase in the proportion of gas.

Table 2 – Oil and gas Reserves and Resources as at end 2023 (2022) in billion boe

Reserves	1P	2P	3P
Reserves	2.2 (2.3)	**3.3 (3.5)**	4.0 (4.3)
Contingent Resources	**1C**	**2C**	**3C**
Producing fields	1.1 (1.2)	**1.6 (1.6)**	2.1 (2.2)
Proposed new developments	1.2 (1.5)	**1.5 (2.0)**	1.8 (2.5)
Marginal Discoveries	1.2 (1.2)	**3.0 (2.9)**	5.9 (5.9)
Total Contingent Resources	3.5 (3.8)	**6.1 (6.5)**	9.9 (10.6)

Note: The classification of Reserves and Resources is explained in Appendix B.

Table 3 – Oil Reserves and Resources as at end 2023 (2022) in billion boe

Oil	1P	2P	3P
Oil Reserves	1.5 (1.5)	**2.3 (2.3)**	2.7 (2.8)
Oil Contingent Resources	**1C**	**2C**	**3C**
Producing fields	0.8 (0.8)	**1.0 (1.0)**	1.4 (1.4)
Proposed new developments	1.1 (1.4)	**1.3 (1.8)**	1.6 (2.2)
Marginal Discoveries	0.7 (0.7)	**1.8 (1.8)**	3.8 (3.8)
Total Contingent Resources	2.6 (2.8)	**4.2 (4.6)**	6.8 (7.4)

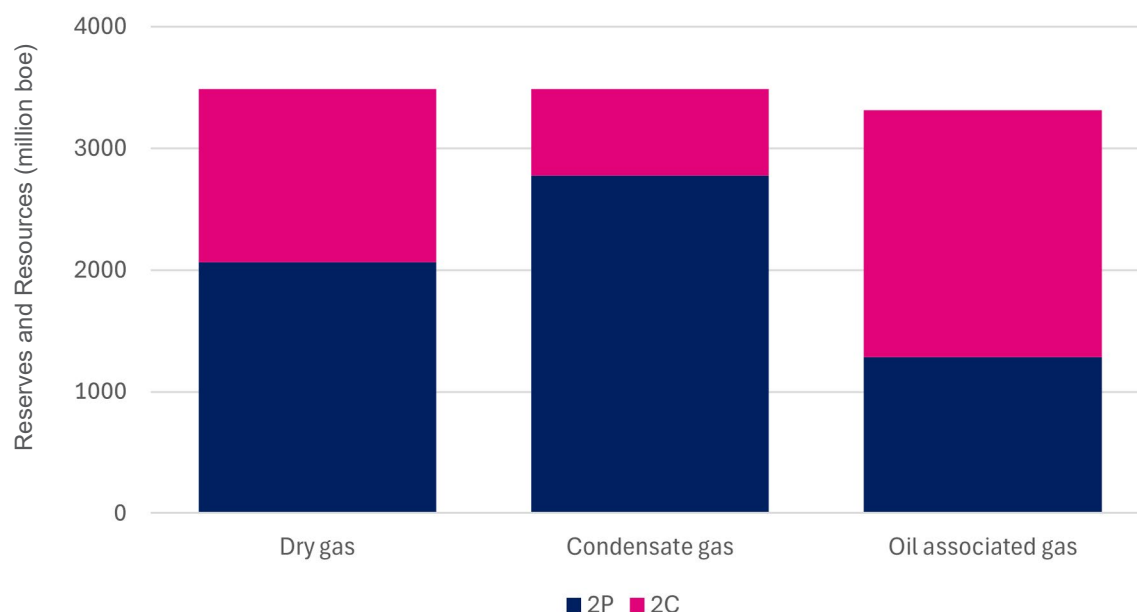## Table 4 – Gas Reserves and Resources as at end 2023 (2022) in billion boe

Gas	1P	2P	3P
Gas Reserves	0.7 (0.8)	**1.1 (1.1)**	1.3 (1.4)
Gas Contingent Resources	**1C**	**2C**	**3C**
Producing fields	0.3 (0.4)	**0.6 (0.6)**	0.7 (0.8)
Proposed new developments	0.1 (0.2)	**0.2 (0.2)**	0.2 (0.3)
Marginal Discoveries	0.5 (0.2)	**1.1 (1.1)**	2.1 (2.0)
Total Contingent Resources	1.0 (1.0)	**1.9 (1.9)**	3.1 (3.2)

Note: Due to rounding, subtotals may not exactly equal the sum or difference of the values entered elsewhere in the table. Versions of the above tables in metric units (million tonnes of oil and billions cubic metres of gas) are presented in Appendix D.

4.2 Gas Reserves distribution by type

Figure 8 indicates how UKCS gas Reserves are distributed between dry gas fields (primarily located in the SNS), gas from gas condensate fields and associated gas from oil fields (both primarily located in the CNS, NNS and WoS).

The largest contribution to future gas production is expected to come from gas condensate fields. These fields tend to be produced at constant rates throughout the year (periods of planned and unplanned downtime apart), compared to dry gas fields where production rates can be higher during periods of peak demand (e.g. in winter) and lower during periods of low demand (e.g. in summer). Also gas condensate fields need oil export infrastructure to convey their produced liquids to market. About 70% of the condensate gas Reserves and Resources lie in the CNS.

Figure 8: Distribution of UKCS gas Reserves and Resources (central case)

Tables 5 and 6 indicate the range of Resources associated with gas Reserves and Contingent Resources in proposed new developments.

Table 5 – Gas Reserves by field type as at end 2023 (2022) in bcf

Fields in production or under development	1P bcf	2P bcf	3P bcf
Gas Reserves from dry gas fields	1491 (1451)	**2065 (2052)**	2736 (2606)
Gas Reserves from gas condensate fields	1802 (2268)	**2775 (3286)**	3310 (3927)
Gas Reserves from associated gas from oil fields	908 (922)	**1283 (1321)**	1535 (1630)

Table 6 – Gas Contingent Resources by field type as at end 2023 (2022) in bcf

Fields where proposed development plans are under discussion	1C bcf	2C bcf	3C bcf
Gas Resources from dry gas fields	702 (926)	**1422 (1642)**	1717 (1960)
Gas Resources from gas condensate fields	502 (615)	**710 (862)**	969 (1180)
Gas Resources from associated gas from oil fields	1363 (1478)	**2027 (2286)**	2845 (3530)

4.3 Petroleum resource distribution by geographic area

Figures 9 and 10 show the distribution of UKCS oil and gas Reserves and Contingent/Discovered Resources by area. Most oil

Reserves are within the WOS and CNS areas with significant gas potential in the CNS and SNS.

Figure 9: Oil Reserves and Resources by area (2P/2C)
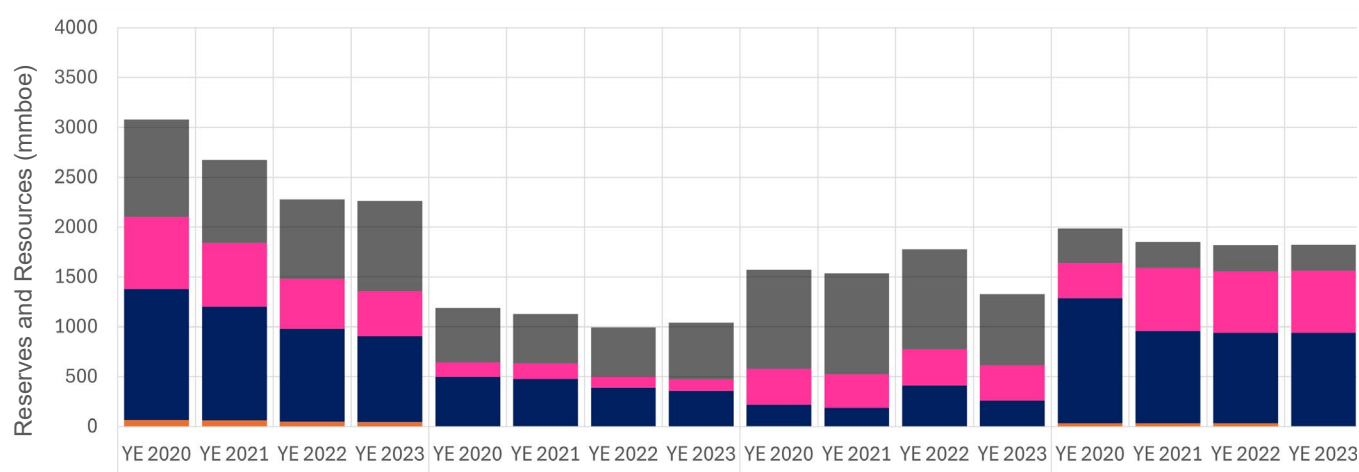
Figure 10: Gas Reserves and Resources by area (2P/2C)
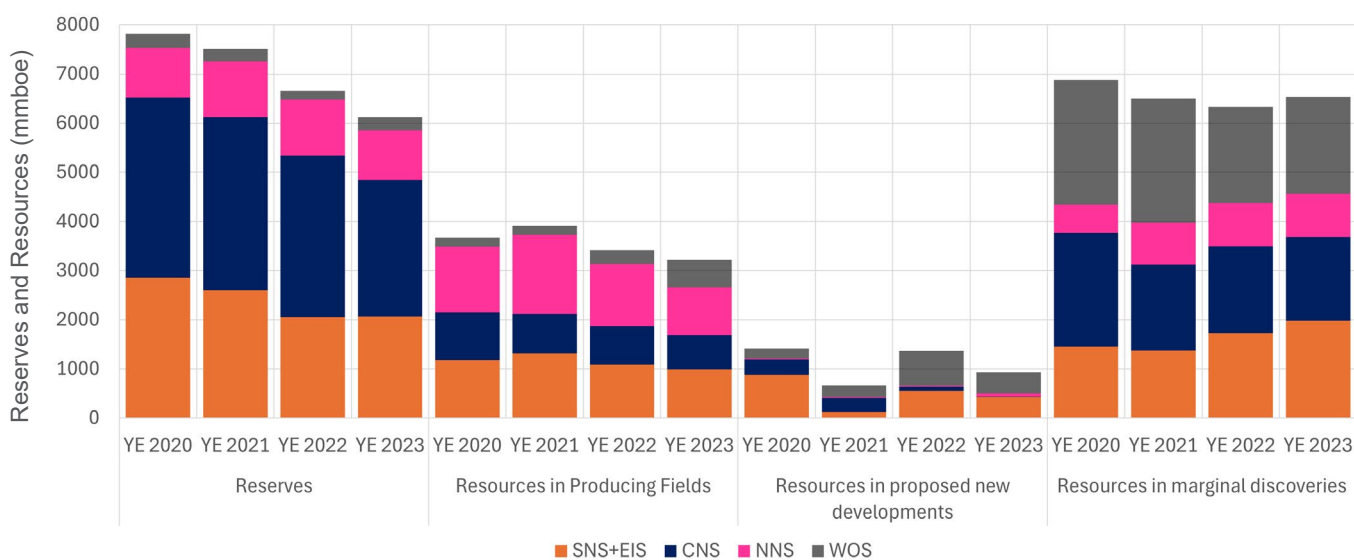
4.4 Contingent Resources by licence status

A significant resource potential remains in unlicensed acreage. A breakdown of Contingent Resources by area and licensed/unlicensed acreage is shown in Figure 11 below. This shows that about two thirds of the Contingent Resources in other Discoveries (296 Discoveries with 2 billion boe from a total of 3 billion boe) was on unlicensed acreage at the end of 2023. The proportion of gas is the same in licensed and unlicensed acreage at 38%.

Figure 11: Contingent resources (2C) in marginal Discoveries on licensed and unlicensed acreage
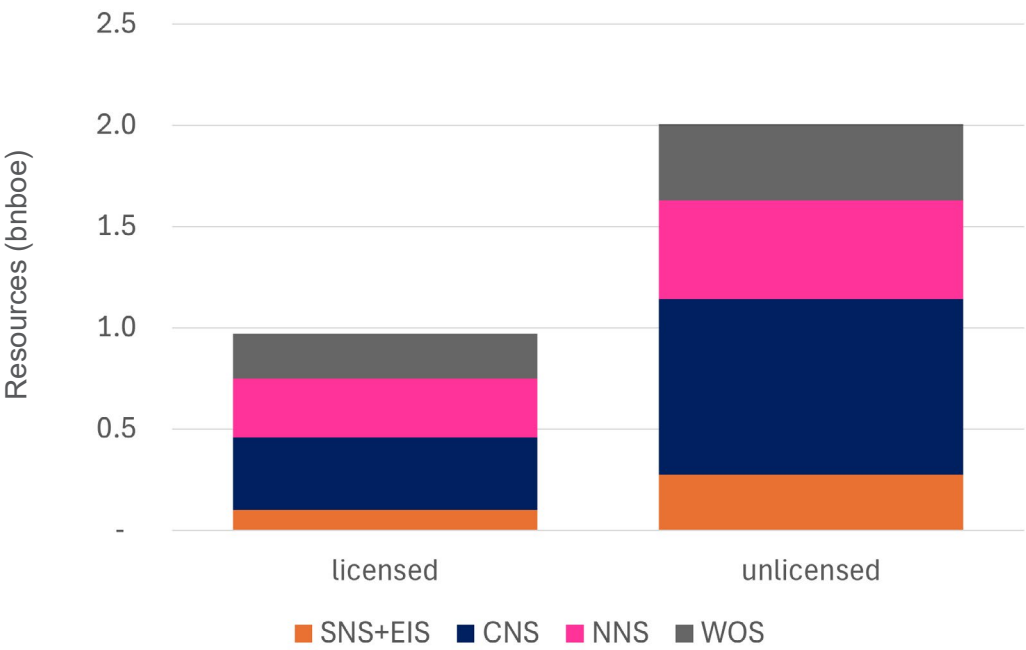
5. Prospective Resources (Yet-to-Find)

5.1 Summary

The overall Prospective Resource figures, when expressed in billions of boe, are the same as last years' estimates. The NSTA estimates that the Mean Yet-to-Find Prospective Resources of Leads and Prospects in the inventory is **3.5** billion barrels of oil equivalent (**Bnboe**). Within this inventory, a range of volume outcomes is possible, as illustrated in Table 7.

There were changes in the number of features from the Lead, Prospect, and Drill Ready Prospect categories as the database was updated with some features from the 33rd licence round, some features matured from previous licence rounds with technical work and subsequently reclassified or the licences relinquished. Drilled features are removed from the Prospective Resources category and Discoveries are classified in the Contingent Resources category.

Table 7 – Prospective Resources associated with Leads and Prospects, with cut-offs

UKCS	P90	Mean	P10
Total Prospective Resources (bnboe)	**2.4**	**3.5**	**4.8**

All values calculated stochastically using the Monte Carlo method, with no dependencies. Volumes are risked recoverable prospective resources. 10 million boe unrisked volume cut-off (30 million boe unrisked West of Shetland) and 15% Geological Chance of Success (CoS) cut-off applied.

Leads and Prospects included in Table 7 meet a volume threshold of 10 million boe Mean Prospective Resources (or a 30 million boe mean volume cut-off West of Shetland) and have an estimated technical (geological) chance of success greater than 15%. These thresholds are consistent with drilling activity taking place under current market conditions. It is important to recognise that the final Prospective Resource that industry is able to deliver will depend on the interplay of a number of other factors which will vary spatially and temporally, including economics, infrastructure status, capital availability, technology development, social and environmental factors, and a host of other constraints and enablers including future Climate Compatibility checkpoints.

The Prospective Resources available in the Lead and Prospect Inventory are potentially supplemented by an additional **11.2** Bboe of Mean Prospective Resources that are estimated in Plays where the Industry has yet to map Leads and Prospects systematically, partly due to the need for improved geophysical datasets (see Table 10). By their nature, these resources are more speculative, with greater risk, but also greater opportunities for value creation due to the impact of successful de-risking of chance factors that are shared among a collection of related Leads and Prospects (play risk).

It is important to recognise that these estimates reflect the current state of subsurface knowledge, limited by the extent of the work that could be performed by the NSTA, and that the figures will be revised over time as work on the prospect inventory and Play portfolio matures.

5.2 Methodology

Previously, during 2017/18, the NSTA made substantial changes to the methodology (Figure 7) by which the UKCS's Yet-to-Find Prospective Resources are estimated, using industry best-practices and building upon the legacy inventory of Leads and Prospects inherited from the NSTA's predecessor organisations.

The Yet-to-Find estimate now also includes Prospective Resources added through Play Analysis, building upon the NSTA's recent regional geoscience initiatives and activities including the Government-Funded Seismic Programmes, the Regional Mapping Project (delivered by Lloyds Register), and post-doctoral research projects (delivered by Heriot-Watt University, the University of Aberdeen and the University of Durham).

A more detailed description of the methodology used is set out in the NSTA's Reserves and Resources report for 2017[3].

5.3 Results

All volumes presented in this section (including tables and figures) are *risked recoverable prospective resources.* Onshore and unconventional hydrocarbon resources are not included in the assessment. Ultimately the Yet-to-find potential of the UK Continental Shelf will be determined by licensing and activity levels. The ultimate volume that can be delivered will depend critically on how industry generates new targets, the efficiency of resource progression from plays through to drill-ready Prospects and maintaining a 'social licence to operate'.

Lead and Prospect-Level Prospective Resources

The Lead and Prospect inventory held by the NSTA currently contains around 6000 features derived largely from operator evaluations, supplemented by in-house evaluations.

It would be reasonable to expect that only a subset of this resource base could be produced commercially, since ultimate recovery will be limited by a number of factors. To model which Leads and Prospects the industry would consider to be viable targets from a geological perspective, the NSTA used a simple set of cut-offs that are consistent with recent drilling activity and so capture features that may, if matured to a drill-ready status, be targeted under current market conditions. This is illustrated in Table 8 and 9 which show the outcome of applying a 10 million boe volume cut-off (increased to 30 million boe West of Shetland) and a 15% geological chance of success cut-off. The feature count is now reduced to a figure of 415 that is more consistent with the UKCS's history of approximately 2,800 offshore exploration wells to date.

Table 8 presents prospective resources by basin with 15% Geological Chance of Success (**CoS**) and 10 million boe volume cut-offs applied (30 million boe West of Shetland). The volume cut-off is applied to the Mean Prospective Resource estimate for each feature.

Table 9 shows the distribution of Prospective Resources by Resource Category with cut-offs applied. In order to progress towards drill-ready status, Leads and Prospects must mature successfully via technical work programmes.

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[3] UK Oil and Gas Reserves and Resources as at end 2017 (nstauthority.co.uk)

In Table 8, 8.1, 8.2 and 9 the oil equivalent volumes and total prospective resources have been updated to reflect the movement of Features between Resource Categories and removal of drilled opportunities from prospective resources category.

Table 8 – Prospective Resources Associated with Basins, with Cut-Offs

Basin	P90	P50	Mean	P10	% Gas	Feature Count
West of Shetland	0.1	0.4	0.6	1.3	45%	28
Northern North Sea	0.2	0.5	0.6	1.0	15%	77
Central North Sea	1.0	1.6	1.7	2.6	16%	226
Southern North Sea	0.2	0.4	0.5	0.9	96%	71
East Irish Sea	0.0	0.1	0.1	0.3	87%	13
Total Prospective Resources	**2.4**	**3.4**	**3.5**	**4.8**	**35%**	**415**

Table 8.1 – Licensed Prospective Resources Associated with Basins with cut-Offs

Basin	P90	P50	Mean	P10	% Gas	Feature Count
West of Shetland	0.0	0.1	0.2	0.7	37%	13
Northern North Sea	0.0	0.2	0.2	0.4	30%	27
Central North Sea	0.3	0.5	0.6	1.1	26%	70
Southern North Sea and East Irish Sea	0.0	0.0	0.0	0.1	100%	5
Total Prospective Resources	**0.5**	**1.0**	**1.1**	**1.8**	**30%**	**114**

Table 8.2 – Unlicensed Prospective Resources Associated with Basins with cut-Offs

Basin	P90	P50	Mean	P10	% Gas	Feature Count
West of Shetland	0.0	0.2	0.3	0.7	53%	15
Northern North Sea	0.1	0.3	0.3	0.7	10%	50
Central North Sea	0.6	1.0	1.1	1.7	12%	156
Southern North Sea and East Irish Sea	0.2	0.5	0.6	1.2	91%	80
Total Prospective Resources	**1.5**	**2.2**	**2.4**	**3.4**	**38%**	**301**

Table 9 – Prospective resources associated with by categories, with cut-offs

Resource Category	P90	P50	Mean	P10	% Gas	Feature Count
Leads	1.0	1.7	1.9	3.0	33%	193
Prospects	0.9	1.4	1.5	2.2	36%	204
Drill-ready Prospects	0.0	0.1	0.1	0.3	32%	18
Total Prospective Resources	**2.4**	**3.4**	**3.5**	**4.8**	**35%**	**415**

Notes: All totals calculated stochastically using Monte Carlo method, with no dependencies (i.e. totals are not calculated arithmetically). Volumes are risked recoverable prospective resources.

*10 million boe unrisked volume cut-off (30 million boe West of Shetland; unrisked) and 15% Geological Chance of Success (CoS) cut-off applied.

Figure 12: Mean Prospective Resources associated with Leads and Prospects and P90-P10 ranges (with cut offs applied*)
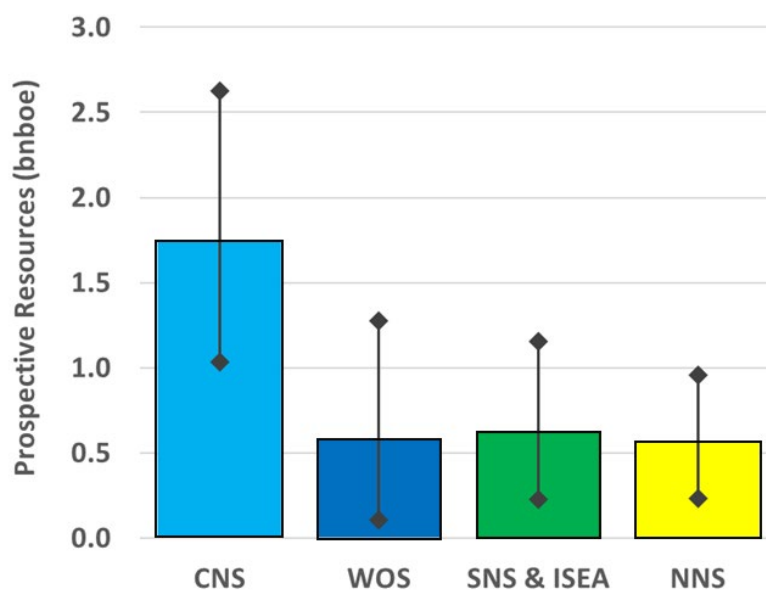
Play-Level Prospective Resources

In 2017/2018, the NSTA invested substantial effort in systematically estimating the prospective resources at a play level that lie outside of mapped Leads and Prospects, adopting industry best-practice methods. As at the Lead and Prospect level, risked Prospective Resources have been modelled stochastically to produce a range of volume estimates, which can be categorised in various ways, most simply at a basin level (Table 10). A high-level list of Plays is appended to this report in Appendix C.

Table 10 – Play-Level Prospective Resources

Basin	Oil Equivalent (billion boe)					
	P99	P90	P50	Mean	P10	P1
West of Shetland	2.0	3.1	4.6	**4.7**	6.3	7.8
Rockall Trough	0.0	0.3	2.1	**2.5**	5.1	8.6
Northern North Sea	0.2	0.4	0.8	**0.9**	1.7	2.7
Central North Sea	0.6	0.9	1.4	**1.5**	2.1	2.8
Mid North Sea High	0.0	0.1	0.5	**0.5**	1.1	1.6
Southern North Sea	0.2	0.4	0.8	**0.8**	1.2	1.6
East Irish Sea	0.0	0.0	0.0	**0.0**	0.1	0.3
SW Britain	0.0	0.0	0.2	**0.3**	0.6	1.0
Total				**11.2**		

Notes: Play-Level Prospective Resources by Basin, no volume or Chance of Success (CoS) cut-offs applied, Total calculated using Monte Carlo with no dependencies. Volumes are risked recoverable prospective resources. Northern North Sea includes East Shetland Platform, SW Britain includes SW Approaches and Cardigan Bay. Mid North Sea High includes Forth Approaches Basin.

Appendices

Appendix A

Data sources

The data for both developed fields and development projects under discussion were compiled from data provided by operators via the NSTA's annual UKCS Stewardship Survey. The Survey also collected data on Contingent Resources in producing fields – these data were not collected prior to 2016.

The end 2023 survey covered:

- 269 producing fields

- 11 projects where an FDP had been approved but production had not yet started

- 11 other projects where FDPs were under discussion as at the end of 2023

Data for unsanctioned Discoveries where no development project is under discussion (referred to as potential additional resources in previous Department of Energy and Climate Change reports) were not collected via the UKCS Stewardship Survey.

The methodology for deriving estimates for prospective resources is presented in Appendix C.

Conversion factors:

The approach used to calculate barrels of oil equivalent is based upon the following (approximate) conversion factors:

    1 tonne of crude oil = 7.5 barrels of oil equivalent
    1 cubic metre of gas = 35.315 cubic feet of gas
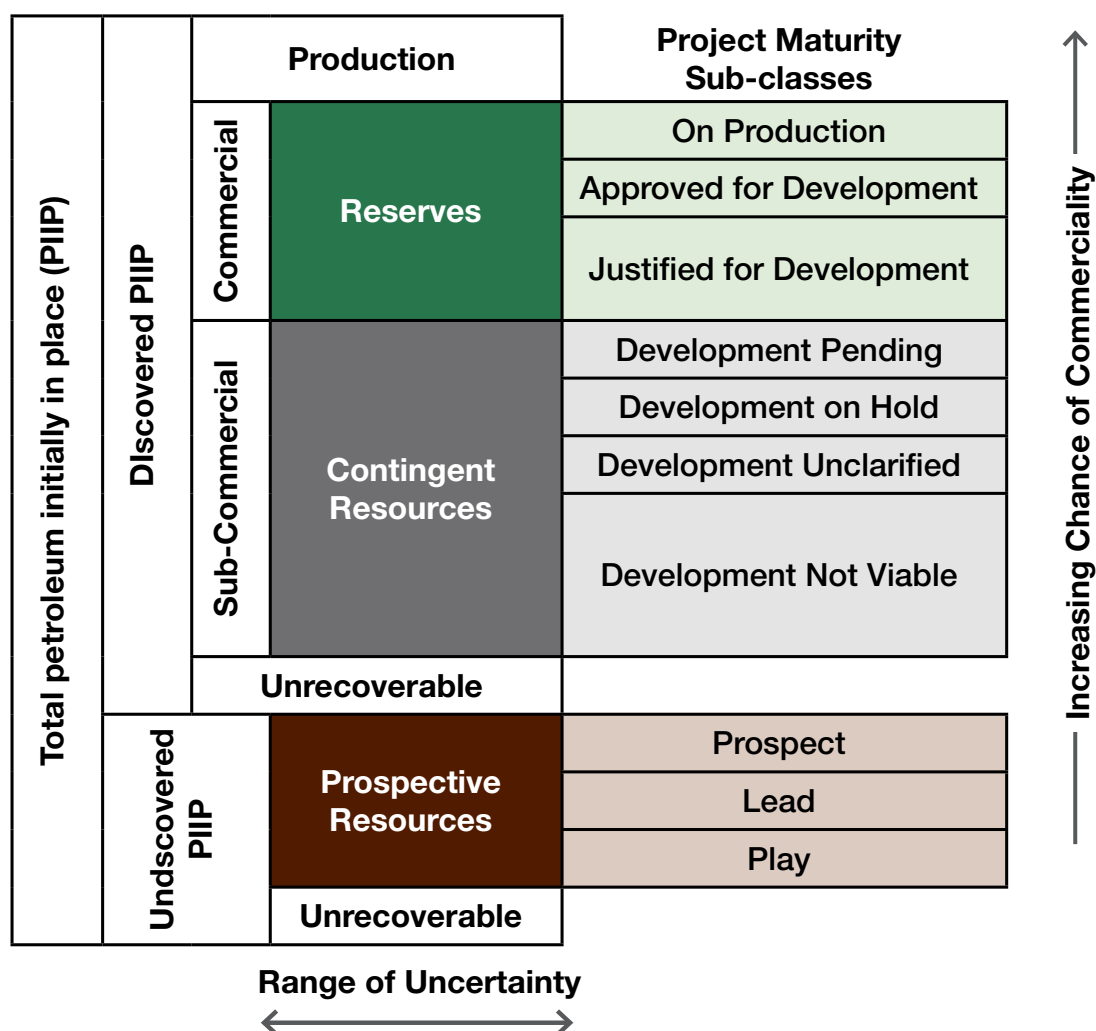   1 cubic foot of gas = 1/5,800 barrels of oil equivalent

Appendix B

Comparison of NSTA terminology with SPE PRMS

The NSTA has sought to adjust its definitions and they are now more closely aligned with those recommended by the Petroleum Resources Management System (**PRMS**) of the Society of Petroleum Engineers (**SPE**). The full definitions associated with this classification system can be found in SPE PRMS 2005 (updated 2018)[4].

The NSTA now classifies Reserves and Resources into the following main categories: Reserves, Contingent Resources and Prospective Resources, with further sub classes aligned with SPE PRMS as laid out in Figure 14.

Figure 13: Comparison of NSTA classifications with SPE PRMS

SPE PRMS

Total petroleum initially in place (PIIP)			Production	Project Maturity Sub-classes	Increasing Chance of Commerciality
	Discovered PIIP	Commercial	Reserves	On Production	
				Approved for Development	
				Justified for Development	
		Sub-Commercial	Contingent Resources	Development Pending	
				Development on Hold	
				Development Unclarified	
				Development Not Viable	
			Unrecoverable		
	Undiscovered PIIP		Prospective Resources	Prospect	
				Lead	
				Play	
			Unrecoverable		

Range of Uncertainty

Source: SPE 2018

4 https://www.spe.org/industry/reserves.php

NSTA classification

		Lower (1P)	Central (2p)	Upper (3P)	Data Source
Reserves	**Fields in production or under development**				UK Stewardship survey
		Lower (1C)	Central (2C)	Upper (3C)	
Contingent Resources	**Contingent Resources in producing fields**				
	Proposed new developments				
	Marginal Discoveries				NSTA in house

		Lower	Mean	Upper	
Prospective Resources	**Prospects**				NSTA in house
	Leads				
	Plays				

Source: SPE 2018

Reserves

These are discovered, remaining volumes that are recoverable and commercial. They can be Proven, Probable or Possible, depending on confidence level.

In the UKCS Stewardship Survey, operators were asked to provide reserves data in accordance with the following definitions for fields in production or under development (which are broadly in line with previous DECC guidance)

- **Proven (1P):** Reserves that, on the available evidence, are virtually certain to be technically and commercially producible, i.e. have a better than 90% chance of being produced

- **Probable (2P):** Reserves that are not yet proven, but which are estimated to have a better than 50% chance of being technically

and commercially producible

- **Possible (3P):** Reserves that at present cannot be regarded as probable, but which are estimated to have a significant – more than 10% but less than 50% – chance of being technically and commercially producible

Contingent Resources

Contingent Resources are those quantities of petroleum estimated to be potentially recoverable from known accumulations, but the applied project(s) are not yet considered mature enough for commercial development.

The "Contingent Resources in producing fields" represent discovered undeveloped resources in the field determined areas.

The "Contingent Resources in proposed new developments" represent discovered undeveloped potential in new field developments under consideration.

The "Contingent Resources in marginal Discoveries" represent undeveloped Discoveries where no development proposals are currently being proposed, in licensed and unlicensed areas.

In the UKCS Stewardship Survey, operators were asked to provide information on Contingent Resources in future planned developments:

- In producing fields (including incremental projects)

- Where development plans are under discussion but have not yet been approved

Contingent resources in other Discoveries:

- The NSTA assessed Contingent Resources in other Discoveries based on in-house information compiled from a variety of sources

Resource confidence levels are defined as follows:

- **1C:** Resource volumes that on the available evidence, are virtually certain to be technically producible, i.e. have a better than 90% chance of being producible

- **2C:** Resource volumes that are not yet 1C, but which are estimated to have a better than 50% chance of being technically producible

- **3C:** Resource volumes that at present cannot be regarded as 2C, but which are estimated to have a significant – more than 10% but less than 50% – chance of being technically producible and has an associated well location and plan.

Prospective resources

Undiscovered potentially recoverable Resources in mapped Leads and Prospects that have not yet been drilled, plus those undiscovered potentially recoverable Resources that are estimated to reside in Plays for which there are few or no mapped features.

Prospective Resource category definitions:

- A Lead is a trapping feature that is associated with a speculative volumetric and chance-of-success assessment and requires additional seismic analysis/acquisition or other key data in order to progress to a prospect.

- A Prospect-Under-Evaluation is a robust trap that has been mapped with a higher degree of confidence using good quality seismic and other key data.

- A Drill-Ready-Prospect requires no further evaluation and has an associated well location and plan.

Appendix C

Central North Sea and Moray Firth

- Eocene (Proven)
- Paleocene (Proven)
- Upper Cretaceous (Proven)
- Lower Cretaceous (Proven)
- Upper Jurassic (Proven)
- Middle Jurassic (Proven)
- Lower Jurassic (Proven)
- Triassic (Proven)
- Devonian (Proven)

Plays not included: Rotliegend, Carboniferous.

Forth Approaches Basin

- Carboniferous (Unproven)
- Rotliegend (Unproven)

Plays not included: Zechstein Dolomites.

Mid North Sea High

- Zechstein (Proven)
- Rotliegend (Unproven)
- Carboniferous (Unproven)
- Devonian (Unproven)

Northern North Sea and East Shetland Platform

- Eocene (Proven)
- Upper Paleocene (Proven)
- Middle Jurassic (Proven)
- Lower Jurassic (Proven)
- Triassic (Proven)
- Devonian (Unproven)

Plays not included: Upper Jurassic interpreted as fully mapped therefore excluded. Upper and Lower Cretaceous excluded as these have been interpreted to be non-reservoir bearing intervals. Intervals younger than Eocene excluded due to biodegradation risk.

West of Shetland (Faroe-Shetland Basin)

- Paleocene (Proven)
- Upper Cretaceous (Proven)
- Lower Cretaceous (Proven)
- Jurassic (Proven)
- Triassic (Proven)

Plays not included: Fractured Basement.

Rockall Trough

- Triassic (Unproven)
- Middle Jurassic (Unproven)
- Upper Jurassic (Unproven)
- Lower Cretaceous (Unproven)
- Paleocene (Partially Proven)

Southern North Sea

- Triassic (Proven)
- Zechstein (Proven)
- Rotliegend (Proven)
- Carboniferous (Proven)

Plays not included: Intra-Carboniferous, Tight-Gas.

South West Britain (including SW Approaches and Cardigan Bay)

- Triassic (Unproven)
- Middle Jurassic (Proven)
- Permian (Unproven)

Plays not included: Carboniferous

Appendix D

Table D3 Oil Reserves and resources as at end 2023 (2022) in million tonnes

Oil	1P	2P	3P
Oil Reserves	196 (205)	302 (313)	359 (380)
Oil Contingent Resources	1C	2C	3C
Producing fields	108 (107)	139 (133)	188 (183)
Proposed new developments	144 (181)	177 (237)	213 (295)
Marginal Discoveries	90 (88)	246 (242)	508 (510)
Total contingent Resources	341 (376)	562 (612)	909 (988)

Table D4 Gas Reserves and Resources as at end 2023 (2022) in billion cubic metres

Gas	1P	2P	3P
Gas Reserves	119 (131)	173 (189)	215 (231)
Gas Contingent Resources	1C	2C	3C
Producing fields	55 (59)	91 (97)	120 (139)
Proposed new developments	18 (26)	26 (39)	36 (50)
Marginal discoveries	85 (81)	185 (179)	347 (336)
Total Contingent Resources	157 (167)	303 (315)	504 (525)

Table D5 Gas Reserves by field type as at end 2023 (2022) in billion cubic metres

Fields in production or under development	1P	2P	3P
Gas Reserves from dry gas fields	42 (41)	58 (58)	77 (74)
Gas Reserves from gas condensate fields	51 (64)	79 (93)	94 (111)
Gas Reserves from associated gas from oil fields	26 (26)	36 (37)	43 (46)

Table D6 Gas Contingent Resources by field type as at end 2023 (2022) in billion cubic metres

Fields where proposed development plans are under discussion	1C	2C	3C
Gas Resources from dry gas fields	20 (12)	40 (16)	49 (20)
Gas Resources s from gas condensate fields	14 (1)	20 (2)	27 (3)
Gas Resources from associated gas from oil fields	39 (13)	57 (21)	81 (28)

North Sea Transition Authority