



North Sea  
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Authority

# UK Oil and Gas Reserves and Resources

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as at end 2022

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# 1. Introduction and executive summary

Official government forecasts suggest that oil and gas will remain an important and critical part of our energy mix as we transition to net zero<sup>1</sup>.

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 UK's petroleum reserves remain at a significant level. The NSTA's estimate for proven and probable (2P) UK reserves as at end 2022 is 3.5 billion boe, 0.5bn boe lower than as at end 2021.
- In 2022, about 490 million boe (mmboe) were produced, but less than 20 million boe net were added to 2P reserves, which equates to a reserve replacement ratio of +3%. New field development activities across the industry were limited, just 60 mmboe were matured by the granting of consent to 3 new field development and 3 field development plan addenda.
- The UK's contingent resource level is significant with a central estimate of discovered undeveloped resources of 6.5 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 continued development of the UK'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 7 wells discovered 100mmboe in 2022<sup>2</sup>. A key part of exploration Stewardship is now to progress the many 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, down 0.6billion boe due to reduced licences at 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.

<sup>1</sup> <https://www.gov.uk/government/publications/energy-and-emissions-projections-2021-to-2040>

<sup>2</sup> 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 UK recoverable petroleum resources, include Reserves, Undeveloped Resources and undiscovered petroleum resources. A total of some 46.9 billion boe of oil and gas had been produced from the UKCS by the end of 2022.

The NSTA's current central estimates as at the end of 2022 are summarised in Table 1 below (estimates as at the end of 2021 are in parentheses).

**Table 1 – Oil and gas reserves and resources central estimates as at end 2022 (end 2021) in billion boe**

Reserves	2P
Reserves	3.5 (4.0)
Contingent resources	2C
Producing fields	1.6 (1.8)
Proposed new developments	2.0 (1.7)
Marginal discoveries	2.9 (3.0)
Prospective resources	Mean
Prospects and Leads	3.5 (4.0)
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 2022 showed a decrease compared to end 2021. This is a result of production of around 490 mmbae in 2022 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 an increase compared to end 2021. This is due to the addition of 13 more discoveries being progressed by operators, and exploration success offset by 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. Ultimately the Yet-to-Find potential of the UK Continental Shelf will be determined by licencing 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 the industry maintaining its 'social licence to operate'.

**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.**

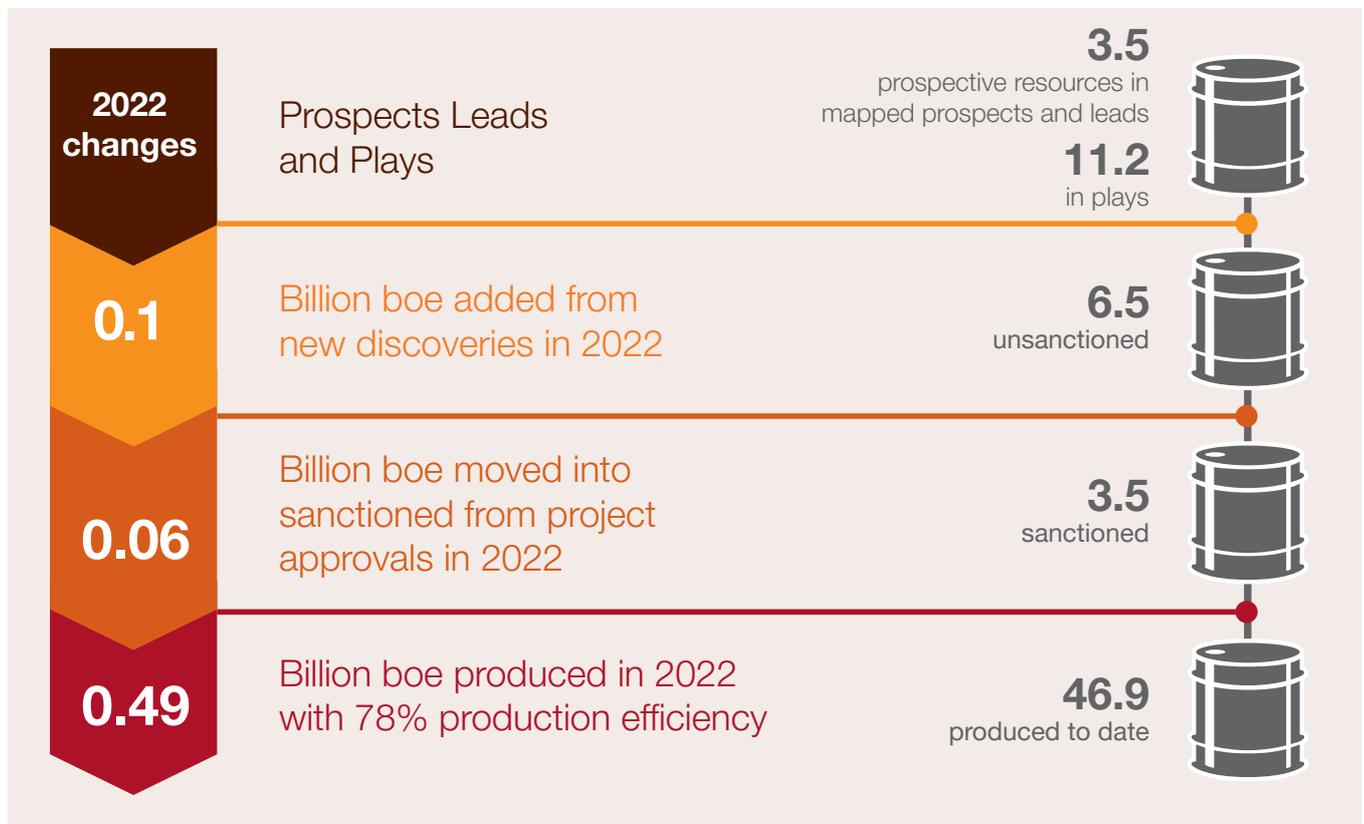
# 3. Oil and gas reserves and contingent resources progression

## 3.1 UKCS reserves and resources progression in 2022

Figure 1, below, illustrates the progression of resources and reserves between the major categories during 2022.

- Five new discoveries from exploration successes in 2022 added 100 mmbob to the contingent resource base.
- Three new Field Development Plan (FDPs) consented to in 2022 and three FDP addenda (FDPAs) for incremental projects in producing fields resulted in just 60 million bob movement from contingent resources to reserves.
- Production during 2022 of around 490 mmbob resulted in a reduction in (remaining) reserves.

**Figure 1: Reserves and Resources Progression**



(Numbers in billion boe as at end 2022)

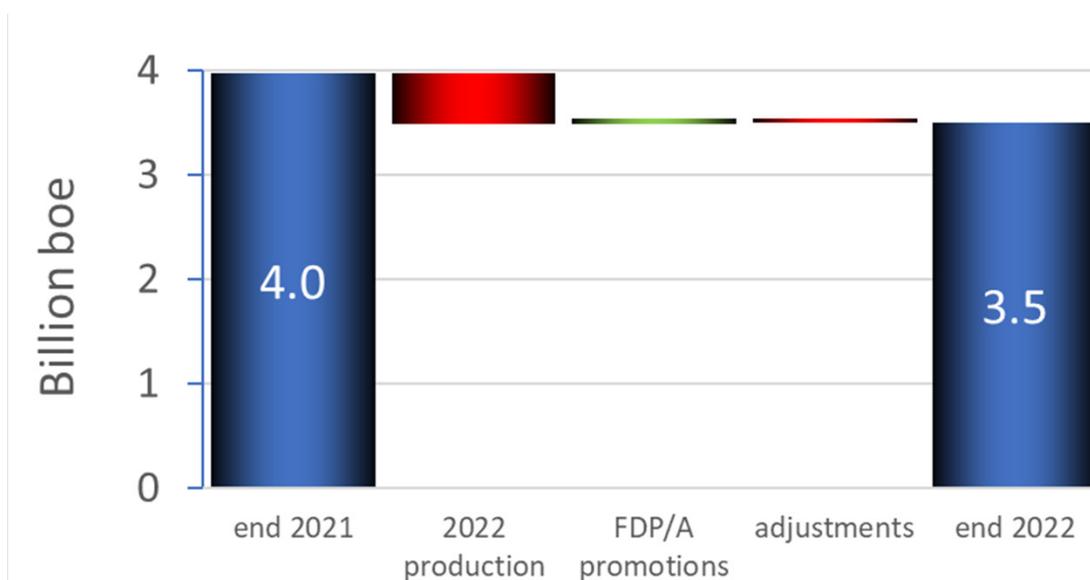
### 3.2 Reserves progression

Reserves reduced from 4.0 billion boe as at end 2021 to 3.5 billion boe as at end 2022. This was a result of:

- Production during 2022 of 490 mmboe
- Three new field development consented to and three FDP addenda for incremental projects in producing fields in 2022 resulted in 60 million boe movement from contingent resources to reserves.

- A reduction to the reserves estimates for producing fields of -40 mmboe. This was due to downward revisions in other fields and life of field reductions (CoP acceleration), but offset by positive additions from other in-field activities, improved field performance and life of field extension (CoP deferral).

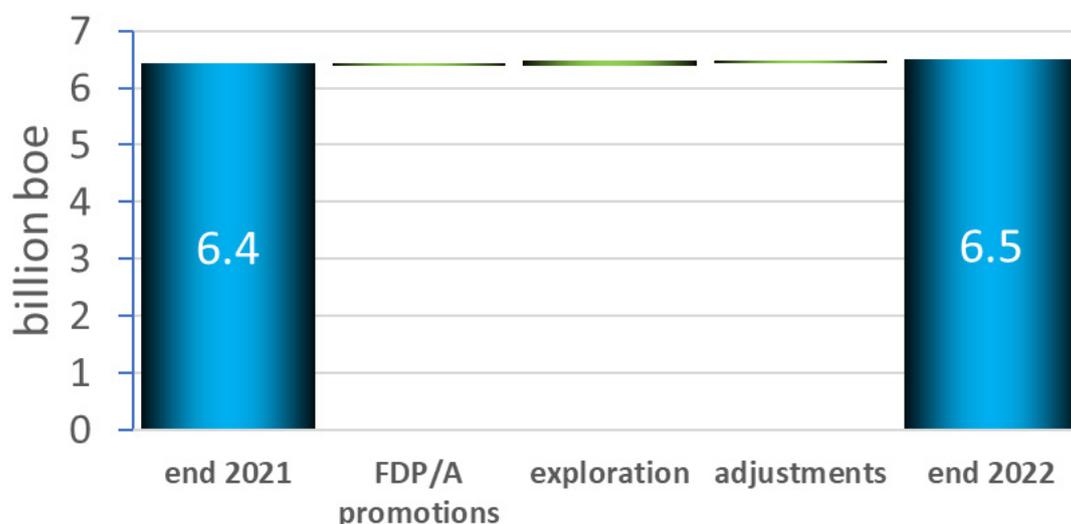
**Figure 2: 2P reserve changes from end 2021 to end 2022**



### 3.3 Contingent resources progression

The UK's contingent resources represents a significant opportunity to progress discovered resources to development. There was a 0.1 billion boe increase in the central estimate of total contingent resources during 2022, the overall estimate is 6.5 billion boe. There were a number of changes within the contingent resources categories, as a result of:

- Three new field development and three field development plan addenda consented to in 2022 resulted 60mmboe movement from contingent resources to reserves.
- Five new discoveries from exploration successes in 2022 adding 100 mmboe to the contingent resource base.
- 13 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 2021 to end 2022**

### 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 2022 was +3%. 60 mmboe of reserves were added as a result of three Field Development Plan and three Field Development Plan addenda consents, while 40 mmboe were revised down by operators. This compares to production of around 490 mmboe in 2022. Replacement of proven and probable reserves by resources maturation remains an issue.

Figure 4 below shows how 2P reserves and the reserves replacement ratio have changed over the last 26 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**

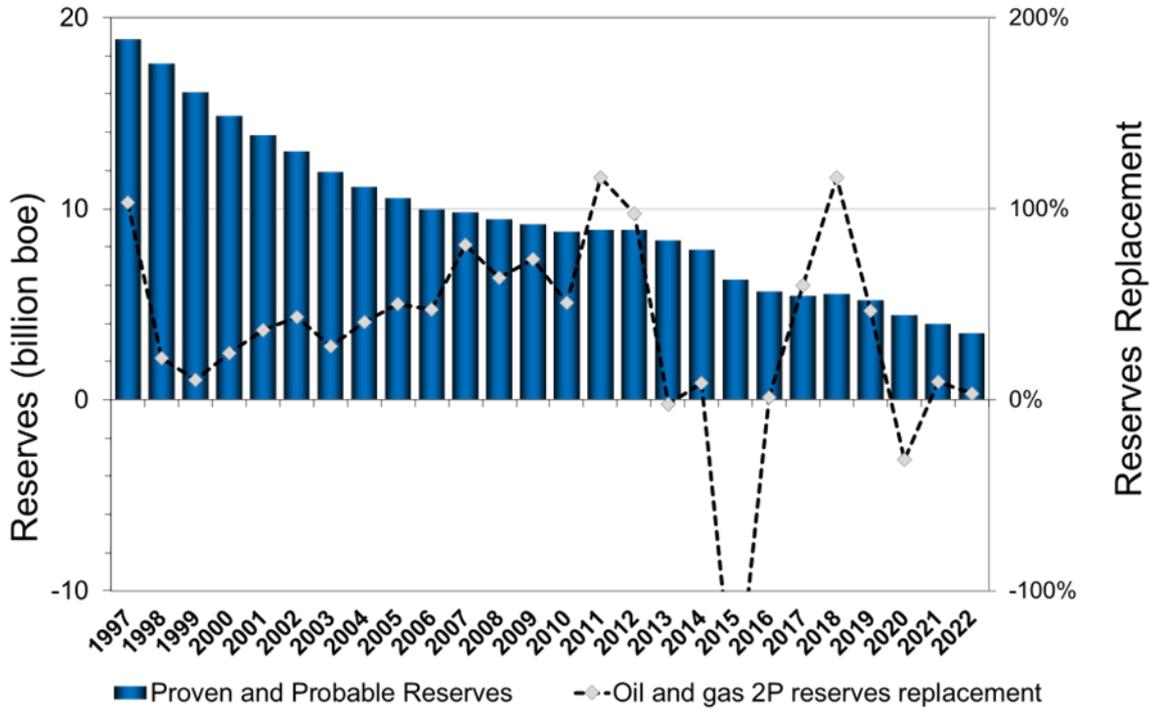
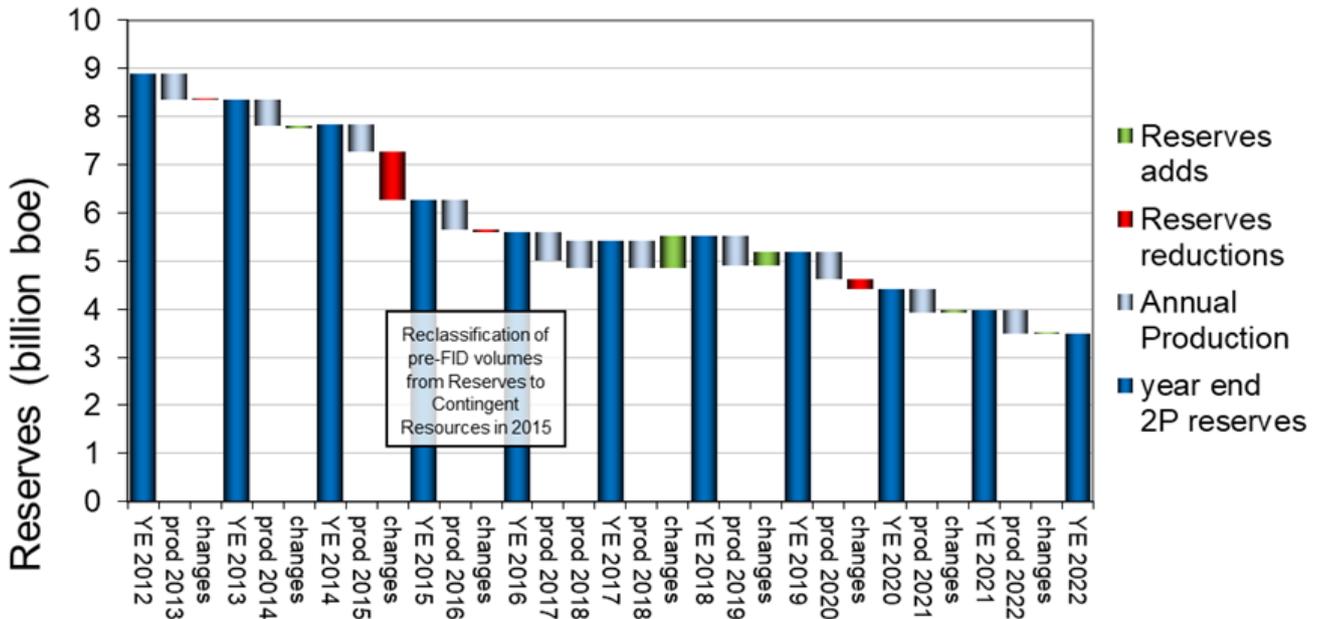


Figure 5 below shows how production and the central estimate of reserves have changed in the last 10 years. As can be seen, overall the UK reserves have decreased.

**Figure 5: 2P reserves and production 2013 to 2022**



### 3.5 Estimated Ultimate Recovery historic trends

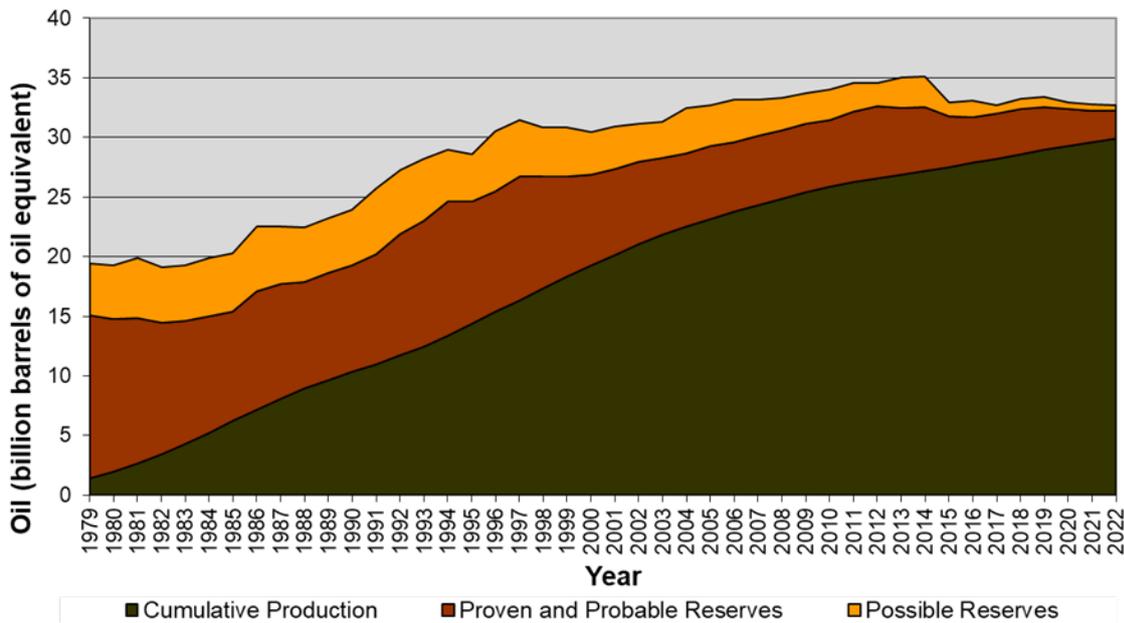
Estimated Ultimate Recovery (EUR) is defined as production (to date) plus (remaining) reserves. Figures 6 and 7 shows how the EUR from the UKCS based on known reserves (proven, probable and possible) has evolved over time for oil and gas fields, respectively.

EUR increased significantly from 1970 to 1990, indicating that exploration success was adding to the contingent resource base and significant contingent resources

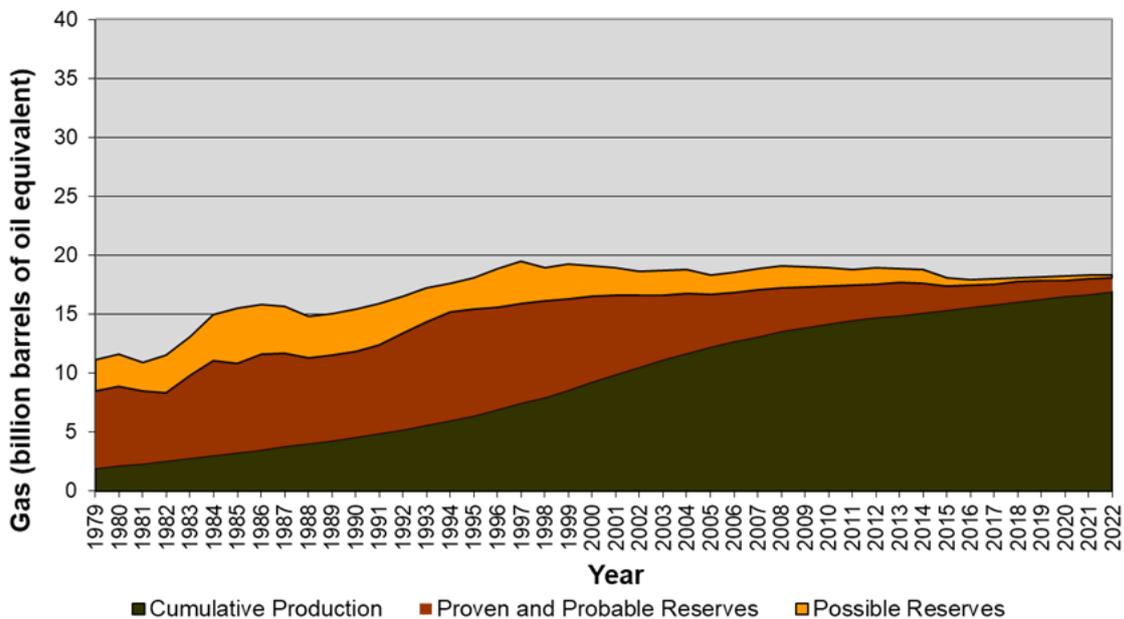
were being matured to reserves. However, in recent times the trend has reduced considerably and now is almost flat, because of low maturation of contingent resources to reserves and the low level of discoveries.

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 2022)**



**Figure 7: Gas Estimated Ultimate Recovery vs time (to end 2022)**



## 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), Irish Sea (IS) 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.

UK 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 2022 was approximately 55% oil and 45% gas, an increase in the proportion of gas.

**Table 2 – Oil and gas reserves and resources as at end 2022 (2021) in billion boe**

Reserves	1P	2P	3P
Reserves	2.3 (2.7)	<b>3.5 (4.0)</b>	4.3 (4.8)
Contingent resources	1C	2C	3C
Producing fields	1.2 (1.2)	<b>1.6 (1.8)</b>	2.2 (2.5)
Proposed new developments	1.5 (1.3)	<b>2.0 (1.7)</b>	2.5 (2.1)
Marginal discoveries	1.2 (1.2)	<b>2.9 (3.0)</b>	5.9 (6.0)
<b>Total contingent resources</b>	3.8 (3.8)	<b>6.5 (6.4)</b>	10.6 (10.6)

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

**Table 3 – Oil reserves and resources as at end 2022 (2021) in billion boe**

Oil	1P	2P	3P
<b>Oil reserves</b>	1.5 (1.8)	<b>2.3 (2.7)</b>	2.8 (3.2)
Oil contingent resources	1C	2C	3C
Producing fields	0.8 (0.9)	<b>1.0 (1.1)</b>	1.4 (1.5)
Proposed new developments	1.4 (1.2)	<b>1.8 (1.5)</b>	2.2 (1.9)
Marginal discoveries	0.7 (0.7)	<b>1.8 (1.9)</b>	3.8 (3.9)
<b>Total contingent resources</b>	2.8 (2.8)	<b>4.6 (4.5)</b>	7.4 (7.4)

**Table 4 – Gas reserves and resources as at end 2022 (2021) in billion boe**

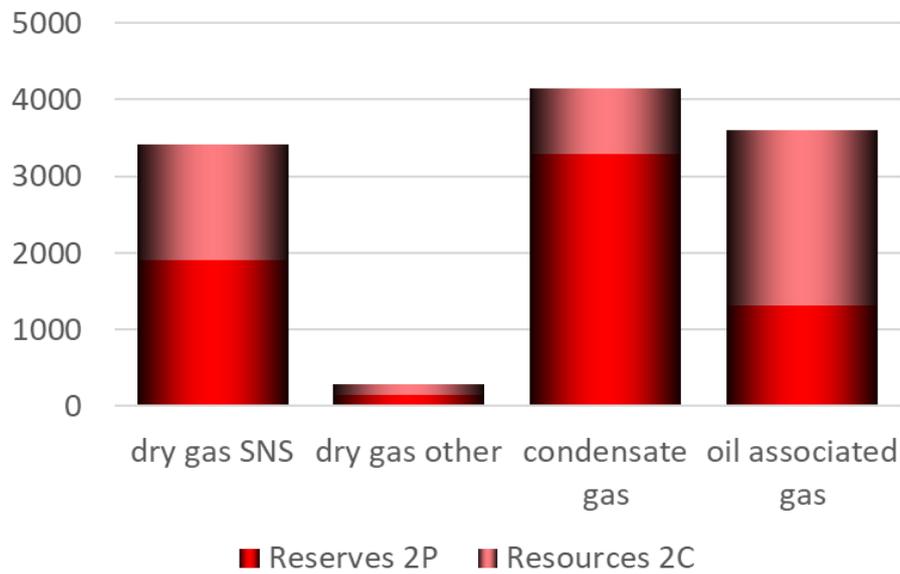
Gas	1P	2P	3P
<b>Gas reserves</b>	0.8 (0.9)	<b>1.1 (1.3)</b>	1.4 (1.6)
Gas contingent resources	1C	2C	3C
Producing fields	0.4 (0.4)	<b>0.6 (0.7)</b>	0.8 (1.0)
Proposed new developments	0.2 (0.1)	<b>0.2 (0.1)</b>	0.3 (0.2)
Marginal discoveries	0.2 (0.1)	<b>1.1 (1.1)</b>	2.0 (2.1)
<b>Total contingent resources</b>	1.0 (1.0)	<b>1.9 (1.9)</b>	3.2 (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 2022 (2021) in bcf**

Fields in production or under development	1P bcf	2P bcf	3P bcf
Gas reserves from dry gas fields	1451 (1767)	<b>2052 (2604)</b>	2606 (3466)
Gas reserves from gas condensate fields	2268 (2397)	<b>3286 (3518)</b>	3927 (4322)
Gas reserves from associated gas from oil fields	922 (996)	<b>1321 (1387)</b>	1630 (1598)

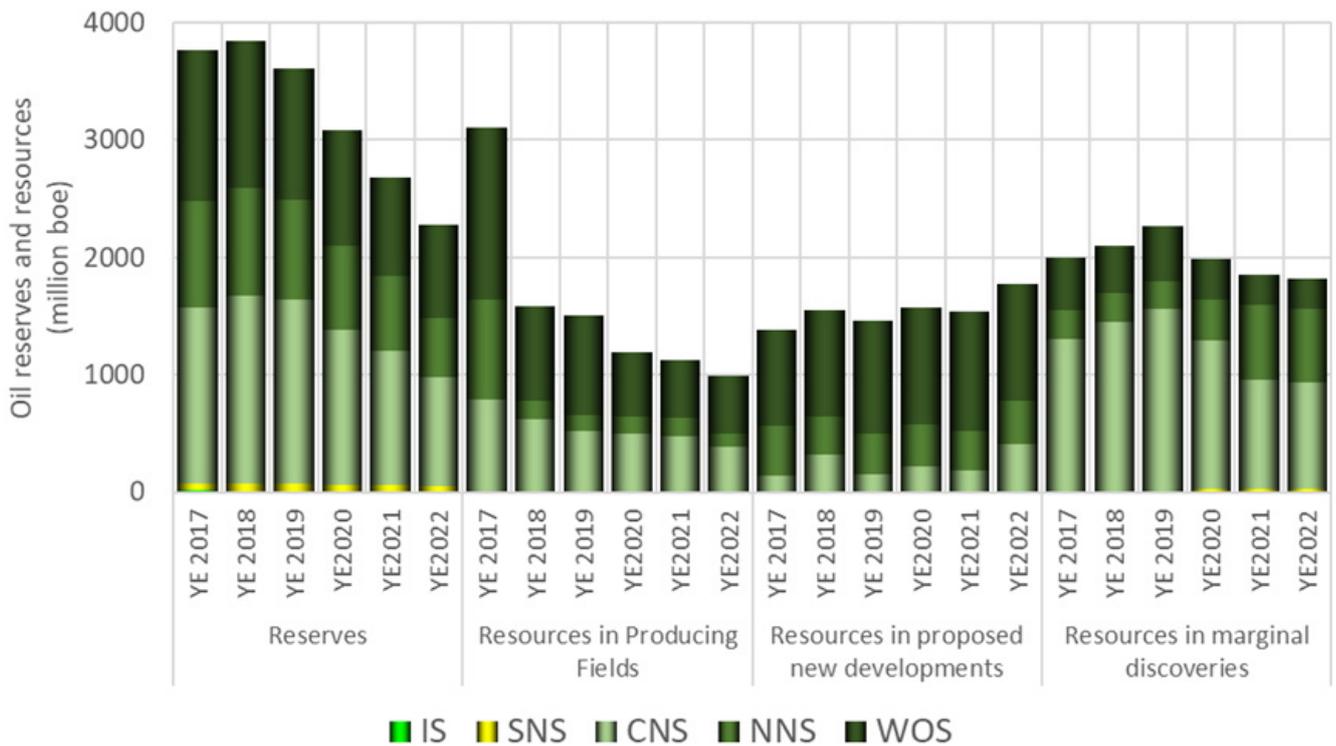
**Table 6 – Gas contingent resources by field type as at end 2022 (2021) in bcf**

Fields where proposed development plans are under discussion	1C bcf	2C bcf	3C bcf
Gas resources from dry gas fields	416 (61)	<b>556 (124)</b>	690 (217)
Gas resources from gas condensate fields	51 (173)	<b>80 (287)</b>	110 (419)
Gas resources from associated gas from oil fields	467 (144)	<b>738 (255)</b>	973 (406)

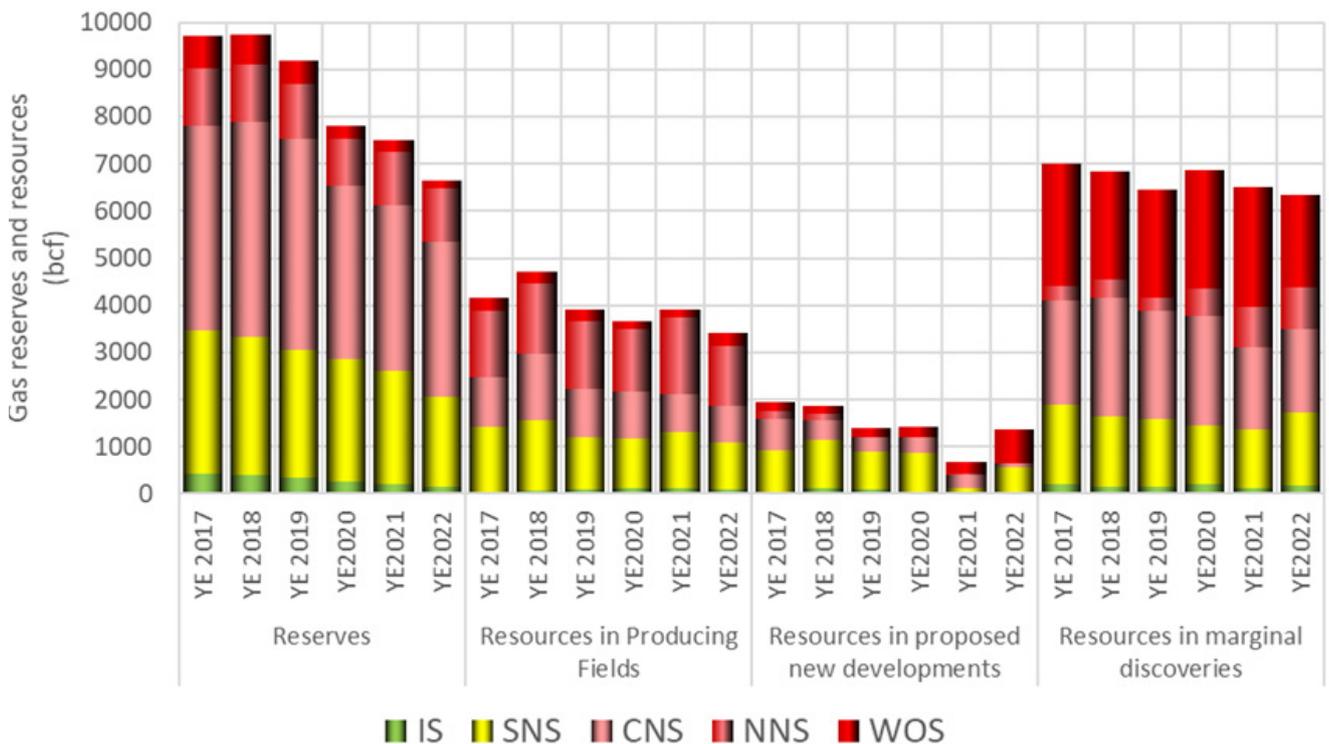
### 4.3 Petroleum resource distribution by geographic area

Figures 9 and 10 show the distribution of UK oil and gas reserves and contingent/discovered resources by area. Most oil reserves are within the WOS and NNS areas with significant gas potential in the CNS.

**Figure 9: Oil reserves and resources by area (2P/2C)**



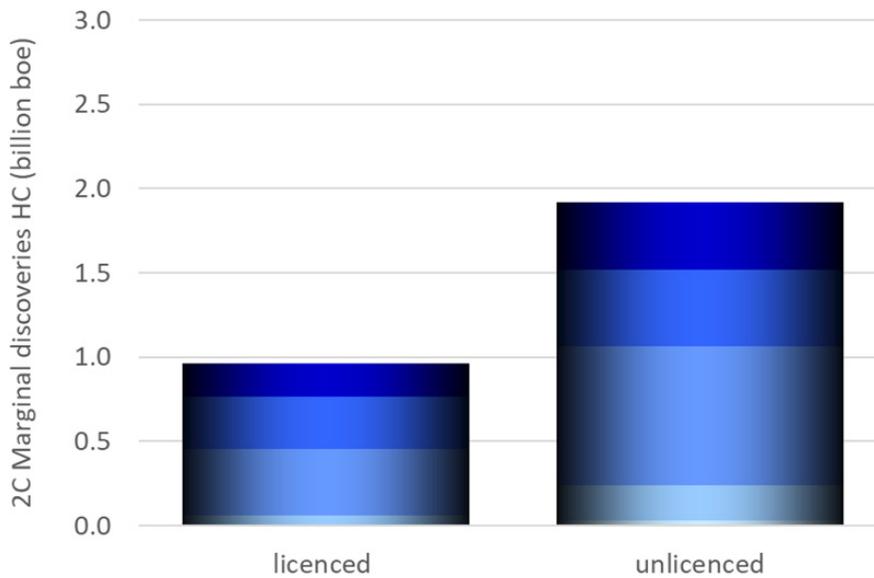
**Figure 10: Gas reserves and resources by area (2P/2C)**



#### 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 (289 discoveries with 2 billion boe from a total of 3 billion boe) was on unlicensed acreage at the end of 2022. .

**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 14% lower than 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.

The main reasons for this reduction are the removal of features from the Lead, Prospect, and Drill Ready Prospect categories as these features mature from the licence rounds with technical work and are 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 & Prospects, with Cut-Offs**

UKCS	P90	Mean	P10
<b>Total Prospective Resources (Bnboe)</b>	<b>2.4</b>	<b>3.5</b>	<b>4.6</b>

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 UK'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, and maintained by the British Geological Survey (BGS).

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 previous reserves and resources report<sup>3</sup>.

## 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 5400 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 472 that is more consistent with the UKCS's history of approximately

2,800 offshore exploration wells to date.

Table 8 and figure 12 present 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. The number of drill-ready prospects is equivalent to around 2-3 years-worth of drilling activity at current rates, which is unlikely to meet industry's current Key Performance Indicator of discovering an additional 200 million boe of resource per year (as a five-year rolling average) through exploration, although this metric has not been met over the last 3 years.

<sup>3</sup> UK Oil and Gas Reserves and Resources as at end 2017 (nstaauthority.co.uk)

In Table 8 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**

**Lead & Prospect-Level Prospective Resources, by Basin, with cut-offs applied\***

Basin	Oil Equivalent (billion boe)						% Gas	Feature Count	Unlicensed Features
	P99	P90	P50	Mean	P10	P1			
West of Shetland	0.0	0.2	0.6	0.8	1.7	3.6	54%	39	18
Northern North Sea	0.1	0.2	0.4	0.4	0.7	1.1	11%	76	28
Central North Sea	1.0	1.2	1.7	1.8	2.5	3.8	21%	293	159
Southern North Sea	0.0	0.2	0.3	0.4	0.7	1.0	97%	59	32
East Irish Sea	0.0	0.0	0.0	0.0	0.1	0.6	91%	5	3
<b>Total Prospective Resources</b>	<b>1.9</b>	<b>2.4</b>	<b>3.3</b>	<b>3.5</b>	<b>4.6</b>	<b>6.9</b>	<b>40%</b>	<b>472</b>	<b>240</b>

**Table 9 – Prospective Resources Associated with Leads & Prospects, with Cut-Offs**

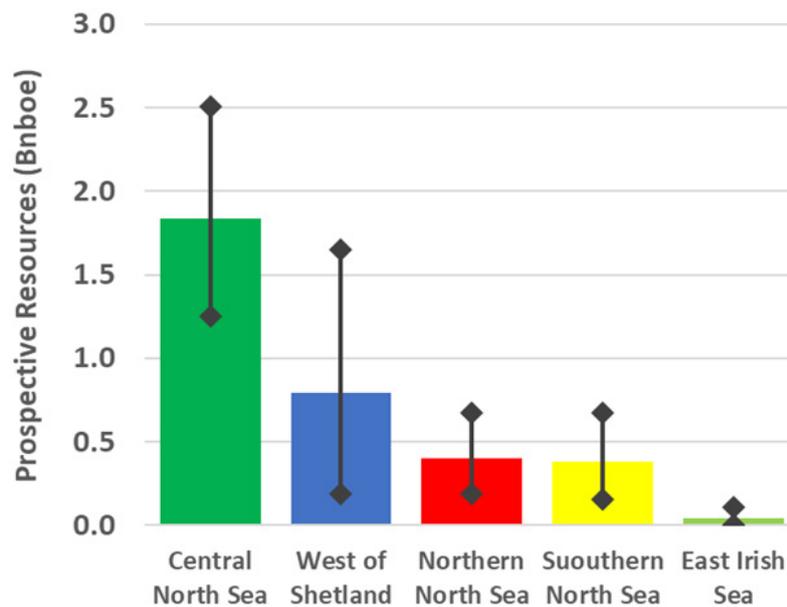
**Lead & Prospect-Level Prospective Resources, by Resource Category (with cut-offs applied\*)**

Resource Category	Oil Equivalent (billion boe)						% Gas	Feature Count
	P99	P90	P50	Mean	P10	P1		
Leads	0.7	1.0	1.6	1.7	2.5	4.4	35%	234
Prospects	0.7	1.0	1.5	1.6	2.3	3.3	44%	224
Drill-ready Prospects	0.0	0.0	0.1	0.2	0.3	1.5	49%	14
<b>Total Prospective Resources</b>	<b>1.9</b>	<b>2.4</b>	<b>3.3</b>	<b>3.5</b>	<b>4.6</b>	<b>6.9</b>	<b>40%</b>	<b>472</b>

**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	<b>4.7</b>	6.3	7.8
Rockall Trough	0.0	0.3	2.1	<b>2.5</b>	5.1	8.6
Northern North Sea	0.2	0.4	0.8	<b>0.9</b>	1.7	2.7
Central North Sea	0.6	0.9	1.4	<b>1.5</b>	2.1	2.8
Mid North Sea High	0.0	0.1	0.5	<b>0.5</b>	1.1	1.6
Southern North Sea	0.2	0.4	0.8	<b>0.8</b>	1.2	1.6
East Irish Sea	0.0	0.0	0.0	<b>0.0</b>	0.1	0.3
SW Britain	0.0	0.0	0.2	<b>0.3</b>	0.6	1.0
<b>Total</b>				<b>11.2</b>		

**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

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### 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 2022 survey covered:

- 278 producing fields
- 6 projects where an FDP had been approved but production had not yet started
- 31 other projects where FDPs were under discussion as at the end of 2022

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

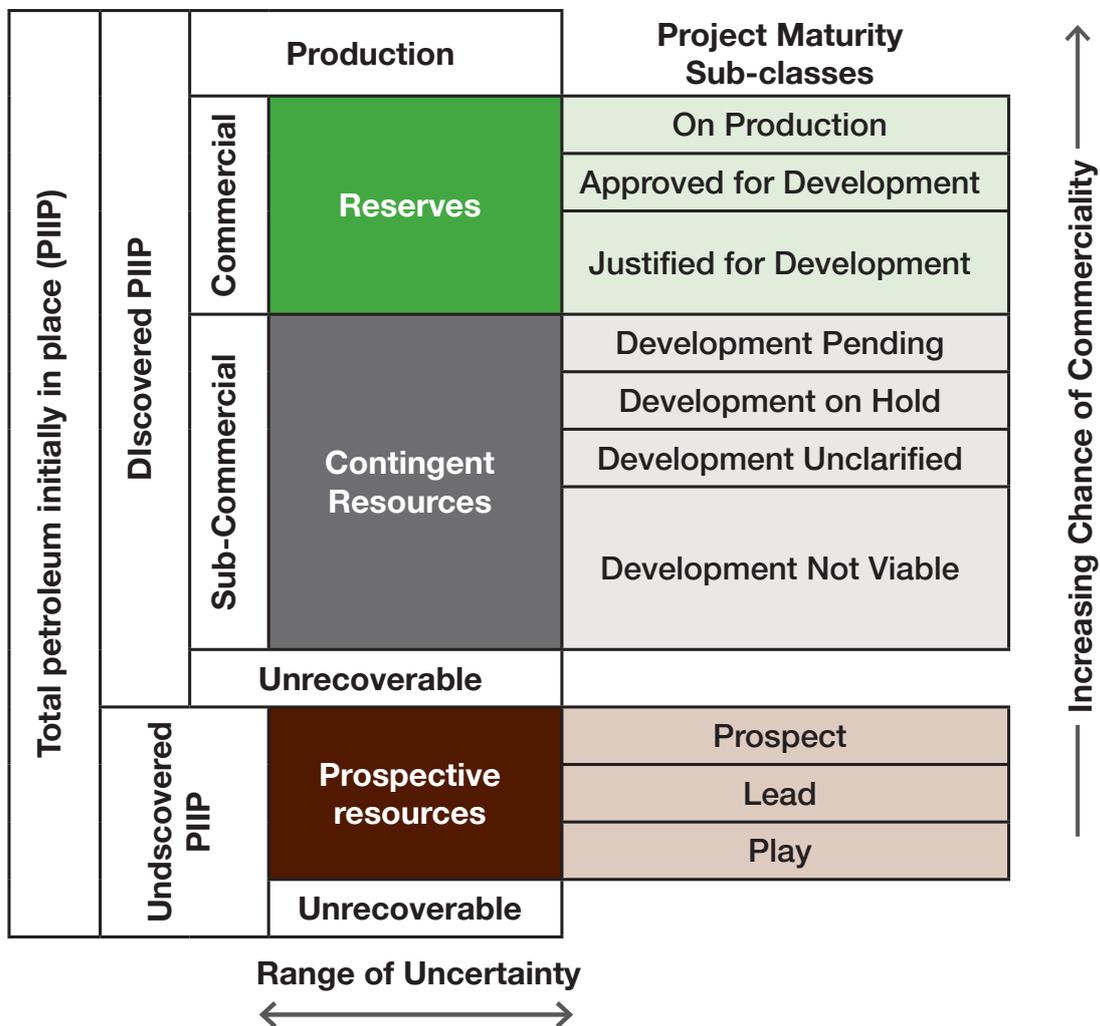
### Comparison of NSTA terminology with SPE PRMS

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)<sup>4</sup>.

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 13.

**Figure 13: Comparison of NSTA classifications with SPE PRMS**

#### SPE PRMS



Source: SPE 2018

<sup>4</sup> <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	NSTA in house
Prospective Resources	Prospects				
	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

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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

## Prospective resources

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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.

### **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.

- 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 & 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 & 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 & Cardigan Bay)

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

Plays not included: Carboniferous

## Appendix D

**Table D3 Oil reserves and resources as at end 2022 (2021) in million tonnes**

Oil	1P	2P	3P
Oil reserves	205 (237)	313 (357)	380 (426)
Oil contingent resources	1C	2C	3C
Producing fields	107 (116)	133 (150)	183 (203)
Proposed new developments	181 (163)	237 (205)	295 (259)
Marginal discoveries	88 (91)	242 (247)	510 (519)
Total contingent resources	376 (370)	612 (602)	988 (981)

**Table D4 Gas reserves and resources as at end 2022 (2021) in billion cubic metres**

Gas	1P	2P	3P
Gas reserves	131 (146)	189 (213)	231 (266)
Gas contingent resources	1C	2C	3C
Producing fields	59 (58)	97 (111)	139 (158)
Proposed new developments	26 (11)	39 (19)	50 (30)
Marginal discoveries	81 (91)	179 (186)	336 (340)
Total contingent resources	167 (160)	315 (316)	525 (528)

**Table D5 Gas reserves by field type as at end 2022 (2021) in billion cubic metres**

Fields in production or under development	1P	2P	3P
Gas reserves from dry gas fields	41 (50)	58 (74)	74 (98)
Gas reserves from gas condensate fields	64 (68)	93 (100)	111 (122)
Gas reserves from associated gas from oil fields	26 (28)	37 (39)	46 (45)

**Table D6 Gas contingent resources by field type as at end 2022 (2021) in billion cubic metres**

Fields where proposed development plans are under discussion	1C	2C	3C
Gas resources from dry gas fields	12 (2)	16 (4)	20 (6)
Gas resources from gas condensate fields	1 (5)	2 (8)	3 (12)
Gas resources from associated gas from oil fields	13 (4)	21 (7)	28 (11)



