

# Hooked on Hydrocarbons

## THE UK'S RISKY ADDICTION TO NORTH SEA OIL AND GAS

Scott Zimmerman and Hanna Fralikhina





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## ABOUT THE COVER

Brent Oil Field Production Platform in the United Kingdom Continental Shelf, Michael Saint Maur Sheil via Getty Images.

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## FURTHER RESOURCES

For additional data on proposed and existing gas and oil extraction sites, see the [Global Oil and Gas Extraction Tracker Map](#). To download primary data from GOGET, see [Download Data](#).

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### EXECUTIVE SUMMARY

In September 2022, the United Kingdom confirmed [a new round of licensing](#) for North Sea oil and gas fields which, if developed, could extend the UK's fossil fuel production into the 2050s. Developing these North Sea fields is a key part of the government's energy strategy, which hews to the myth of gas as a necessary "[bridge to a lower-carbon future](#)"—a myth that has been widely debunked as studies of methane emissions from burning gas show that methane has more than 80 times the warming power of carbon dioxide (CO<sub>2</sub>) over a 20-year period.

This report details the largest of these North Sea fields' locations, ownership, statuses, and hydrocarbon and emissions production to highlight new oil and gas projects' incompatibility with UK and world climate targets.

### INTRODUCTION

The UK will be attempting to lease North Sea fields for development at a time of worsening climate impacts for the country, such as the [extreme heat this July](#) and [historic flooding](#). All the while, increasingly severe warnings from the International Energy Agency (IEA), United Nations, and Intergovernmental Panel on Climate Change (IPCC) state that new oil and gas development and exploration [must end immediately](#) as it is [incompatible](#) with limiting warming to 1.5°C and [unnecessary](#) to meet projected global demand in a 1.5°C pathway. The extraordinarily long time horizon for developing and exploiting some of these fields' reserves—with production in some cases projected to begin in the 2030s and extend into the 2050s—is radically at odds with the UK's Paris commitments to achieve net-zero emissions by midcentury.

## BURNING THROUGH THE UK'S CARBON BUDGET

Oil and gas production from existing North Sea fields is expected to decline between now and 2050. However, dwindling production due to aging fields and the lack of large discoveries is not rapid enough to be compatible with equitable phaseout pathways to limit warming in a manner compliant with the 1.5°C Paris-Agreement goal. Yet, industry is still hoping to further [increase production rates projections](#), calling for [more investment in the region](#) and an [end to certain taxes](#). In a [landmark 2021 report](#), the IEA determined that no investment in new oil and gas fields are needed to meet demand in a pathway to limit global warming to 1.5°C. Further research shows that [ceasing development of new fields is necessary to limit warming to 1.5°C](#), and top United Nations officials have called for [“no expansion in oil and gas exploration.”](#) Despite all of that, the United Kingdom is hosting another licensing round for oil and gas exploration this October. Neighboring countries have sworn off oil and gas exploration, but the UK, a self-proclaimed [climate leader](#), has rejected calls to do so. Supermajors such as Shell, BP, and Total have plans to start up new fields in the UK North Sea, along with independent oil and gas companies. The 20 largest fields expected to reach financial investment decisions (FID) or receive development consent in the next

three years could produce over 920 MtCo<sub>2e</sub>, more than most countries in the world produce annually.

In 2021, according to Rystad Energy, the UKCS had 5.96 billion barrels of oil equivalent (BBOE) in its producing fields' reserves. Under-development fields held 0.59 Bboe, while undeveloped and undiscovered fields contained 13.5 Bboe. Exploiting all of these reserves could yield 7,602 million tonnes of carbon dioxide (MtCo<sub>2</sub>) (Table 1)—significantly more than the sum of the UK's legally binding carbon budgets for 2023–2037: 4,640 MtCo<sub>2e</sub> (BEIS 2019).

According to one study published in the journal *Environmental Research Letters*, over 40% of existing fossil fuel production sites need to be shut down early if global heating is to be limited to 1.5° Celsius. Staying below that temperature threshold may require “governments and companies not only to cease licensing and development of new fields and mines, but also to prematurely decommission a significant portion of those already developed.” The study only looked at fields that had already reached FID and determined that developing any of them was incompatible with limiting warming to 1.5°C. Undiscovered and undeveloped fields, therefore, are wholly out of step with the Paris goal (Trout et al 2022).

**Table 1: UK offshore oil and gas reserves in developed fields and projected in undeveloped and undiscovered fields**

	Developed fields			Undeveloped fields			
	Producing fields	Under development	Total developed	Discovered, undeveloped fields	Undiscovered licensed fields	Unlicensed fields	Total undeveloped + undiscovered
Oil (Bbbls)	4.53	0.26	4.79	3.88	0.92	1.52	6.32
Gas (Bboe)	1.42	0.33	1.75	2.1	4.44	0.63	7.17
Total (Bboe)	5.96	0.59	6.55	5.99	5.36	2.14	13.49
Emissions (MtCo <sub>2</sub> )	2413	228	2641	2384	1973	861	5218

Adapted from Table 1: “UK offshore oil and gas reserves in developed fields and projected in undeveloped and undiscovered fields” from [FOES 2021](#). Rystad Energy UCube (July 2021), IPCC emissions factors for combustion of oil and gas.

## FOSSIL FUEL DOUBLESPEAK

The British Energy Security Strategy (BESS) aims to expand domestic UK energy supply by “further [utilizing] North Sea reserves,” restating the UK government’s “commitment to a strong and evolving North Sea industry” (PMO 2022). The North Sea Transition Deal (NSTD) is the plan to carry out that commitment. It is an agreement between the UK government and UK offshore oil and gas companies and has the goal of harnessing “the power of the UK offshore oil and gas industry to deliver net-zero by 2050” (BEIS-A 2022).

The North Sea trade association, Offshore Energy UK (OEUK), describes the deal as helping “secure maximum economic recovery from the UKCS in a sustainable way” (OEUK 2022). Friends of the Earth Scotland, however, describes the NSTD strategy as one that simply takes the goal of maximum economic recovery, “then simply tacks on the government’s commitment to net zero, as if they weren’t in open conflict” (FOES 2021).

## CHECKPOINTS BUILT TO FAIL

NSTD stated that for the new licensing round to take place, the oil and gas sector must pass a series of tests called the “Climate Compatibility Checkpoint.” The Checkpoint’s stated purpose is “to ensure future [licenses] awarded are aligned with net zero” (NSTA 2022). The potential tests covered a range of topics, from importer status to support of “energy transition technologies” to the “global production gap.” The production gap refers to the difference between the global sum of governments’ projections for oil and gas production and carbon budgets for limiting global warming to 1.5°C (Dunne 2022). However, the final [Climate Compatibility Checkpoint design](#), published September 22, 2022, “concluded that a specific test on the production gap is not required” citing the “improbability of global cooperation” (BEIS-B 2022). Using this limited Checkpoint, the government decided that the sector had passed its test and the “33rd licensing round is compatible with the UK’s climate objectives” (Rees-Mogg 2022), clearing the way for the licensing round to take place in October. Greenpeace UK responded stating “we believe this licensing round is unlawful and we’ll be looking at taking legal action” (Walker 2022).

Many have criticized the Climate Compatibility Checkpoint design as insufficient throughout the consultation process. As written, new projects that already hold a license, but have not yet received development consent or reached a final investment decision can go ahead without being subject to the Climate Compatibility Checkpoint (Dunne 2022). By not providing a rigorous test of the climate compatibility of proposed new developments (Uplift 2022), the scope of the Checkpoint is insufficient. The Climate Change Committee, an independent government body, [determined](#) the Checkpoint is “too narrow and does not provide appropriate grounds fully to assess the climate impacts” of new UK fields and called for an equivalent test to “apply to later development stages, such as [consenting of production](#).”

When the details of the final design of the Checkpoint were released in September 2022, they were promptly deemed “[meaningless](#)” by activists as it does not cover emissions from the burning of fossil fuels.



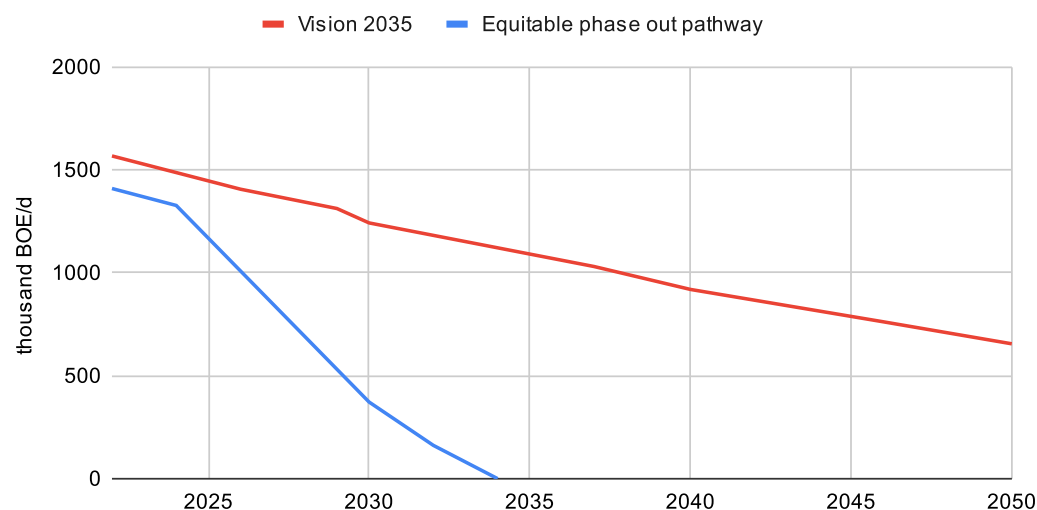
## PRODUCTION GAP

The North Sea Transition Authority (NSTA) claims that “oil and gas production from the UKCS will decline at a faster rate than required in 1.5°C scenarios” based on its projections (NSTA-a 2022). Yet it is unclear exactly which production outlooks are being used to inform the UK’s “production gap” analysis. Rystad Energy data shows a [growth rate](#) of 1% year over year for oil and –2% for gas between 2021 and 2030. That rate exceeds the 1.5°C pathway laid out by the IEA, the UNEP Production Gap Report (PGR), and UCL Energy Institute researchers. PGR authors analyzed the UK production pathways and found that the “Vision 2035” scenario of the [NSTA 2019 Corporate Plan](#), “would not be aligned” with the goal of limiting long-term warming to 1.5°C. Furthermore, those scientists argued, it may be “incumbent upon a country like the UK to commit to a wind down of national oil and gas production that is even faster than the global average decline rates consistent with limiting warming to 1.5°C” (Achakulwisut 2022). The Climate Change Committee also has stated

“an end to UK exploration would send a clear signal to investors and consumers that the UK is committed to the 1.5°C global temperature goal” (CCC 2022).

A policy brief from the UCL Energy Institute also analyzed production pathways for the UK and found that the “development of new UK oil and gas fields are not compatible with limiting warming in line with the Paris Agreement” and recommends “a moratorium be placed on all new oil and gas fields” (Welsby 2022). Oil Change International came to the same conclusion and further stated that even without any new development, production from existing fields alone could exceed the [UK’s “fair share” carbon budget](#) within a few years (OCI 2022). Any projection where oil and gas production continues past 2034 is incompatible with the equitable pathway laid out in the Tyndall Center’s “Phaseout Pathways for Fossil Fuel Production Within Paris-compliant Carbon Budgets” report (Calverley 2022).

**Figure 1: UK Oil and Gas Projection, Vision 2035 vs. Equitable Fair Share**



“Vision 2035” UK oil and gas projection as shown in the [OGA Corporate Plan 2019–2024](#) compared to the “Group 1” fair share oil and gas production pathways consistent with limiting warming to 1.5°C per “Phaseout Pathways for Fossil Fuel Production Within Paris-compliant Carbon Budgets” (Calverley 2022).

## NEW FIELDS WILL NOT LOWER BILLS

Industry implies that further exploitation of North Sea oil and gas fields would drive down costs for consumers and [protect them from future price hikes](#). This [does not reflect reality](#) as private companies control North Sea oil and gas production and sales. These international companies follow market logic and sell wherever the price is highest within global markets (Plumpton 2022). According to the Minister of State at the Department for Business, Energy & Industrial Strategy, it is a “[myth](#)” that extracting more North Sea

gas lowers prices, and the Climate Change Committee agrees UK reserves “are too small to impact meaningfully the prices faced by UK consumers” (CCC NIC 2022). Even if prices were to be affected by North Sea production, exploration occurring as a result of a new licensing round would likely not lead to new production until the 2030s or 2040s, and possibly post-2050 (CCC 2022). In its annual economic report, OEUK admitted that [new investment won't offer a near-term solution to the energy crisis](#).

## DOMESTIC VS INTERNATIONAL PRODUCTION

According to industry, domestic hydrocarbon production will reduce reliance on imports from Russia and OPEC countries, and oil and gas produced in the UK is less carbon intensive than gas produced elsewhere. But the vast majority—77% in 2021—of gas imports to the UK come from Norway, as do nearly 50% of crude oil imports (Donnarumma 2022). While the UK has lower oil and gas emissions intensities than the global average (CCC 2022), emissions are higher in the UK than in Norway, its biggest import partner (Kulovic 2022) (Evans 2022), NSTD targets are less ambitious than Climate Change Committee recommendations (CCC-a 2021) (Evans 2022), and real

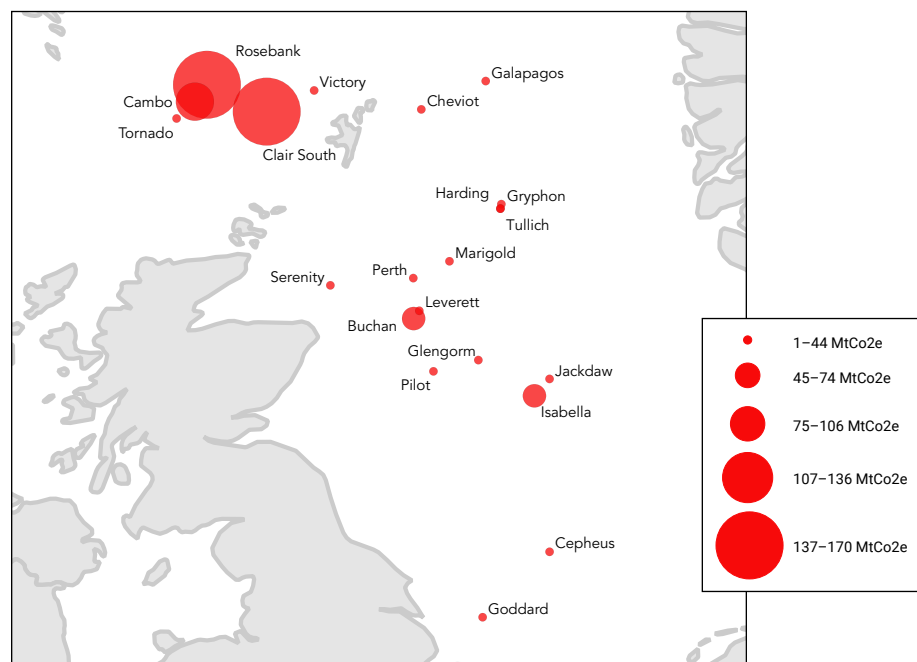
emissions intensities jumped upwards in 2021 (Boren 2022). The UK does import a significant percentage of its refined oil from Russia, but the IEA's 10-Point Plan to Cut Oil Use points out actions that can be taken to reduce oil demand with immediate impact (IEA 2022). Without new exploration and licensing of fields, absolute imports of both oil and gas would still decline significantly (Achakulwisut 2022). In fact, research by Acasta Risk shows that even without any new licensing rounds, there is still a reduction in relative import dependency compared to the Climate Change Committee balanced net zero pathway (Uplift 2022).

## FIELD DESCRIPTIONS

The Climate Compatibility Checkpoint as drafted is not applied at the production consent stage. Therefore, numerous fields that already hold a license but have not yet received development consent or a final investment decision won't be subjected to the review.

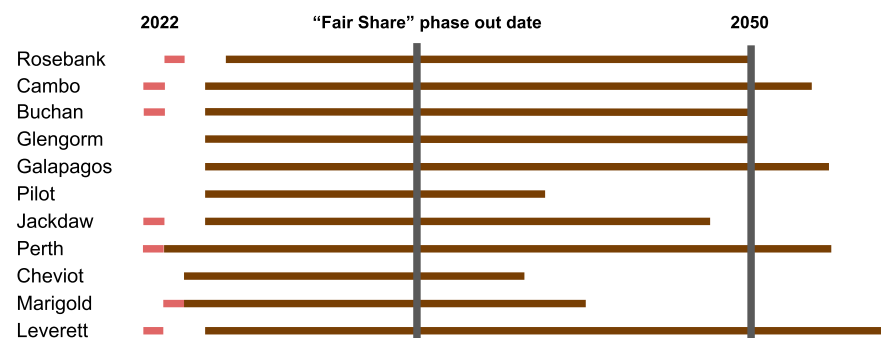
Carbon Brief [published](#) a list of these oil and gas projects. Drawing on GEM's [Global Oil and Gas Extraction Tracker](#) and new research, this report provides further information on these fields.

**Figure 2: Largest UKCS Fields by Potential Emissions**



Twenty-one fields industry is hoping to develop in the UK North Sea, shown by potential lifetime emissions in terms of carbon dioxide emissions.

**Figure 3: Production of Fields Expected to Continue Past UK Fair Share Phase Out Date**



FID (red) and production (brown) from selected UK fields for which data was available, according to GOGET, compared to the UK Fair Share Phase out date (grey, 2034) per Calverley, D., & Anderson, K. (2022). Phaseout Pathways for Fossil Fuel Production Within Paris-compliant Carbon Budgets.



## Rosebank Oil and Gas Field

Anticipated FID: 2023

Anticipated Start Date: 2026

Current Status: In Development, EIA submitted August 2022

Rosebank oil and gas field is the largest of the fields industry is aiming to start up in the UK North Sea. The field is located in the Faroe-Shetland Channel approximately 130 km northwest of Shetland, at a depth of around 1100 meters (Equinor 2022) (Offshore Magazine 2022).

The field was discovered in 2004 by Texaco North Sea UK Company—a subsidiary of Chevron—DONG Energy, OMV and StatoilHydro (Duncan, 2020). As of 2022, the field is owned by Equinor (40%, operator), Suncor Energy (20%) and Ithaca Energy (20%)—which is wholly owned by Delek Group Limited (Equinor 2022). Rosebank's CAPEX is listed as 4.1 billion euros, its OPEX as £3.6bn.

In 2012, FID was expected to be taken in “early” 2013, with first production in 2017 (OT 2012). In 2019, Equinor stated that FID for Rosebank is planned to be taken by May 2022. However, in February 2022, ExproNews reported that Equinor “has not even submitted an FID” and that “no drill bit will go into the ground any time soon.” As of August 2022, FID is expected in 2023, and first oil is expected in the latter part of 2026. Production is set to continue through to 2050.

Carbon Brief published an analysis by Uplift which states that the expected recovery from Rosebank is 325 million barrels of oil (MMbbl). Based on that, Rosebank's potential lifetime emissions are 170 million tonnes of carbon dioxide equivalent emissions (MtCo2e).

Greenpeace promised to fight Rosebank coming online, calling the project “shameful.” Uplift criticized the UK government for “effectively handing over at least half a billion [pounds] to the Norwegian government” while the United Kingdom “faces a prolonged recession and millions of British families are being pushed into poverty from soaring energy bills.”

## Clair South Oil Field

Anticipated FID: 2022

Anticipated Start Date: 2024

Current Status: In Development

Clair South oil field, also known as Clair field phase 3 development project, is located 75 km west of the Shetland Islands in the UK Continental Shelf (UKCS) (Chevron; UpstreamOnline, Feb 2020).

The original Clair oil field was discovered in 1977 (NS Energy). Clair South is the third development phase of the Clair field (Chevron). Phase one began production in 2004, phase two in 2019 (UKCS Production Dashboard 2022). The field is owned by BP (45.11%, operator), Shell (27.97%), Chevron (19.42%), and Harbour Energy (7.5 %) (NS Energy, OT Clair Ridge Field, Harbour, BusinessWire, ConocoPhillips).

FID was expected to be reached in 2021 but has been pushed back to 2022 in an effort to look for input from contractors to “make the development as economically and environmentally competitive as possible” (UpstreamOnline, Feb 2020, EnergyVoice 2020). As of February 2020, first oil production was expected in 2024 (UpstreamOnline, Feb 2020).

Expected recovery is about 292 million barrels of oil equivalent (Mmboe), which equates to potential lifecycle emissions of 153 MtCo2e.

Friends of the Earth (FOE) stated in 2021 that Clair South runs afoul of the guidance of the IEA's Net Zero by 2050 report.

## Cambo Phase 1 Oil and Gas Field

Anticipated FID: 2021

Anticipated Start Date: 2025

Current Status: In Development, EIA submitted in 2021

Cambo oil field is located approximately 125 km west of the Shetland Islands in the UKCS (Ithaca EIA, 2021, NSTA License).

The field was discovered in 2002 by Hess Corporation. As of August 2022, the project is owned by Ithaca Energy Limited (70%)—a wholly owned subsidiary of the Delek Group—and Shell plc (30%). However, Shell is intending to divest its 30% stake in the project.

FID was expected to be reached in 2021 with production starting in 2025, however, in December 2021,

after facing sustained criticism from environmental groups, Shell announced its decision to sell its 30% stake in the project, stating that the economic case for investment in the North Atlantic project was not strong enough. Later that same month, then-owner Siccar Point Energy made the decision to pause the project. However, in early 2022, the field was granted a two-year license extension, and Ithaca Energy—which acquired Siccar Point—pledged to develop Cambo.

Total recoverable reserves of Cambo are estimated to be 170 MMbbl and 53.5 billion cubic feet of gas (BCF). Provided oil production starts in 2025, the field is forecast to peak in 2029 and reach its economic limit in 2053 (OT Cambo, 2021).

The potential total lifecycle emissions from the field are 95 MtCo<sub>2e</sub>, per GEM's calculations assuming 170 MMbbl oil and 53.5 BCF of gas are produced.

The project has faced significant criticism from environmental groups. The #StopCambo campaign gathered more than 100,000 signatures from the public and over 80 civil society organizations on an open letter calling on the government to stop the project (StopCambo). Opposition to or concern over the project has also been expressed by dozens of MPs and the UK Labour Party, Green Party, Scottish Labour, Scottish Greens, and Scottish National Party (StopCambo). Greenpeace is also considering taking legal action if the UK government approves the project (BBC April 2022).

## Buchan Oil and Gas Field

**Anticipated FID:** 2022

**Anticipated Start Date:** 2025

**Current Status:** In Development

Buchan oil field is located in the UKCS approximately 120 km northeast of Aberdeen.

Buchan oil field was discovered in 1974 and originally brought into production by BP in 1981. Production stopped in May 2017 because the floating production vessel (FPV) reached its end life. An environmental appraisal for decommissioning was filed for Buchan in March 2020. However, in 2019 after conducting a seismic survey, Jersey Oil and Gas (JOG) submitted an application for a redevelopment license,

and was awarded a 100% working interest and operatorship of the Buchan oil field (New Beginning, OT 2021). The development cost is expected to be US\$1.4 billion (OT 2021).

As of 2021, FID was expected to be reached in 2022 and production was expected to start in late 2025 and continue for over 20 years.

The original development produced 147.8 MMbbl of oil and 36.5 billion cubic feet (BCF) of gas from 1981 until 2017. JOG estimated production of over 120 Mmbbl of crude oil in the P50 case from Buchan, leading to estimated total lifecycle emissions of 63 MtCo<sub>2e</sub>.

## Glengorm Oil and Gas Field

**Anticipated FID:** –

**Anticipated Start Date:** 2025

**Current Status:** In Development

Glengorm gas field is located in the UKCS about 120 km east of Aberdeen.

CNOOC Petroleum Europe Limited, a wholly-owned subsidiary of CNOOC Limited, discovered the field in January 2019 and is its operator. CNOOC holds 50% interest in the project, with TotalEnergies and Energean each holding 25% interest.

Production is expected to start in 2025, is forecast to peak in 2029, and is predicted to continue until the field reaches its economic limit in 2054. In April 2021, Glengorm South appraisal well, the first appraisal well on the Glengorm gas field, found “no commercial hydrocarbons” (EnergyVoice 2021, Offshore Energy 2021). CNOOC and Energean stressed that the existing Glengorm North discovery and the Glengorm Central appraisal well, which will be drilled next, were considered to be independent of Glengorm South (EnergyVoice 2021). In December 2021, CNOOC announced that the second appraisal well (22/21c-14) yielded “no commercial hydrocarbons” either (Exponews 2022).

Expected ultimate recovery was originally estimated to be as high as 250 Mmboe but has since been downgraded to around 62.5 Mmboe. It is reported that this volume may still be commercial as a tie-back, for instance to TotalEnergies' Elgin-Franklin facilities (Exponews 2022).

FOE estimated total lifecycle emissions from the field at [92 MtCo2e](#) given the original reserves estimate. Taking into account the downgraded reserves, GEM estimates the total lifecycle emissions from the field to around 33 MtCo2e.

While the original discovery of the field was hailed as significant by industry, the project faced opposition from environmental groups who called it a “disgrace” given its potential contribution to climate change ([Guardian 2019](#)).

### Galapagos Oil Field

**Anticipated FID:** –

**Anticipated Start Date:** 2025

**Current Status:** In Development

Galapagos oil field is located in the UKCS, 120 km to the northeast of the Shetland islands.

The field is a combination of the redevelopment of the former North West (NW) Hutton field and the appraised Darwin discovery ([GeoExpo 2021](#), [OnePetro](#)). The NW Hutton part of the Galapagos field was discovered in 1975, production started in 1983 and ceased in 2003 ([BridgePetroleum](#), [Decommissioning](#)). The field was estimated to originally contain 487 Mmboe, with 126 Mmboe recovered since the start of production ([Decommissioning](#)). The southern Darwin extension of the field was discovered in 1975 by Amoco Corporation and remained undeveloped. In 2012, TAQA proved additional reserves at Darwin, but due to financial considerations, TAQA relinquished one of its licenses covering the southeasternmost area of Darwin ([GeoExpo 2021](#), [UpstreamOnline 2020](#)). Bridge Petroleum acquired the remaining two licenses covering NW Hutton and the main Darwin area from TAQA and INEOS in 2017 ([UpstreamOnline 2020](#)). Bridge Petroleum is, as of 2022, the [operator and sole owner](#) of the field.

Production is expected to start in 2025, is forecast to peak in 2026, and is predicted to continue until the field [reaches its economic limit in 2056](#).

Bridge Petroleum said in 2022, “Galapagos is a massive project, comprising around 81m barrels of reserves, and we believe we can do better than that” targeting 30% recovery of remaining oil in place, which would equate to [360 MMbbl](#). GEM, based on the

lower-end recovery estimate, calculated potential total lifecycle emissions from the field to be 42 MtCo2e.

### Pilot Oil Field

**Anticipated FID:** –

**Anticipated Start Date:** 2025

**Current Status:** In Development

Pilot oil field is a heavy oil field located in the UKCS about 145 km east of Aberdeen ([NS Energy 2022](#), [Orcadian](#)).

The field was [discovered in 1989](#). Development was not pursued further due to the high viscosity of the oil in the field as well as other factors. In 2014, the license for Pilot was awarded to Orcadian Energy, a LSE listed company, which is now the sole owner and operator of the field ([OT 2021](#), [Orcadian](#)).

In June 2022, Orcadian submitted a draft field development plan (FDP) to NSTA ([Orcadian](#)). Production is expected to start in 2025, is forecast to peak in 2027, and is predicted to continue until the field reaches its economic limit in 2040 ([OT 2021](#)).

Expected ultimate recovery of the field is 79 Mmboe ([Carbon Brief 2022](#), [FOE 2021](#), [Orcadian](#)).

FOE [stated in 2021](#) that Pilot runs afoul of the guidance of the IEA’s Net Zero by 2050 report, and estimated total lifecycle emissions from the field at 41 MtCo2e, which is consistent with GEM estimates.

### Tornado Gas Field

**Anticipated FID:** 2022

**Anticipated Start Date:** 2030

**Current Status:** In Development

Tornado gas field is located 160 km west of the Shetland Islands in the UKCS.

The field was [discovered in 2009](#). Siccar Point Energy (50%, operator) and Shell plc (50%) were awarded the license in the UKCS 30th License Round in 2018 ([OffshoreMag 2018](#)). Ithaca Energy Limited acquired Siccar Point Energy in July of 2022 and now [serves as the field operator and owner of the 50% interest](#). Ithaca Energy is a wholly owned subsidiary of the Delek Group ([Ithaca, 2022](#)). The field is expected

to be developed as part of a regional gas development hub ([SiccarPoint](#)).

FID is expected to be reached in 2022 with production starting in 2030 ([NSTA 2022](#)).

Tornado was the sixth largest discovery made in the UKCS between 2008 and 2019, with Rystad estimating [recoverable resources of 86 Mmboe](#) in 2020. However, more recent reports put Tornado's recoverable resources at [around 80 Mmboe](#).

GEM estimates lifecycle emissions from the field to be 42 MtCo2e.

According to the North Sea Transition Authority, the project continues to progress with various gas export options being considered. However, the project is "unlikely to be commercial as a stand alone development," and ongoing exploration studies in the license area are aimed at identifying additional gas resources. A decision is expected to be made by September 2022 on whether to proceed with seismic surveys, drill, or relinquish the license ([NSTA 2022](#)). It is notable that further progress on this field may be dependent on the development of Cambo Phase 1 Oil and Gas Field, which has encountered setbacks and significant opposition from environmental groups ([EnergyVoice 2022](#)).

## Harding Gas Field (Redevelopment)

**Anticipated FID:** –

**Anticipated Start Date:** –

**Current Status:** In Development

Harding gas field is a gas redevelopment project of a producing oil field. The field is located 320 km north-east of Aberdeen in the UKCS in shallow water at a depth of 110 meters.

Harding oil field was discovered in 1987 by Britoil ([TAQA Env Statement](#), [OffshoreMag 1995](#)). It began producing oil in 1996 ([UKCS Production Dashboard 2022](#)). In 2006, BP announced plans to develop the gas resources in the reservoir via the Harding Area Gas Project; however, the project was abandoned due multiple factors ([OT Harding Gas Project](#)). In 2013, TAQA completed the acquisition of the field from BP, becoming the operator of the field ([OffshoreMag 2013](#)). In 2017, TAQA and Maersk funded concept studies on potential facilities for supporting a project

to exploit the remaining gas reserves at the field ([UpstreamOnline 2019](#), [UpstreamOnline 2017](#)). In 2019, TAQA submitted an environmental statement about a proposed project at Harding but the document was not made available to the public ([UpstreamOnline 2019](#)).

The field is owned by TAQA (70%), with TAQA Bratani Limited as the operator, and TotalEnergies (30%) ([OT Harding Gas Project](#), [Total Acquisition, OT Harding Oil](#)). TAQA is a fully owned subsidiary of Abu Dhabi National Energy Co ([ADX](#), [GlobalDat](#)). In December 2021, TAQA was intent on selling its North Sea assets, including the potential gas blowdown project at Harding and at TAQA's other Quadrant 9 Area fields ([Bloomberg 2021](#)).

Production at the gas field was expected to commence [once the remaining recoverable oil has been produced](#) from the area, no clear FID or start date has been reported.

The field has produced 286.8 Mmbbl of oil and 129 BCF of gas in its lifetime ([UKCS Production Dashboard 2022](#)). Expected future recovery from the redevelopment is estimated at 58 Mmboe ([Carbon Brief 2022](#)). Based on that estimate, potential total lifecycle emissions from the field are 30 MtCo2e.

## Jackdaw Oil and Gas Field

**FID Date:** July 2022

**Anticipated Start Date:** 2025

**Current Status:** In Development

Jackdaw oil and gas field is located approximately 250 km east of Aberdeen in the UKCS.

The field was discovered in 2005. Jackdaw is [operated by Shell](#) and owned by [BG International Limited](#) (74%) and [ONE-Dyas E&P Limited](#) (26%). Shell UK is a wholly-owned subsidiary of Shell, and Shell [acquired BG International Limited](#) in February 2016. ONE-Dyas E&P Limited is a [subsidiary of ONE-Dyas B.V.](#), which is [49% owned by SHV](#) and [51% owned by ONH BV](#).

The initial plans for the development of the field [were rejected](#) by the UK Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) in October of 2021 on environmental grounds. However,



an updated development proposal [was approved](#) by OPRED in June 2022. Jackdaw [reached FID](#) in July 2022. Production is expected to start in the second half of 2025 and to continue until the field reaches its [economic limit in 2048](#).

Expected ultimate recovery is often cited as between [120 and 250 Mmboe](#), however, Uplift (via Rystad) put the expected recovery as 56 Mmboe. Even using the lowest estimate, GEM estimates total lifecycle emissions from the field to be 29 MtCo2e.

The project has faced significant opposition from community members and environmental groups. In June 2022, climate experts and activists expressed anger over the government granting the final regulatory approval for the project, some calling it “[desperate and destructive](#).” The [Stop Jackdaw campaign](#) held [protests](#) to demand the government reverse its decision. In July of 2022, Greenpeace lodged a legal challenge against the UK government over the consent granted to develop the field. Greenpeace [argued](#) the government has not considered the total lifecycle emissions from the field and the associated impact on global warming.

## Perth Oil and Gas Field

**Anticipated FID:** 2022

**Anticipated Start Date:** 2023

**Current Status:** In Development

Perth oil and gas field is located approximately 180 km northeast of Aberdeen ([Parkmead](#)). The Scott field is nearby and is a candidate for a subsea tieback development ([Woodmac 2022](#)).

The Perth Field was discovered in 1983. Between 2000 and 2015, operators attempted to develop the field, but were not successful due to a lack of a suitable tieback host to process sour fluids and economics. The Parkmead Group currently holds 100% equity in Perth.

As of 2020, Perth was expected to reach FID in 2021 with first oil in 2023–2024 (Allan and Southwood 2020). However, as of April 2022, the anticipated FID for Perth had been pushed back to 2022 with production projected to commence in 2023 with an end of economic life in 2054 ([OT 2022](#)).

Parkmead estimates [P50 recoverable resources](#) as 55 Mmboe. Perth is the “core” of Parkmead’s “Greater Perth Area development project.” That project has the potential to deliver between 75 and 130 Mmboe ([Parkmead 2022](#)).

FOE [stated in 2021](#) that Perth runs afoul of the guidance of the IEA’s Net Zero by 2050 report, and estimated total lifecycle emissions from the field at 29 MtCo2e, which is consistent with GEM estimates.

## Cheviot Oil and Gas Field

**Anticipated FID:** –

**Anticipated Start Date:** 2024

**Current Status:** In Development

Cheviot oil and gas field is located in UKCS, approximately 50 km east of the northern Shetland Islands.

Cheviot is a redevelopment of the Emerald field, which was discovered in 1975 and put into in 1992 after an “[unusually large number of setbacks and changes](#).” Due to “[inadequate project planning and execution](#),” the field was abandoned after 8% of the original oil in place was extracted (Offshore 2022).

In 2003, Alpha Petroleum was awarded the license for the field ([Alpha 2022](#)). As of 2022, Alpha has a [100% interest](#) in the Cheviot field. Waldorf Production announced that it has acquired Alpha Petroleum from Shorelight Partners on July 11, 2022.

According to the NSTA Energy Pathfinder, Alpha Petroleum was targeting first oil in Q2 2021, however an April 2020 update said that target was delayed due to COVID-19 ([NSTA EP 2020](#)). As of 2022, Cheviot is expected to start commercial production in 2024 and continue producing until the [end of the field’s economic life in 2039](#).

Cheviot is considered “[one of the largest undeveloped fields in the UK North Sea](#),” according to Waldorf. Alpha Petroleum has stated Cheviot’s reserves are “[at least](#)” 55 MMbbl of oil and 120 BCF (21.4 Mmboe) of gas.

Cheviot is one of the fields [FOE called out](#) in 2021 for ignoring the guidance of the IEA’s Net Zero by 2050 report. GEM calculated the emissions of the field to be potentially 40 MtCo2e.

## Serenity Oil Field

**Anticipated FID:** –

**Anticipated Start Date:** 2024

**Current Status:** In Development

Serenity oil field is located in the UKCS about 60 km northeast of Fraserburgh. It is in close proximity to the Blake and Tain fields (i3 2022).

i3 Energy discovered the field in 2019 (Europa 2022). In April 2022, i3 announced it had completed a farm-in agreement (FIA) with Europa Oil & Gas Limited. Under the FIA, Europa obtains a 25% non-operated working interest in Serenity, while i3 retains 75% ownership.

It is unclear when the project is expected to reach FID and begin operation. In July 2022, Europa's CEO stated that an appraisal well will be drilled in September 2022 and production from Serenity would not commence until after 2023.

Europa put the P50 reserves of Serenity at around 68 MMbbl, using that estimate, GEM calculated the potential lifetime emissions of the Serenity oil field to be 36 MtCo2e.

## Marigold and Sunflower Oil Fields

**Anticipated FID:** 2022

**Anticipated Start Date:** 2023

**Current Status:** In Development

Marigold oil field is located in the UKCS, approximately 220 km northeast of Aberdeen. Marigold and Sunflower are being developed within a plan that also includes Marigold East (FKA Yeoman) and Kildrummy – referred to as the Marigold Cluster.

The field operator, Anasuria Hibiscus UK (AHUK), acquired stakes in the relevant blocks in 2018. In 2021, AHUK increased its interest in Marigold and Sunflower to 87.5% (OT Marigold-a 2021). The remaining 12.5% is held by Caldera Petroleum UK. Anasuria Hibiscus is a subsidiary of Hibiscus Petroleum and Caldera Petroleum of Aban Energies. NSTA requested AHUK work with Ithaca energy to jointly develop Marigold and Marigold East in November 2021.

Hibiscus pushed back its timeline for Marigold to reach FID from December 2020 to March 2021, citing COVID-19 delays in Q4 2020. Hibiscus is, as of March

2022, targeting FID and NSTA approval of its FDP in 2023. If that target is reached, the production phase is expected to be from 2024–2042 (OT Marigold-b 2021). Marigold is the first phase from the Marigold cluster; Sunflower and Kildrummy are planned as subsequent phases (HP 2022).

In a 2022 presentation to investors, Hibiscus stated that 2C resources from Marigold were 44 MMbbl. Sunflower adds an additional 5.8 MMbbl of contingent oil resources (HP 2022). The Marigold Cluster (including Marigold, Sunflower and Kildrummy) is estimated to contain 60 MMbbl of oil. Ithaca's P2158 license contains 15 Mmboe.

If 50 Mmboe are produced and burned from Marigold and Sunflower, 26 MtCo2e could be emitted to the atmosphere.

FOE stated in 2021 that Marigold and Sunflower ignore the guidance of the IEA's Net Zero by 2050 report.

## Leverett Oil and Gas Field

**Anticipated FID:** 2022

**Anticipated Start Date:** 2023

**Current Status:** In Development

Leverett oil field is located in UKCS, approximately 150 km northeast of Aberdeen, at a depth of about 250 meters (OT 2022). It is being developed as a tie-back to the Britannia oil and gas field (NEO 2021).

Zennor Petroleum Limited was awarded the licenses containing Leverett in May 2018. In 2021, NEO Energy acquired Zennor and became the operator of Leverett. HitecVision, a private equity investor, owns NEO Energy (HV 2022) (OT 2022).

As of April 2022, FID was expected to be reached for Leverett within 2022, production to commence in 2025, and the field to produce hydrocarbons through 2057 (OT 2022). Energy Voices says that Leverett holds "40m barrels of gas-condensate resources" (EV 2019).

Leverett is one of the fields FOE called out in 2021 as ignoring the guidance of the IEA's Net Zero by 2050 report. Lifecycle emissions from the field are potentially around 21 MtCo2e.



## Gryphon Gas Field (Redevelopment)

**Anticipated FID:** –

**Anticipated Start Date:** –

**Current Status:**

The Gryphon oil and gas field is located approximately 190 km southeast of the Shetland Islands in the UKCS ([Total](#)) (Pelletier 2020). The project is a redevelopment, focused on extracting gas from the mature oil field ([UpstreamOnline 2013](#)).

The field was discovered in 1987 ([Total](#)), and production began in 1993 ([UKCS Production Dashboard 2022](#)). Since at least 2013, companies involved in the project have proposed exploiting the field's gas resources ([UpstreamOnline 2013](#), [UpstreamOnline 2017](#)). As of 2022, Totalenergies E&P North Sea UK Limited, a subsidiary of Total Energies, operates the field and holds 86.5% equity. Sojitz Energy Development Limited, a subsidiary of Sojitz Group, holds the remaining 13.5% ([NSTA License](#)).

Production at the gas field was expected to commence once the remaining recoverable oil has been produced from the area, which will be in [2025](#), according to [Offshore Technology](#), although no clear FID or start date has been reported.

Gryphon oil production peaked in 1994. It has produced [137.5 Mmbbl of oil and 123 bcf](#) (21.2 Mmboe) of gas since 1993—99.31% of its total recoverable reserves ([UKCS Production Dashboard 2022](#)). Expected ultimate recovery of the redevelopment is [estimated at 35 Mmboe](#). GEM estimates total lifecycle emissions from the field to be 18 MtCo2e.

## Cepheus Gas Field

**Anticipated FID:** –

**Anticipated Start Date:** –

**Current Status:** In development

Cepheus gas field is located about 185 km east of Robin Hood's Bay.

It was [discovered in 2014](#) by GdF Suez and partners. As of 2022, that license is owned by Neptune Energy (38.75%, Operator) and Spirit Energy (61.25%) ([NSTA License](#)). Neptune's major shareholders are China Investment Corporation, The Carlyle Group and CVC Capital Partners. Spirit Energy is a joint

venture of [Centrica, Stadtwerke München GmbH and Bayerngas GmbH](#).

According to Uplift, Cepheus is one of the North Sea oil and gas projects that [could be approved between 2022 and 2025](#). As of 2014, Cepheus was expected to be developed as a tie-in to the nearby Cygnus development.

Uplift's analysis states the resources of the project to be 30 Mmboe. Potentially, lifecycle emissions from this field could be as high as 16 MtCo2e.

## Victory Gas Field

**Anticipated FID:** 2022

**Anticipated Start Date:** 2024

**Current Status:** In development, FDP submitted to NSTA in July 2022

Victory gas field is located in the UKCS, approximately 47 km north west of the Shetland Islands.

Texaco discovered Victory in 1977. Corallian Energy Limited was awarded the Victory gas field license in 2020, becoming the operator and 100% owner. Corallian is a private company, in which Reabold Resources has had a [49.99% interest since 2018](#). In May 2022, Reabold announced it had received a [potential offer](#) from a "credible party" for its stake in Corallian.

In November 2020, the "[Victory project schedule](#)" projected FID to be reached and the FDP to be approved in early 2022 with production starting at the end of 2024. By December 2021, expected FID had been [pushed back](#) to the end of 2022. On July 5, 2022, Corallian submitted its letter of application for consent to develop, FDP, and [Environmental Impact Assessment](#) (EIA) to NSTA. According to the timeline listed in the EIA, Corallian is targeting first gas by Q4 of 2024.

Offshore Technology expects the production phase for Victory to be between 2024 and 2032. In its lifetime, the field is [expected to produce around 157 BCF \(28-29 Mmboe\)](#) of gas.

FOE [stated](#) in 2021 that the Victory field runs afoul of the guidance of the IEA's Net Zero by 2050 report. FOE estimated total lifecycle emissions from the field at 11 MtCo2e. That figure could be as high as 15 MtCo2e, per GEM's calculations.

## Tullich Gas Field (Redevelopment)

Anticipated FID: –

Anticipated Start Date: –

Current Status: Discovered

Tullich field is located approximately 320 km north-east of Aberdeen.

Parts of the field were discovered in 1991, but after more wells were drilled with limited success, there was [no further activity](#) in the block for about ten years. In 2001, Kerr-McGee, then the operator of the block, began its exploration/appraisal campaign. The Department of Trade and Industry approved the project's field development plan in March 2002, and the field was producing oil by August 2002. As of 2020, the field is [100% owned and operated](#) by TotalEnergies.

Various oil and gas companies operating in the North Sea issued a statement in 2017 expressing interest in developing mature oil fields to exploit [“a significant gas cap” in the Quad 9 area](#), straddling the Tullich, Harding, Morrone, Gryphon, and South Gryphon fields.

Production at the gas field was expected to commence [once the remaining recoverable oil has been produced](#) from the area. Between 2002 and 2022, Tullich oil field had [extracted 97% of its total recoverable reserves](#). No clear FID or start date has been reported.

The resources of the project are [25 Mmboe](#). Potentially, emissions from this field could be as high as 13 MtCo2e.

## Goddard Gas Field

Anticipated FID: –

Anticipated Start Date: –

Current Status: Discovered

Goddard gas field, previously known as Glein, is in the Saturn Banks area of the Southern Gas Basin of the North Sea, approximately 81 km east of Grimsby.

The field was discovered by ARCO in 1994. Goddard is being developed as part of phase two of the Saturn Banks project, with IOG plc (formerly known as [“Independent Oil and Gas”](#)) serving as the field operator. The Saturn Banks project is equally

owned (50:50) by IOG and CalEnergy Resources. IOG is a [listed, independent company](#) on the London Stock Exchange, while [CalEnergy is a wholly-owned subsidiary of Northern Powergrid](#), which is in turn owned by Berkshire Hathaway Energy Company and ultimately Berkshire Hathaway.

As of July 4, 2022, IOG and CalEnergy had [not yet reached FID](#) on Goddard's phase of the project. CalEnergy lists Goddard as being in the “pre-development phase.” An expected start year for production was not found.

Gross mid-case contingent gas resources are [132 billion cubic feet](#) (23 Mmboe), leading to expected life-cycle emissions of 12 MtCo2e. Goddard is one of the fields FOE [called out](#) in 2021 for ignoring the guidance of the IEA's Net Zero by 2050 report.

## Isabella Oil and Gas Field

Anticipated FID: –

Anticipated Start Date: –

Current Status: Discovered – No FID date found, No anticipated start date found

The Isabella field is located 170 km east of Aberdeen. It was discovered by Total E&P North Sea UK Limited, a subsidiary of TotalEnergies, in 2020 and was the [only Central North Sea discovery](#) that year.

Total holds a 30% operator stake in the field license, alongside partners Neptune E&P UK Limited (50%), Ithaca Energy (UK) Limited (10%), and Energean Exploration limited<sup>1</sup> (10%). Neptune's major shareholders are China Investment Corporation, The Carlyle Group and CVC Capital Partners. Ithaca Energy is a wholly owned subsidiary of Delek Group. Energean is a [listed independent company](#) (TotalEnergies 2020).

According to [Neptune](#), results for a [September appraisal well](#) are due mid-2023. If the results suggest the field is economical to develop, the estimated cost could be [\\$US1 billion](#).

Estimates show that 120 Mmboe could be extracted from the field, leading to 63 MtCo2e of emissions.

FOE [stated](#) in 2021 that the Isabella field runs afoul of the guidance of the IEA's Net Zero by 2050 report.

1. Known as EUROIL EXPLORATION LIMITED until March 2021.

## ANNEX

Table 2: Chart of Key Facts Regarding UK Oil and Gas Fields Potentially Reaching FID between 2022 and 2025

Name	Operator	Status	Block(s)	Discovery year	Anticipated FID year	Production start year	Expected recovery (Mmboe)	Lifecycle emissions (MtCo2e)
Rosebank	Equinor	ID	213/27a, 213/26b, 205/1a, 205/2a	2004	2023	2026	325	170
Clair South	BP	ID	206/7a, 206/8a, 206/9a, 206/12a, 206/13a	1977	2022	2024	292	153
Cambo	Ithaca Energy	ID	204/4a, 204/5a, 204/9a, 204/10a	2002	2021	2025	182	95
Buchan	Jersey Oil and Gas	ID	20/5a, 20/5e, 21/1a	1974	2022	2025	120	63
Glengorm	CNOOC Petroleum Europe Limited	ID	22/21c	2019	2022	2025	63	33
Galapagos	Bridge Petroleum	ID	211/27	1975	2025	2025	81	42
Pilot	Orcadian Energy	ID	21/27a	1989	2025	2025	79	41
Tornado	Ithaca Energy	ID	204/8	2009	2022	2030	80	42
Harding Redevelopment	TAQA Bratani Limited	ID	9/23b	1987			58	30
Jackdaw	Shell plc	ID	30/2a, 30/2d, 30/3a DEEP	2005	2022	2025	56	29
Perth	Parkmead Group	ID	14/25a, 15/21a North Area, 15/21a South Area, 15/21e, 15/21b, 15/21c	1983	2023	2023	55	29
Cheviot	Alpha Petroleum UK Holdings	ID	2/10b, 2/15a, 3/11b, and 3/6a	1975	2024	2024	76	40
Serenity	i3 Energy	ID	13/23C	2019	2024	2024	68	36
Marigold	Anasuria Hibiscus UK	ID	15/13a, 15/13b		2024	2024	44	23
Leverett	Neo Energy	ID	21/03a, 21/03d		2022	2023	40	21
Gryphon Redevelopment	TotalEnergies E&P North Sea UK	ID	9/18b, 9/18c	1987		2025	35	18
Cepheus	Neptune Energy	ID	44/12a	2014			30	16
Victory	Corallian Energy	ID	207/01a	1977		2024	29	15
Tullich Redevelopment	TotalEnergies E&P North Sea UK	ID	9/23a	2001			25	13
Goddard	IOG North Sea Limited	Disc	48/11c, 48/12b	1994			23	12
Isabella	TotalEnergies	Disc	30/12d	2020			120	63

## METHODOLOGY

Oil and gas unit level data is collected and validated through government data on individual units, country energy and resource plans, and government websites tracking extraction permits and applications; reports by state-owned and private companies; news and media reports; and local non-governmental organizations tracking extraction permits and operations.

Emissions were calculated using a proxy from the Oil Climate Index Plus Gas (OCI+) for a barrel of crude from the UK Forties field: 523 kg CO<sub>2</sub>e/boe, using a 100-year GWP for methane.\* OCI+ values for emissions intensities were then multiplied by estimates for future production from the field, drawing on GOGET data.

\*Note: If using the 20-year GWP for methane, the life cycle emissions stated in this report would be 8% higher.

## ABBREVIATIONS

Bbbls - Billion barrels  
 Bboe - Billion barrels of oil equivalent  
 BCF - Billion cubic feet  
 BESS - British Energy Security Strategy  
 CO<sub>2</sub> - Carbon dioxide  
 EIA - Environmental Impact Assessment  
 FDP - Field development plan  
 FID - Final investment decision  
 FOE - Friends of the Earth  
 FOES - Friends of the Earth Scotland  
 GEM - Global Energy Monitor  
 GOGET - Global Oil and Gas Extraction Tracker  
 IEA - International Energy Agency  
 IPCC - United Nations, and Intergovernmental Panel on Climate Change  
 JOG - Jersey Oil and Gas  
 KM - Kilometers  
 MMbbl - Million barrels of oil  
 Mmboe - Million barrels of oil equivalent  
 MtCo<sub>2</sub> - Million tonnes of carbon dioxide  
 NSTA - North Sea Transition Authority  
 NSTD - North Sea Transition Deal  
 OEUK - Offshore Energy UK  
 OPEC - Organization of the Petroleum Exporting Countries  
 OPRED - UK Offshore Petroleum Regulator for Environment and Decommissioning  
 P50 - Probable reserves  
 PGR - United Nations Environment Programme Production Gap Report  
 UKCS - UK Continental Shelf

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