bp

**North Sea Region**

# 2018 Annual Environmental Statement

18

## Introduction

This is the annual environmental statement for the BP entities which operated in the United Kingdom Continental Shelf (UKCS) in 2018. The statement covers offshore installations operated by BP entities and also installations owned and operated by third parties in the course of providing services to BP entities.[1, 2, 3]

## Environmental impacts

We are committed to minimising our impact on the environment and, while environmental challenges and opportunities differ depending upon the lifecycle stage of each operating facility, our overarching goal of "no damage to the environment" remains the same.

The North Sea oil and gas sector is subject to strict environmental regulation, which BP strive to comply with at all times. We work closely with regulators to constantly review what we do, how we do it, and how we can do it better. Our Operating Management System is designed to drive continuous improvement in our regulatory compliance and environmental performance. Our system meets the requirements of the latest version of the international standard for environmental management ISO14001:2015. In August 2018 our external auditors, ERM CVS stated, "The operating management system established by North Sea Region Major Operating Site, conforms to the requirements of ISO 14001:2015."

## Our goal

To cause no damage to the environment by:

- systematically identifying environmental impacts and seeking to avoid or minimise these;
- improving environmental performance, including reducing our carbon emissions;
- putting plans in place to reduce environmental risks associated with our projects and operations;
- working to understand developments in future environmental legislation and ensuring our continued compliance.

[1] To fulfil the requirements of OSPAR Recommendation 2003/5, all operators of offshore installations on the United Kingdom Continental Shelf (UKCS) are required to produce an annual environmental statement which is made available to the public and the Department for Business, Energy & Industrial Strategy (BEIS), previously the Department of Energy and Climate Change (DECC).

[2] DECC Guidance and Reporting Requirements: Environmental Management System Requirements in relation to OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry.

[3] Changes to scope of reported data from 2017 are as follows:

- Data is not reported for Magnus and Sullom Voe Terminal (SVT) due to transition of operatorship to EnQuest NNS Limited on 1st December 2017.
- Data is not reported for Forties Pipeline System (FPS) due to transition of operatorship to INEOS FPS Ltd on 1st November 2017.
- Data is reported for Bruce until 29th November 2018 when operatorship transitioned to Serica Energy PLC.
- Data for Foinaven is restricted to the EU-ETS Permit, Flare and Vent Consents and Production Consent as these are the only permits still held by Britoil Limited as Well and Licence Operator. All other environmental permits for Foinaven are held by Golar Nor (UK) Limited as Installation Operator.

# Our **portfolio**

# Our portfolio

## We have a refreshed and refocused portfolio that will now sustain production into the 2050s.

Our portfolio today is smaller than in the past but stronger, with less operating complexity, reduced risk, and better potential to increase and sustain production and returns.

### Schiehallion Area

The Schiehallion Area incorporates the Schiehallion, Loyal and Alligin fields located around 175 kilometres west of the Shetland Islands. Schiehallion and Loyal are developed through the Glen Lyon floating production, storage and offloading (FPSO) vessel. Alligin was sanctioned in 2018 and is being developed as a two-well subsea tieback to the Glen Lyon and is expected to come on stream in 2020.

Production from the Schiehallion Area was shut-in between 2013 and 2017 to allow for the Quad 204 project – a multi-billion-pound investment by BP and partners to completely redevelop the hub and maximise production from the fields. Quad 204 saw the removal of the old FPSO, construction and installation of the Glen Lyon FPSO and renewal of much of the subsea infrastructure network.

Through the Quad 204 project, BP and partners expect to unlock a further estimated 450 million barrels of resources, extending the life of the fields out to 2035 and beyond.

## **Clair** Phase One

With an estimated seven to eight billion barrels of oil in place, the Clair field is the largest oilfield on the UK Continental Shelf. The field, located 75 kilometres west of the Shetland Islands, was discovered in 1977, but challenging reservoir characteristics and the technological limits of the time meant it was the mid-1990s before the field saw extensive drilling and 2001 before BP and partners approved a development plan. Production from the Clair field began in 2005 through the Clair Phase One platform which was the first fixed platform west of Shetland.

## Clair Ridge

The physical size of the Clair field dictates development via a phased approach. Clair Ridge is the second phase of development. The bridge-linked platforms, which delivered first oil in November 2018, are designed to recover an estimated 640 million barrels of oil and ramp up to 120,000 barrels of oil per day at peak production. The new facilities, which are designed for 40 years of production, required capital investment in excess of £4.5 billion. BP and partners are now considering a third phase of development in the Clair field.


## Foinaven

The Foinaven field is located 190 kilometres west of Shetland in water depths of up to 500 metres. The field was discovered in 1990 and sanctioned for development in 1994. It was the first deepwater development on the UKCS and the first west of Shetland. First oil from the field was in November 1997. The pioneering fast-track development was based on a network of subsea wells linked via a subsea network of pipelines, control umbilicals and risers to the Petrojarl Foinaven FPSO.

## Eastern Trough Area Project (ETAP)

ETAP ranks as one of the largest and most commercially complex North Sea oil and gas developments of the past 20 years; multiple fields with varying ownership sharing a central processing facility (CPF). BP operates six of the seven ETAP fields; Machar, Madoes, Mirren, Mungo, Monan and Marnock. The non-operated Seagull field (BP ownership share 50%) will be tied back to the ETAP CPF with first production expected in 2021. We are exploring options to develop another new field, Skua, through the ETAP hub.

ETAP came on stream in July 1998 with an estimated production life of 20 years. However, a multi-million-pound investment programme in 2015 secured its future well into the 2030s.

In the two decades of operations, more than 550 million barrels of oil equivalent (gross) have been produced from the BP-operated ETAP fields.

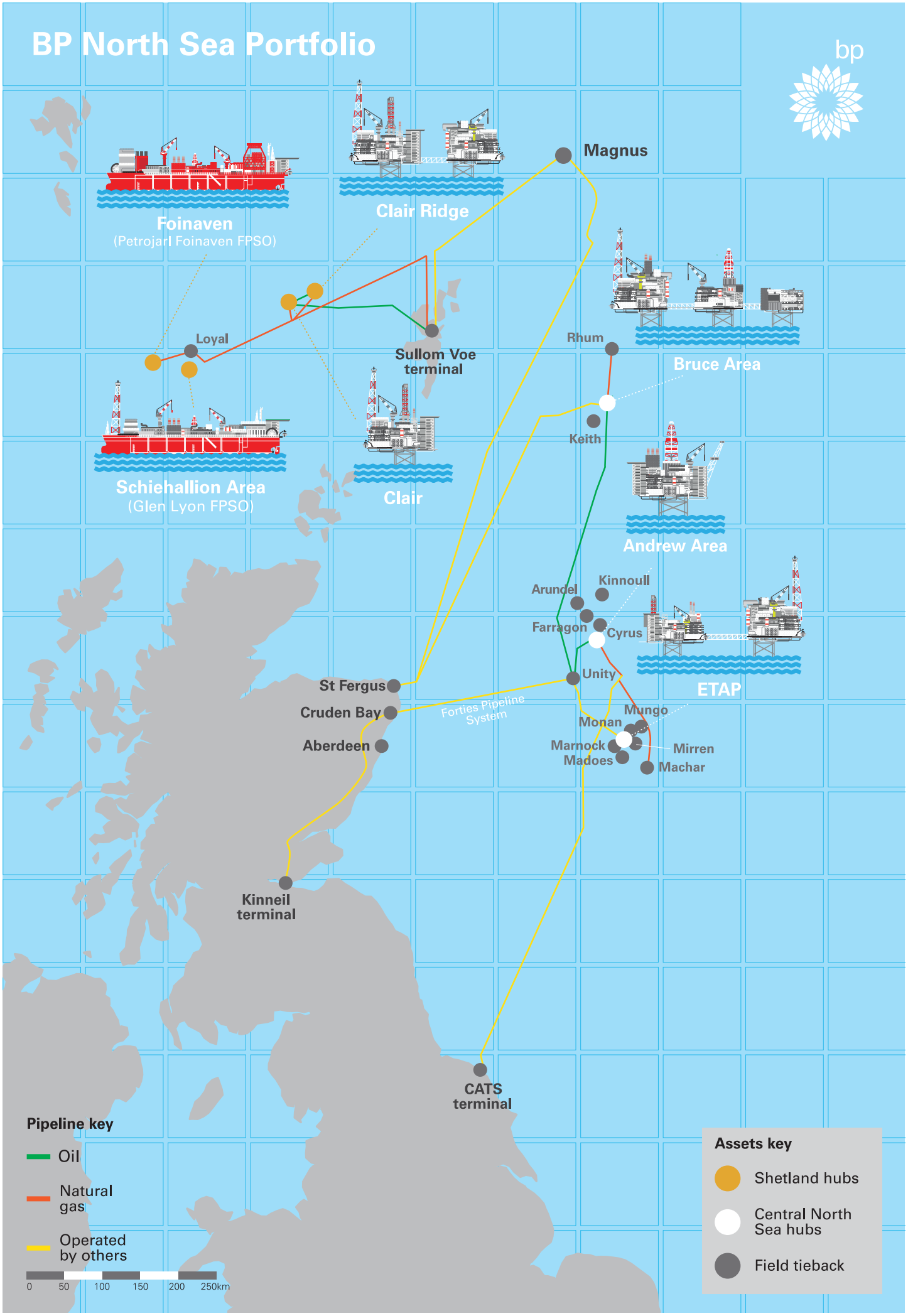
## Andrew Area

The Andrew Area includes the Andrew, Arundel, Cyrus, Farragon and Kinnoull fields which all produce through the Andrew platform. The field started production in 1994. Andrew, Cyrus and Farragon were shut in in mid-2011 to allow for the Andrew Area Development (AAD), a major brownfield project enabling the Kinnoull field, located 28 kilometres to the north, to be developed through the existing facilities.

The ADD also included extensive new subsea infrastructure, a new 750-tonne process module and structural strengthening of the platform. In 2017, the Arundel field came on stream - only 18 months after project sanction. The Andrew Area is expected to produce into the mid-2020s.

## Bruce

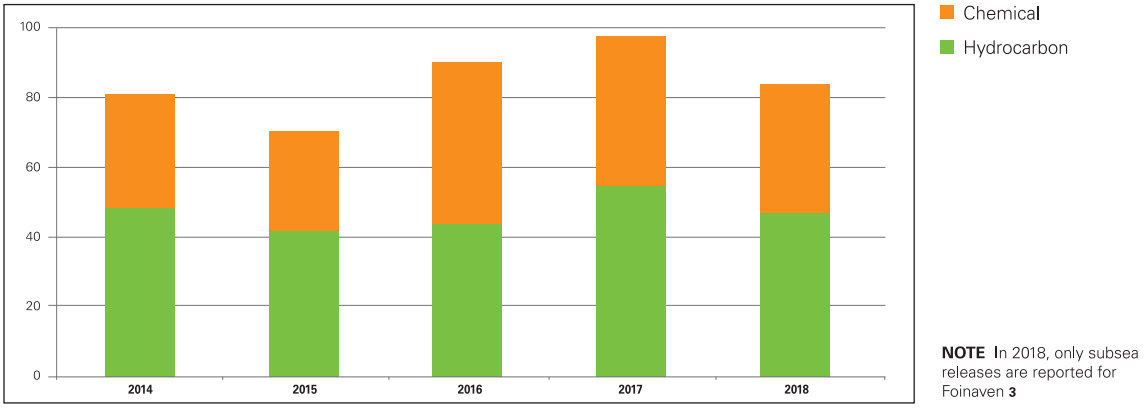
The Bruce Area hub is made up of the Bruce, Keith and Rhum fields which all produce through the Bruce platform. BP announced in November 2017 its intention to sell a package of its interests in the Bruce assets to Serica Energy. Serica replaced BP as the operator of these assets when the deal completed in November 2018.


BP North Sea Portfolio
bp
Foinaven
(Petrojarl Foinaven FPSO)
Clair Ridge
Magnus
Loyal
Sullom Voe terminal
Rhum
Bruce Area
Keith
Schiehallion Area
(Glen Lyon FPSO)
Clair
Andrew Area
Arundel
Kinnoull
Farragon
Cyrus
Unity
ETAP
St Fergus
Cruden Bay
Forties Pipeline System
Mungo
Monan
Aberdeen
Marnock
Madoes
Mirren
Machar
Kinneil terminal
CATS terminal
Pipeline key
Oil
Natural gas
Operated by others
0 50 100 150 200 250km
Assets key
Shetland hubs
Central North Sea hubs
Field tieback

# 1. Releases to the Environment

Our goal is "no damage to the environment", which includes seeking to avoid unpermitted releases to the environment. However, during the course of conducting operations, hydrocarbons and chemicals can be accidentally released. We monitor the number and volume of such releases closely and investigate the causes, so we can avoid similar events in the future. In 2018, we reported a 10% reduction in unpermitted releases from offshore facilities to the Regulator with 85 releases in 2018 compared to 98 in 2017. This reduction is shown in Figure 1 below.

**Number of spills of chemicals and hydrocarbons**




**NOTE** In 2018, only subsea releases are reported for Foinaven **3**

**Figure 1: Total number of releases of chemicals and hydrocarbons between 2014 and 2018**

Similarly to the statistics from 2017, in 2018 more than 70% of the 85 releases were less than 10 litres in volume. There were 36 chemical releases in 2018, 10 less than in 2017. The number of hydrocarbon releases also decreased from 52 in 2017 to 49 in 2018. Of the 49 oil releases in 2018, only 16% were releases of crude oil. The total volume of crude oil released was less than six litres. The remaining releases were from utility systems installed to support the production of the oil and gas and consisted of hydraulic oil, diesel and oil based lubricants. In total, less than 370 litres of oil and oil based products was released to the environment.

As Figure 2 shows, the overall reduction in the number of oil and chemical releases was driven by a significant decrease in releases from mobile drilling operations where the number of releases decreased from 23 in 2017 to 17 in 2018. Small reductions in the number of releases also occurred from the Foinaven and Glen Lyon FPSOs as well as the ETAP platform. An increase in the number of releases occurred from the platforms in the Clair Field. There were a combined 22 releases in 2017 and 27 releases in 2018 from the Clair Phase 1 and Clair Ridge platforms. The primary cause of this increase was a series of small releases of oil contaminated water from the drainage systems on the two platforms.

**Total number of hydrocarbon and chemical releases reported to the regulator**

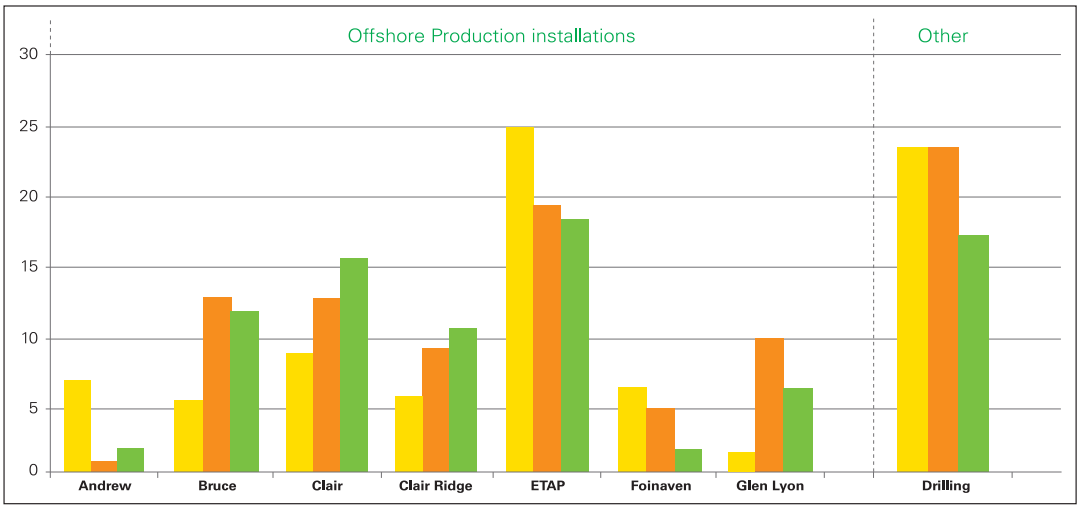



**Figure 2: Number of hydrocarbon and chemical releases reported to the regulator between 2016 and 2018 for individual operating facilities and drilling activities**

**NOTE** The vast majority of emissions and releases reported in this Statement under the category "drilling" relate to operations undertaken by third parties such as drilling contractors from installations owned and operated by those third parties in the course of providing services to BP entities.

# 1. Releases to the Environment (cont'd)

In 2018, the total quantity of oils and chemicals released to sea from BPs offshore operations in the UKCS declined by approximately 33% to 46 tonnes. This is shown in Figure 3 below. The primary cause of this was a 30% decrease in the volume of chemicals released from approximately 67,000 litres in 2017 to less than 46,000 litres in 2018. The volume of oil released also declined from approximately 3,600 litres in 2017 to 370 litres in 2018.

**Quantity of chemicals and hydrocarbons unrecovered** (tonnes)

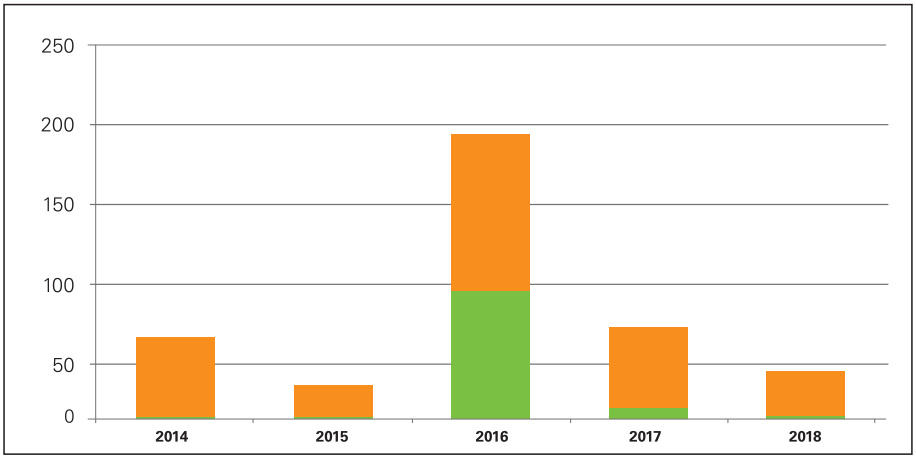



**Figure 3:** **Total quantity (tonnes) of unrecovered chemicals and hydrocarbon releases between 2014 and 2018**

Table 1 shows the number of oil and chemical releases greater than 2 tonnes in 2018. In total there were four releases greater than two tonnes. These releases were all of low toxicity water based hydraulic fluid released from subsea control systems. The largest release totalled 20.34 tonnes and related to a long term release from a Subsea Isolation Valve (SSIV) operated from the Bruce Platform. There were 7 releases greater than 2 tonnes in 2017.

| Offshore Installation/Field | Quantity Released (tonnes) | Hydrocarbon or chemical | Brief details |
|---|---|---|---|
| Bruce | 20.34 | Chemical | Release from subsea isolation valve |
| Bruce | 10.89 | Chemical | Release from subsea hydraulic hose |
| Bruce | 9.71 | Chemical | Release from subsea control module |
| Schiehallion | 2.19 | Chemical | Release from subsea tree |

**Table 1:** **Details and quantity of chemical and hydrocarbon releases greater than 2 tonnes (chemicals released are of low toxicity to the environment)**

# 1. Releases to the Environment (cont'd)

These releases resulted in an increase in the quantity of chemicals released from the Bruce Platform shown in Figure 4 below.

**Total hydrocarbon and chemical unrecovered spills** (tonnes)

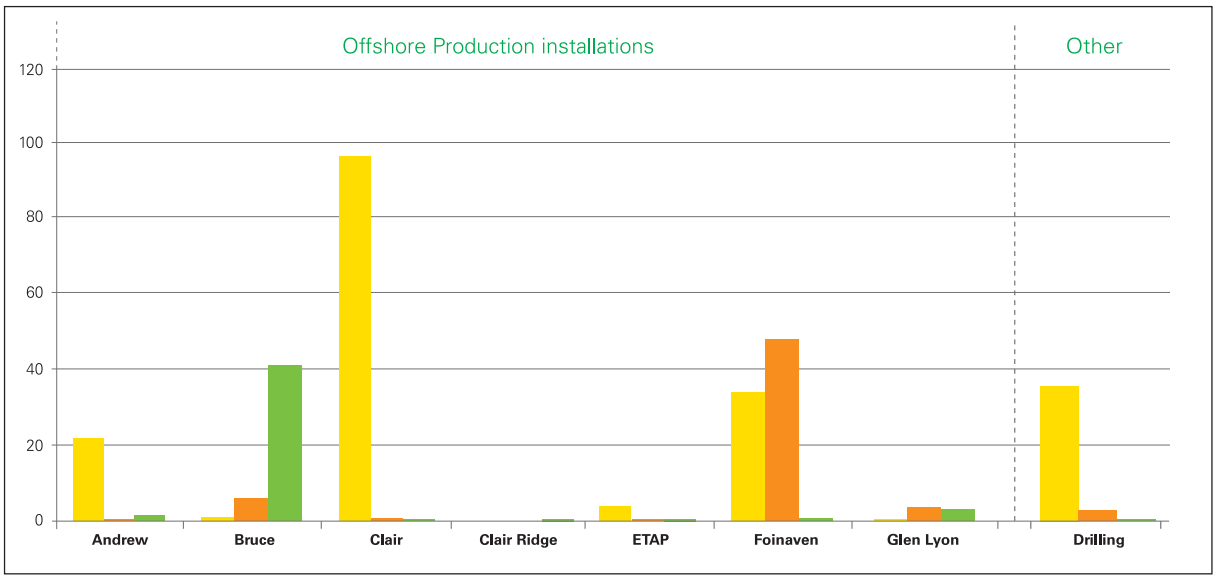



**Figure 4: Quantity (tonnes) of hydrocarbon and chemical releases reported to the regulator between 2016 and 2018 for individual operating facilities and drilling activities**

# 2. Atmospheric emissions

Atmospheric emissions occur in our operations, mainly through combustion of fuel gas to generate power and through flaring. We track and report our greenhouse gas (GHG) emissions and non-GHG emissions. We work to manage our emissions to air principally by focusing on plant reliability and energy efficiency.

We report GHG emissions on a carbon dioxide ($CO_2$)-equivalent basis, including $CO_2$ and methane. Our GHG emissions decreased around 25% in 2018 from 2017, as shown in Figure 5 and Figure 6 below. This was primarily due to divestment of the FPS and SVT onshore assets, but also BP has an active programme to identify and deliver Sustainable Emissions Reductions (SERs). In 2018 we delivered approximately 21,000 tonnes CO2 equivalent of emissions reductions, for example, reduced emissions associated with power generation on the ETAP asset.

**Total greenhouse gas emissions** (millions of tonnes of $CO_2$ equivalent)

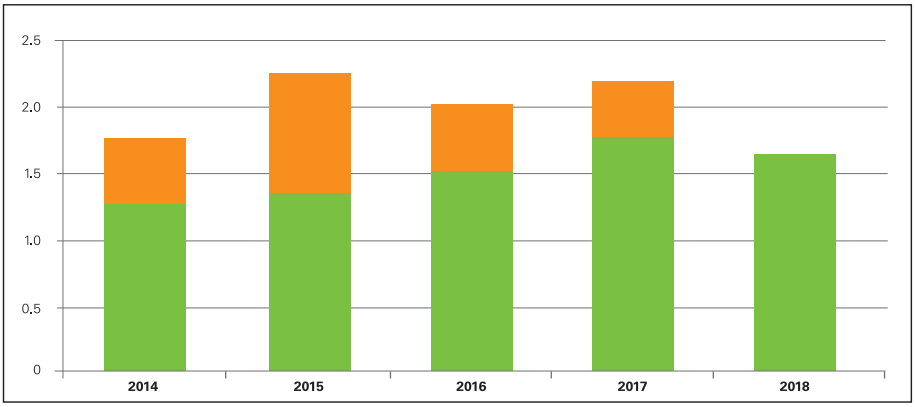



**Figure 5: Total greenhouse gas (GHG) emissions (millions of tonnes of $CO_2$ eqivalent) between 2014 and 2018**

**Greenhouse gas emissions by asset** (tonnes of $CO_2$ equivalent)

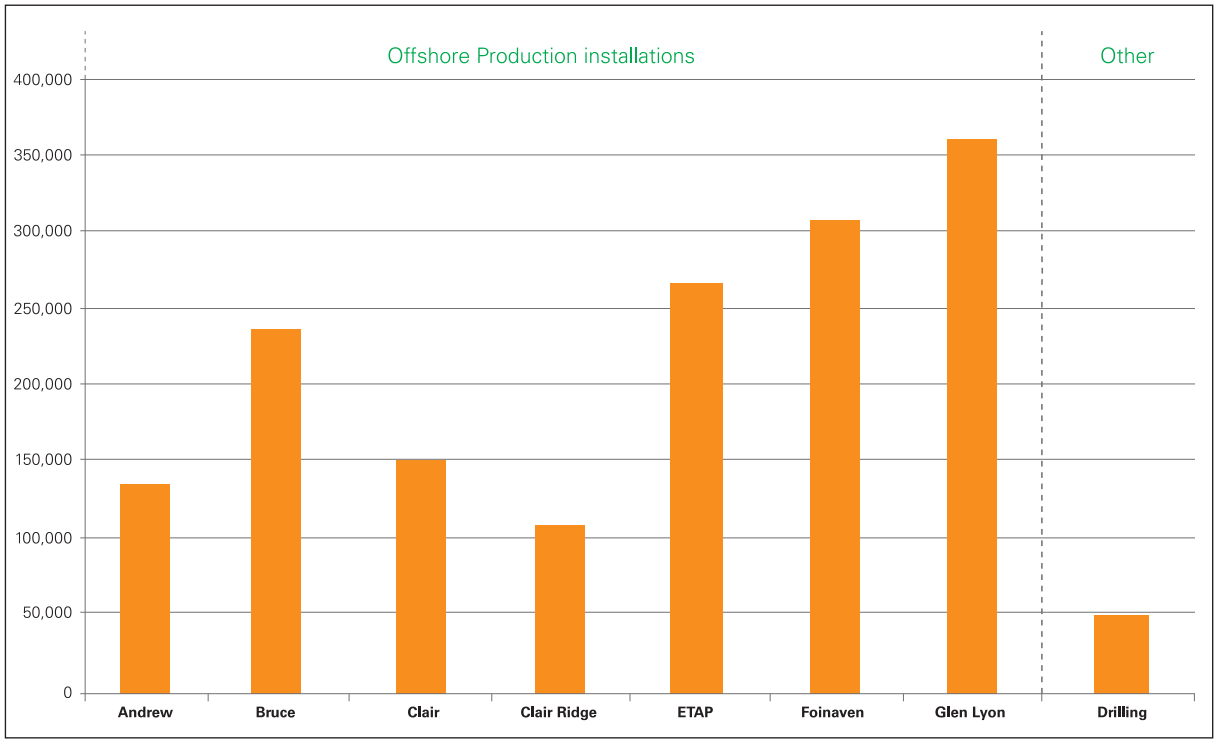



**Figure 6: GHG emissions for individual operating facilities and drilling activities during 2018.**

# 2. Atmospheric emissions (cont'd)

Figure 7 below shows the ongoing improvement in offshore GHG intensity compared with previous years. This was a result of improved plant reliability and reduced flaring. The slight increase in 2017 is primarily due to the start-up of operations on Glen Lyon, which required increased flaring to enable the safe start-up of operations.

**Greenhouse gas emissions** (tonnes of $CO_2$ equivalent per 1,000boe)

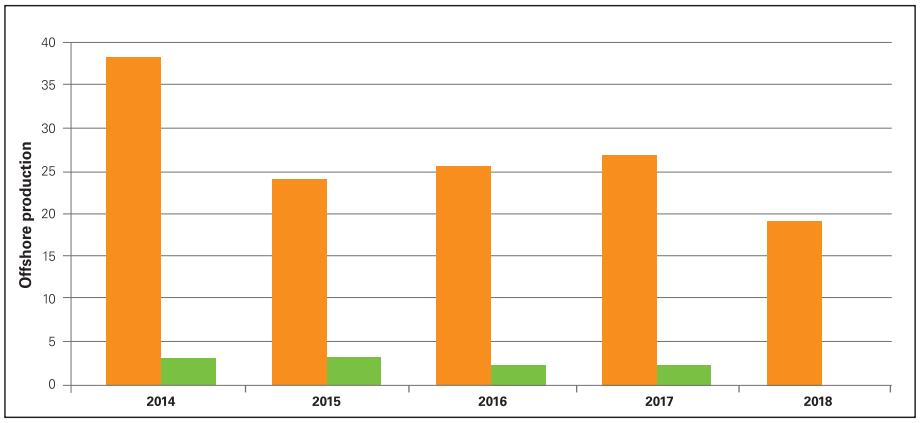



**Figure 7: GHG intensity (tonnes of $CO_2$ equivalent per 1,000 boe) for offshore installations and onshore terminals between 2014 and 2018**

Flaring of gas on offshore installations is essential for safety reasons. We seek to minimize flaring from our operations to maximise resource recovery and ensure compliance with consented flaring limits. In 2018, around 135,000 tonnes of gas was flared (see Figure 8 below), a decrease of about 40% from the previous year. The decrease in flaring is due to the divestment of Magnus and the FPS and SVT onshore Terminals, and higher flaring rates at Glen Lyon in 2017 due to the start-up of operations.

**Total production gas flared** (tonnes)

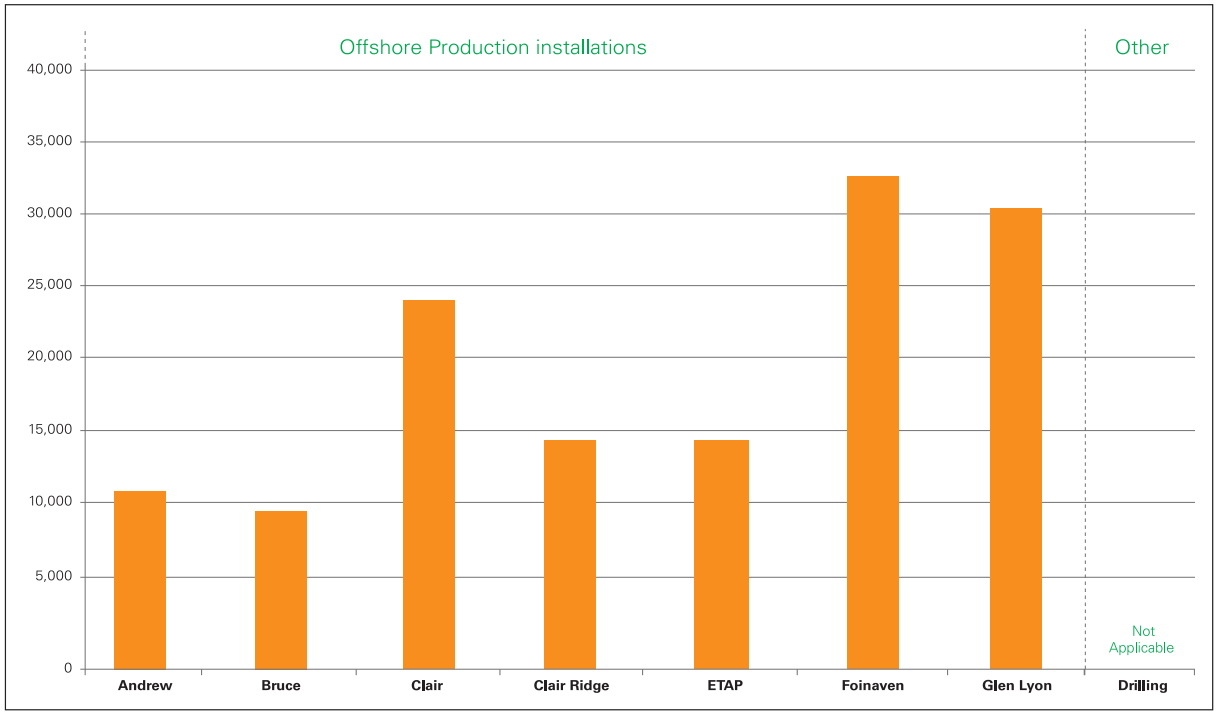



**Figure 8: Total production gas flared (tonnes) for individual operating facilities during 2018.**

# 2. Atmospheric emissions (cont'd)

The non-GHG emissions we track include nitrogen oxides, sulphur oxides, carbon monoxide and volatile organic compounds. The emissions of these substances are shown in Figure 9 below.

**Total non-greenhouse gas emissions** (tonnes)

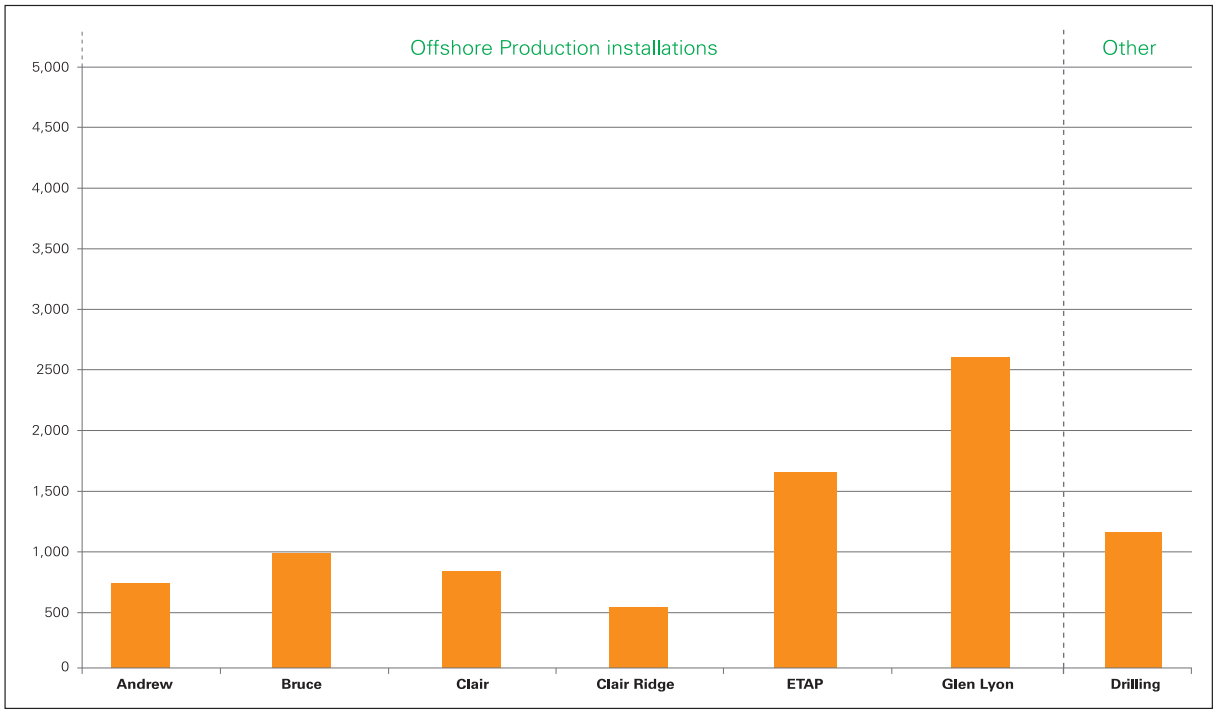



**Figure 9: Total Non-GHG emissions (tonnes) for individual operating facilities and drilling activities during 2018.**

# 3. Permitted discharges

We use chemicals offshore to improve the flow of fluids; to facilitate the separation of materials; to prevent the degradation and fouling of process equipment and in control systems. The composition of these chemicals is diverse and their usage and discharge are permitted by the Regulator. Our production chemicals use increased by around 50% in 2018, whilst production chemicals discharged increased by around 40% in 2018, as shown in Figure 10 below. The increase in production chemical use was primarily due to increased usage from the start-up of the Clair Ridge Platform and ramp-up of operations on the Glen Lyon.

**Total production chemicals used and discharged by offshore facilities** (tonnes)

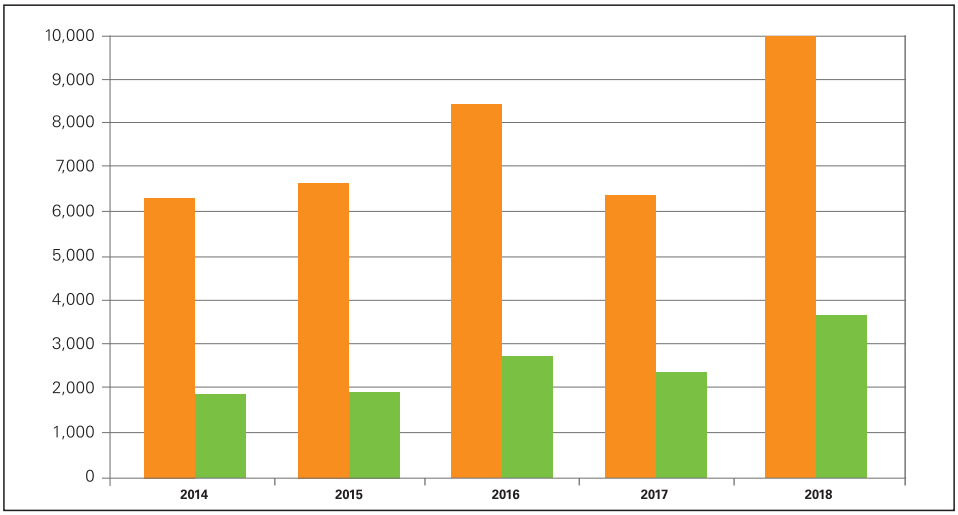



**Figure 10: Total permitted production chemical use and discharge (tonnes) between 2014 and 2018**

Figure 11 below shows the total use and discharge of production chemicals by operating facility in 2018. Clair chemical use is primarily related to the management of hydrogen sulphide. Subsea chemical use and discharge relates to flushing of pipelines to remove hydrocarbons before maintenance and inspection activities are undertaken and use in hydraulic control systems. A significant proportion of chemical use on Glen Lyon relates to additive use in water-injection systems as part of microbiological control.

**Total production chemicals used and discharged by offshore facilities** (tonnes)

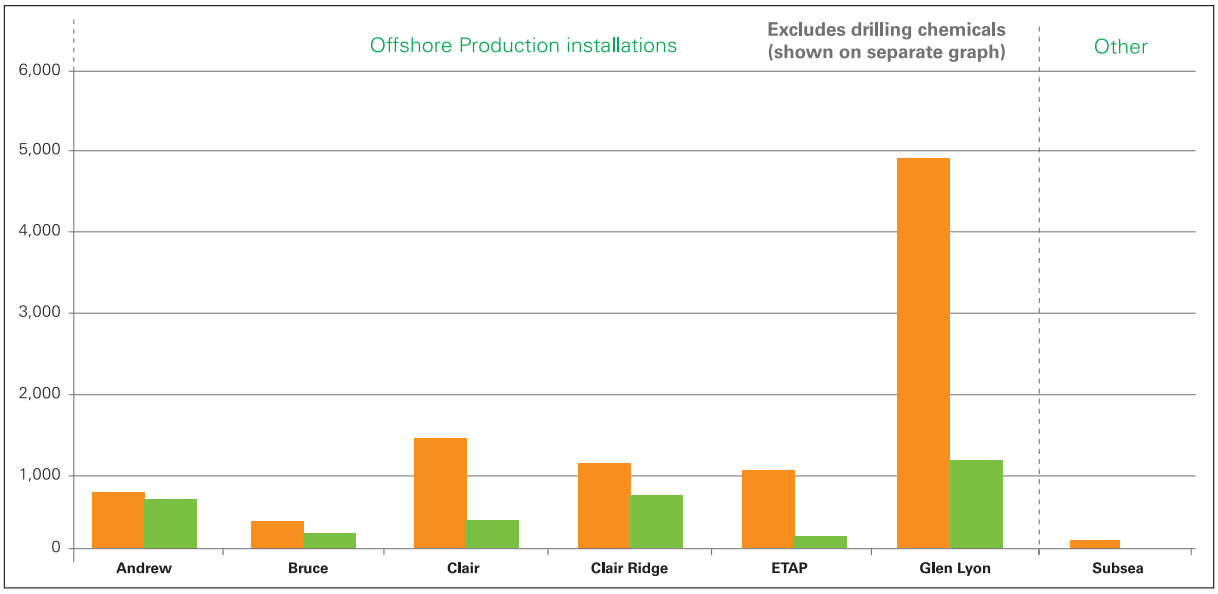



**Figure 11: Total permitted production chemical use and discharge (tonnes) for operating facilities during 2018**

# 3. Permitted discharges (cont'd)

Fluids produced from oil producing wells often contain large quantities of water as well as hydrocarbons. The water and hydrocarbon are separated during processing. Hydrocarbons are exported and the remaining produced water, which contains trace amounts of oil, is either reinjected into the wells or discharged to sea in accordance with environmental permits. In order to minimise oil discharges, the majority of our offshore installations have been designed to reinject some or all produced water.

Figures 12 and 13 summarise the produced water discharges. Total produced water discharged by BP operated facilities reduced by 75% in 2018. This was due to a significant reduction in discharges from the Andrew Platform (which does not have reinjection capability) which discharged 1.7 million tonnes of produced water in 2018 in comparison to 3 million tonnes in 2017. The divestment of Magnus and the FPS and SVT onshore terminals accounted for the remainder of the reduction.

**Total produced water discharged** (millions of tonnes)

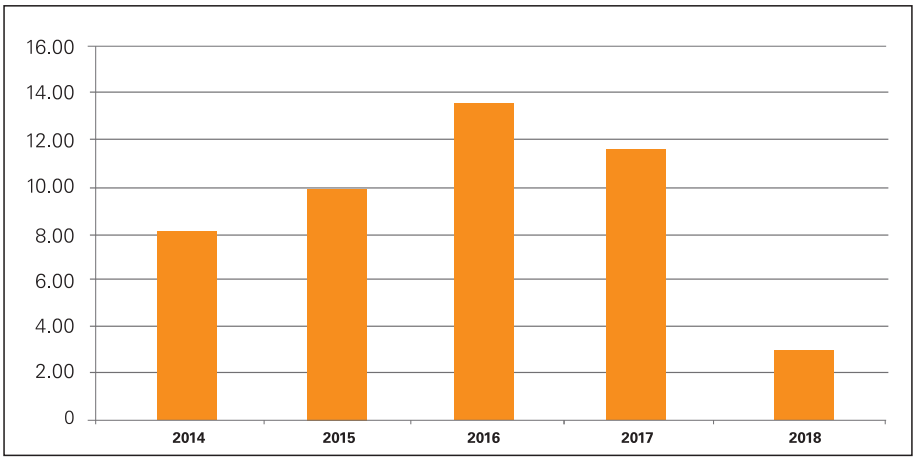



**Figure 12: Total produced water discharged (millions of tonnes) between 2014 and 2018**

**Total produced water discharged** (millions of tonnes)

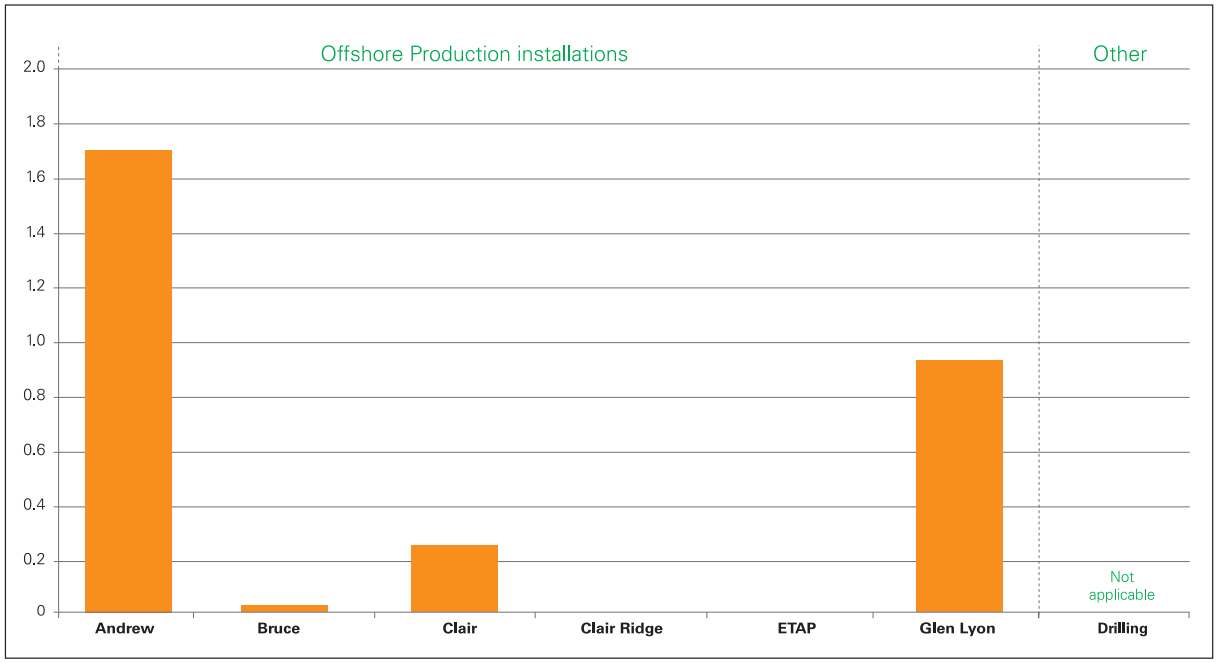



**Figure 13: Total produced water discharges (millions of tonnes) for operating facilities during 2018.**

# 3. Permitted discharges (cont'd)

The total amount of oil in produced water that can be discharged and the concentrations of oil in produced water are governed by the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 as amended and specified in the permits for each operating facility. Where such facilities discharge produced water, the permits require the monthly average concentrations of oil to be below 30 milligrams (mg) of oil per litre.

Figure 14 below shows the annual average oil in produced water concentrations for each operating facility in 2018. All installations with the exception of Bruce achieved the 30 mg/L threshold for discharges to sea. At Bruce, a damaged flow control valve led to produced water being discharged at concentrations in excess of 30 mg/L instead of being re-injected. These discharges were very limited volumes and in total the Bruce platform discharged less than one tonne of oil to sea during 2018 (see Figure 15).

**Annual average oil concentration in produced water discharged** (mg/l)

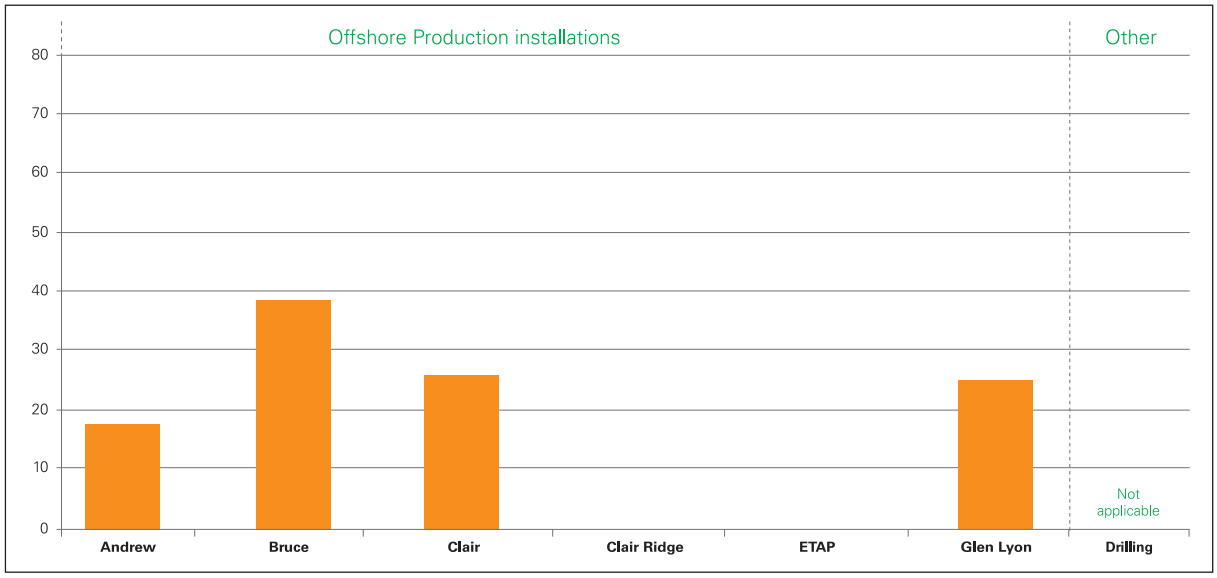



**Figure 14: Annual average oil in produced water discharge (mg/l) for operating facilities during 2018**

Figure 15 shows the total oil in produced water discharged for our operating facilities during 2018. Of all the produced water discharged, oil makes up less than 0.01 % of the total mass. Volumes of total oil in produced water discharged from the Andrew, Clair and Glen Lyon facilities are higher compared to Bruce, due to the higher total produced water discharge (Figures 13 and 15).

**Total oil in produced water discharged** (tonnes)

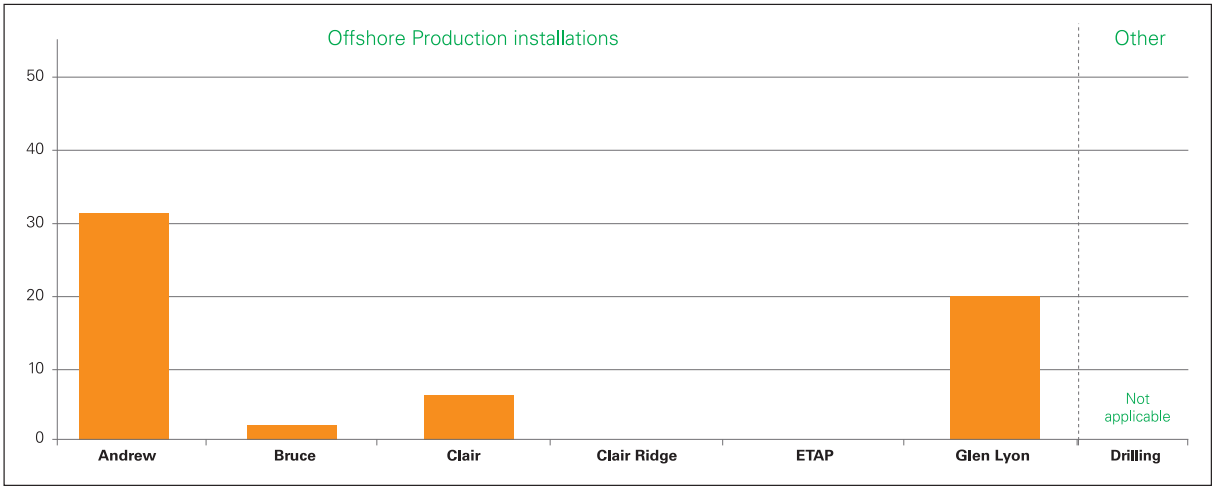



**Figure 15: Total oil in produced water discharged (tonnes) within total produced water discharged (Figure 13) for operating facilities during 2018.**

# 4. Waste

Waste from our operations is segregated and, where possible, reused or recycled. Special waste includes paints, hazardous chemical, oils, batteries, aerosols, heavy metals, wax from pigging operations and oily waste. Quantities of special waste generated by the operating facilities are shown below in Figure 16. Clair Ridge had higher than normal quantities of special waste due to commissioning and start-up work, and associated waste liquids and sludge.

## **Special waste from operating facilities** (tonnes)

Excludes drilling waste (shown on separate graph)

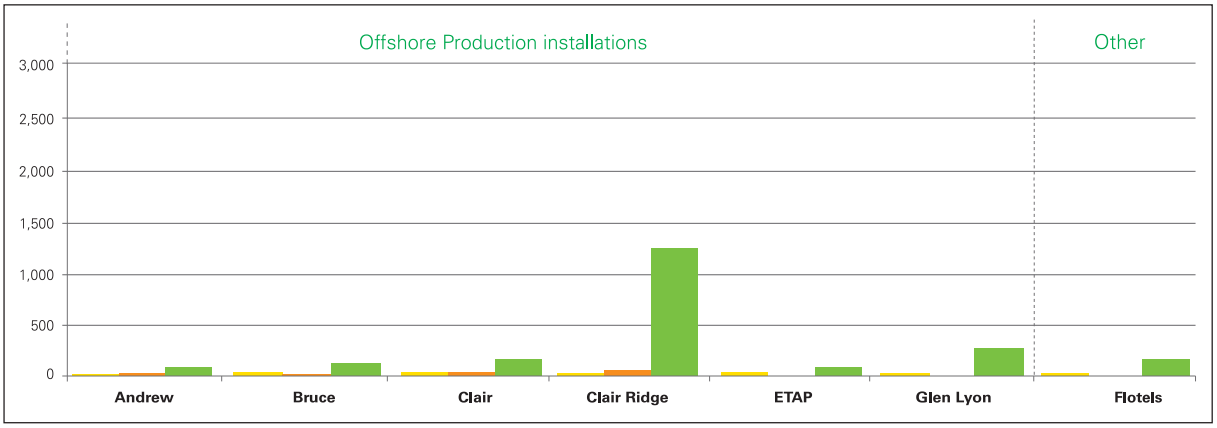



**Figure 16: Special waste (tonnes) reported by operating facilities during 2018.**

Non-special waste includes segregated recyclables (paper, packaging, wood etc.), general waste (i.e. accommodation waste) and uncontaminated scrap metals. Quantities of non-special waste generated by our operating facilities are shown in Figure 17 below. A higher volume of non-special waste, including recyclable wood and scrap metal, and general waste, was generated at Clair Ridge due to commissioning and start-up activities.

## **Non-special waste from operating facilities** (tonnes)

Excludes drilling waste (shown on separate graph)

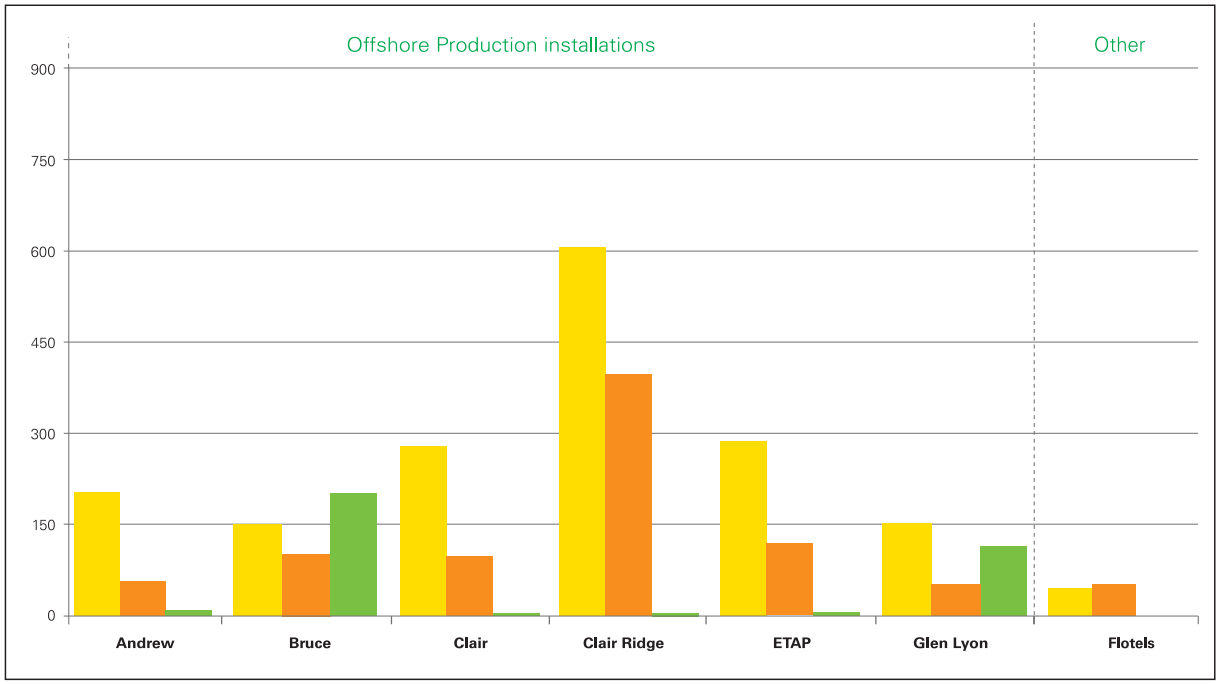



**Figure 17: Non-special waste generated by operating facilities during 2018.**

# 5. Drilling specific environmental performance

The drilling of five wells came to an end in 2018 and permit returns were filed with the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). All five wells were in the Schiehallion Field (West of Shetland) and were drilled using the Deepsea Aberdeen Mobile Offshore Drilling Unit (MODU), operated by Odjfell. The Blackford Dolphin MODU, operated by Dolphin Drilling, carried out well intervention work in the Foinaven field and at the Capercaillie field.

As part of drilling and intervention operations, approximately 22,000 tonnes of chemicals were used, of which approximately 16,000 tonnes were discharged in accordance with environmental permits as shown in Figure 18 below. The majority of these chemicals were completion brines and water-based mud chemicals classified by OSPAR as posing little or no risk to the environment (PLONOR).

**Drill cuttings and drilling chemicals** (tonnes)

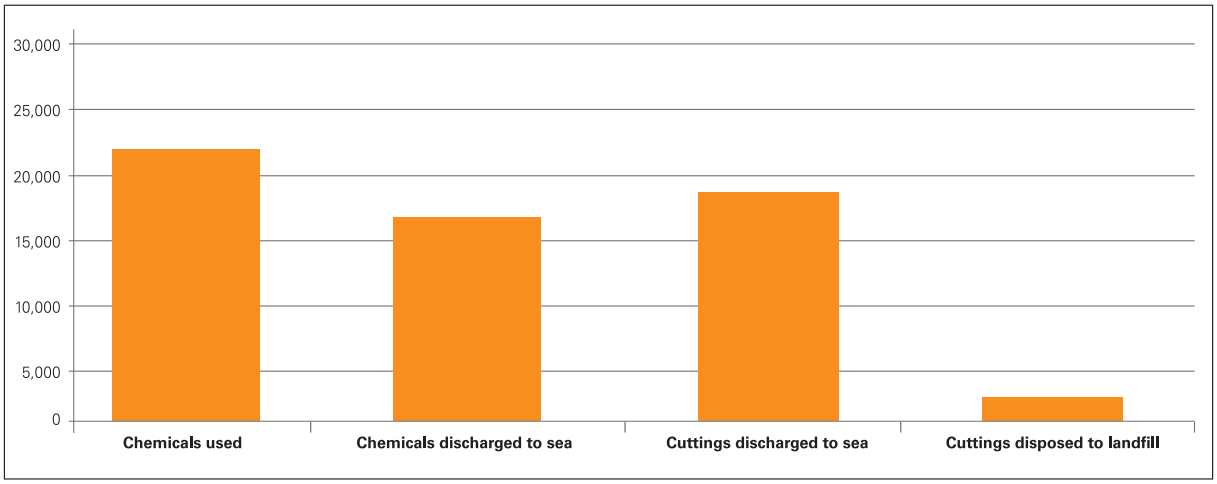



**Figure 18: Total drill cuttings produced, and drilling chemicals used in 2018 (tonnes). No drill cuttings were reinjected during drilling activity in 2018.**

Drilling waste includes special wastes such as hazardous completion, workover and drilling fluid additives. Non-special wastes are predominantly non-hazardous workover and completion drilling fluids and brines. In 2018, 96.5% of total drilling activity waste was either recycled or treated- see Figure 19 below.

**Operational drilling waste from MODUs.** (tonnes)

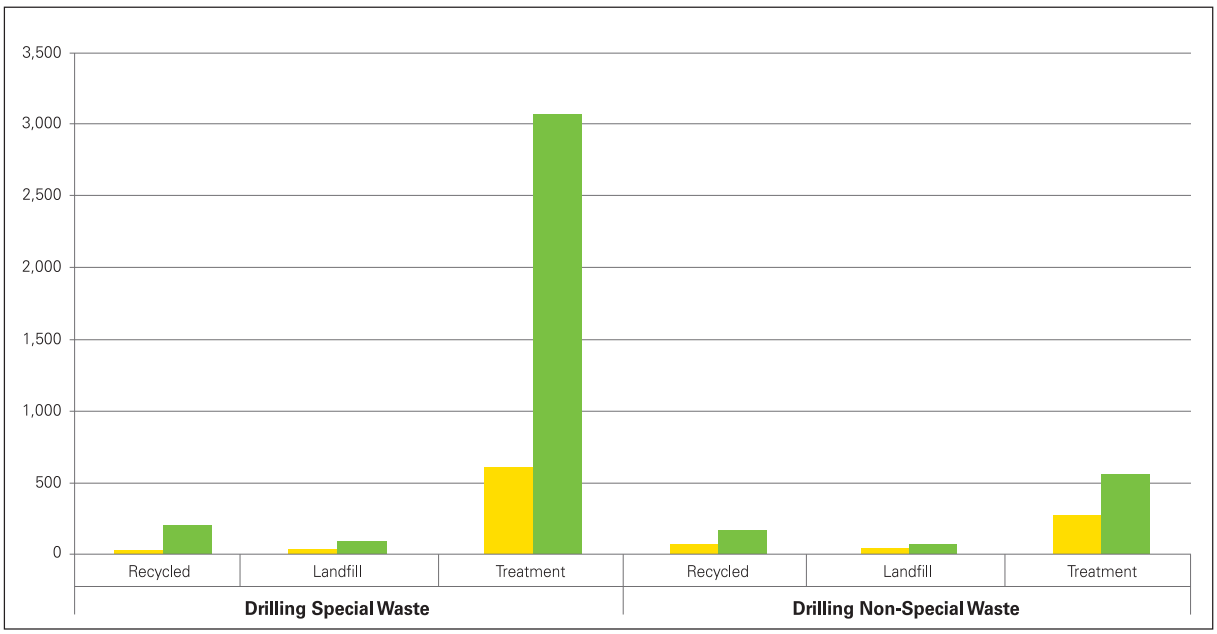



**Figure 19: Special and non-special waste (tonnes) generated during drilling activity in 2018**