PERENCO

2019 ENVIRONMENTAL REPORT

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ABBREVIATIONS

BEIS	Department for Business, Energy & Industrial Strategy
BOEPD	Barrels of Oil Equivalent Per Day
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CHARM	Chemical Hazard and Risk Management
CO_2	Carbon dioxide
EEMS	Environmental and Emissions Monitoring System
ETS	Emissions Trading Scheme
EU	European Union
HC	Hydrocarbon Gases
HQ	Hazard Quotient
MMCFGD	Million Standard Cubic Feet Per Day
MEG	Mono Ethylene Glycol
MW(th)	Megawatt Thermal
NOV	National Oilwell Varco
NOx	Nitrogen Oxides
NUI	Normally Unattended Installation
OCNS	Offshore Chemical Notification Scheme
OPPC	Oil Pollution Prevention and Control
OPRED	The Offshore Petroleum Regulator for Decommissioning & Environment
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
P&A	Plug and Abandon
PEC:NEC	Predicted Effect Concentration against No Effect Concentration
PLONOR	Pose Little Or No Risk
PUK	Perenco UK Limited
QSSHE	Quality, Safety, Security, Health and Environment
SEMS	Safety and Environmental Management System
SNS	Southern North Sea
SO_2	Sulphur Dioxide
UKCS	United Kingdom Continental Shelf

PERENCO UK SOUTHERN NORTH SEA

Perenco UK Limited Southern North Sea Operations (referred to hereafter as 'PUK SNS') has been operating in the Southern North Sea (SNS) since 2003 and processes up to 15% of the UK's national gas production. PUK's daily production is approximately 300 mmcfgd (51,400 boepd equivalent) with an additional 300 mmcfgd processed and exported from other producers.

PUK SNS owns and operates the largest infrastructure within the United Kingdom Continental Shelf (UKCS), comprising 45 offshore platforms, 14 subsea wells, and a network of more than 2,400 km of pipelines connected to its two onshore terminals Bacton and Dimlington where the gas is received, treated, metered and then exported into the UK National Grid.

PUK SNS are responsible for over 10% of the UKCS well stock and have more than 200 wells permanently producing across 40 gas fields; Leman, Indefatigable, LAPS, Trent, Cleeton including Wollaston, Whittle, Ravenspurn North and Ravenspurn South, West Sole comprising West Sole, Hyde, Hoton and Newsham fields and the Amethyst field.

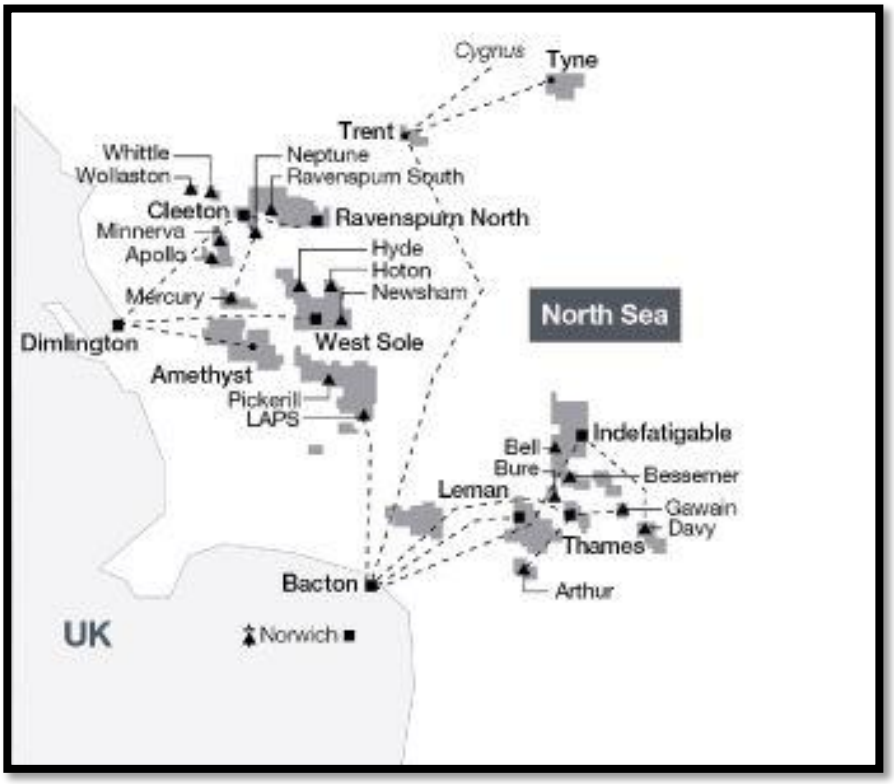


Figure.1 SNS Operations

The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) requires all operators of offshore installations to produce a Public Statement to report their environmental performance under the OSPAR Recommendation 2003/5 'To promote the Use and Implementation of Environmental Management Systems by the Offshore Industry'. These statements must be prepared on an annual basis, covering offshore installation activities carried out during the previous calendar year, and made available to the public by the 1st June of each year.

This report outlines PUK SNS's offshore environmental performance for its UKCS operations during 2019. The Wytch Farm, Bacton Terminal and Dimlington Terminal operations are therefore excluded from this report.

SNS OPERATIONS 2019

In 2019 PUK SNS saw a continued high level of offshore activity. This activity ranged from normal production operations, to platform based well intervention projects, through to a full decommissioning activities. The following were key permitted project activities undertaken during 2019:

- **North West Bell Pipeline Repair:** subsea clamp installed on PL1705;
- **Pipeline Remediation:** Mattresses and rock placement on PL22, PL23 and PL24;
- **Thames Subsea Well Removal:** Removal of three wellheads and wellhead protection structures ;
- **Pickerill Decommissioning:** Pickerill A and B hydrocarbon free and platform dismantlement preparation;
- **Tyne Decommissioning:** Platform dismantlement and removal (Jan 2020);
- **Guinevere:** Platform dismantlement and removal (Jan 2020).

SNS OPERATIONS: PRODUCTION HUB PROFILES

Ravenspurn North (RN) Hub

Figure.2 Ravenspurn North Platform

Fields: Ravenspurn North, Johnston.

Infrastructure and blocks:

- Ravenspurn North Manned Platform 43/26.
- ST-2 Normally Unmanned Installation (NUI) 43/26.
- ST-3 (NUI) 42/30.
- Johnston Subsea Development 43/27.

Discovery Date: 1983.

Producing Horizon: Leman Sandstone.

Water Depth: Approx. 41m.

Environmental Protected Areas: Within the Southern North Sea SAC.

Onshore Terminal: Dimlington.

Hub Overview: Gas from Ravenspurn North and Johnston passes to the Cleeton Development, also operated by PUK, via a 24-inch diameter interfiled pipeline (PL669) from the Ravenspurn North Platform. At Cleeton, the Ravenspurn North and Johnston gas is commingled with production from Cleeton and associated tie-backs and is exported onshore via a 59 kilometre 36-inch diameter pipeline (PL447) to the onshore Dimlington Gas Terminal.

Cleeton Hub

Figure.3 Cleeton Platform

Fields: Cleeton.

Infrastructure and blocks:

- Cleeton 42/29.
- Ravenspurn South Alpha (NUI) 42/23.
- Ravenspurn South Bravo (NUI) 42/23.
- Ravenspurn South Charlie (NUI) 42/23.
- Neptune (NUI) 47/04.
- Minerva (NUI) 47/03.
- Whittle subsea development 30/19.

Discovery Date: 1976.

Water Depth: 29-46m.

Environmental Protected Areas: Within the Southern North Sea SAC.

Onshore Terminal: Dimlington.

Hub Overview: The Cleeton Development comprises the normally attended Cleeton host facility, which targets the Cleeton gas field, located within UKCS Block 42/29. In addition, the Cleeton Development includes a number of Normally Unattended Installations (NUIs), subsea developments and associated infrastructure, targeting satellite fields which are tied back to the Cleeton host facility. Gas and condensate are routed to the onshore Dimlington Gas Terminal located on the East Riding of Yorkshire coast, via a 59 kilometre 36-inch export pipeline (PL447). Produced water is re-injected at the Cleeton host facility.

West Sole Hub

Figure.4 West Sole Alpha Platform

Felds: West Sole.

Infrastructure and blocks:

- West Sole Alpha 48/6.
- West Sole Bravo (NUI) 48/6.
- West Sole Charlie (NUI) 48/6.
- Hyde (NUI) 48/6.
- Hoton (NUI) 48/7.
- Amethyst A1D (NUI) 47/14.
- Amethyst A2D (NUI) 47/14.
- Amethyst B1D (NUI) 47/14.
- Amethyst C1D (NUI) 47/14.

Discovery Date: 1965.

Water Depth: 28m.

Environmental Protected Areas: Southern North Sea SAC.

Onshore Terminal: Dimlington.

Hub Overview: The West Sole Alpha platform consists of steel legged platforms, which includes process facilities and accommodation and receives gas and fluids from all of the associated tie-backs. Processed gas and some fluids are routed to the onshore Dimlington Gas Terminal located on the Yorkshire coast via a 71.9 kilometre 16 inch diameter pipeline (PL28), through the West Sole Alpha platform through a 68 kilometre 24 inch diameter pipeline (PL145) and through the Amethyst A2D platform via a 47.7km 30 inch diameter pipeline (PL649).

LAPS Hub

Figure.5 Excalibur NUI

Fields: Lancelot, Excalibur, Galahad, Waveney, Malory and Guinevere.

Infrastructure and blocks:

- Lancelot (NUI) 48/17.
- Excalibur (NUI) 48/17.
- Galahad (NUI) 48/17.
- Waveney (NUI) 48/17.
- Malory (NUI) 48/12D.
- Guinevere* (NUI) 48/17B.

*Decommissioned.

Discovery: 1986.

Water Depth: Average 20m.

Environmental Protected Areas: N/A.

Onshore Terminal: Bacton.

Hub Overview: The LAPS Complex comprises six normally unmanned installations (NUIs) and associated infrastructure targeting a number of fields. The Lancelot Assembly and Waveney Step-out Tee, located on the 20-inch gas export pipeline (PL876) from Lancelot to the onshore Bacton Gas Terminal (BGT), receives gas and condensate directly from the Lancelot, Excalibur, Galahad and Waveney NUIs and the Galahad Assembly. Once comingled the gas and condensate are then conveyed to BGT via pipeline PL876.

Indefatigable (Inde) Hub

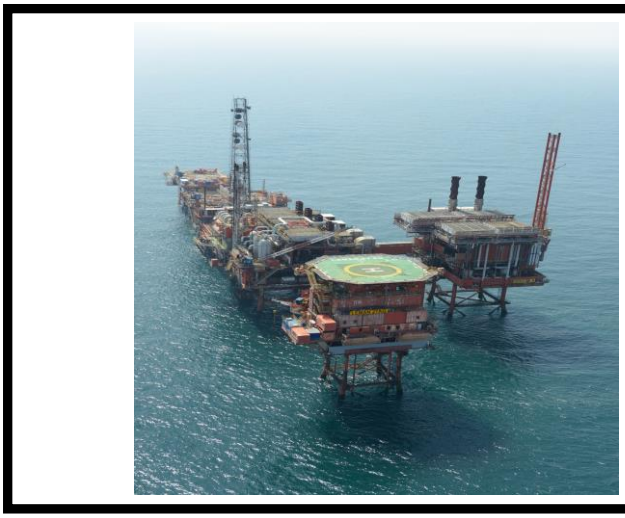


Figure.6 Inde 23A Platform

Fields: Indefatigable.

Infrastructure and Blocks:

- Inde 23A 49/23A.
- Inde 23C (NUI) 49/23C.
- Inde 23D (NUI) 49/23D.
- Inde 18A (NUI) 49/18A.
- Inde 18B (NUI) 49/18B.
- Bessemer (NUI) 49/23A.
- Wenlock (NUI) 49/12A.
- Davy (NUI) 49/30A.

Discovery Date: 1966.

Water Depth: 28m.

Environmentally Protected Areas: North Norfolk Sandbanks and Saturn Reef.

Onshore Terminal: Bacton.

Leman Hub

Figure.7 Leman 27A Platform

Fields: Leman / Leman South.

Infrastructure and Blocks:

- 27A 49/27.
- 27B (NUI) 49/27.
- 27C (NUI) 49/27.
- 27D (NUI) 49/27.
- 27E (NUI) 49/27.
- 27F (NUI) 49/27.
- 27G (NUI) 49/27.
- 27H (NUI) 49/27.
- 27J (NUI) 49/27.

Discovery Date: 1966.

Water Depth: 38m.

Environmental Protected Areas: North Norfolk Sandbanks and Saturn Reef.

Onshore Terminal: Bacton.

Hub Overview: The Leman Development produces from both the Leman and Leman South gas reservoirs. Leman 49/27A is the normally attended host facility and comprises five bridge-linked platforms that house processing, gas compression and accommodation facilities. Gas and condensate from the Leman and Leman South reservoirs are routed to the onshore Bacton Gas Terminal (BGT) located on the North Norfolk coast, via a 61 kilometre 30-inch export pipeline. Produced water is routed to 49/27A where it is reinjected into a dedicated disposal well.

Trent, Tyne and Tors

Fields: Trent, Kilmar, Garrow.

Infrastructure and Blocks:

- Trent (NUI) 43/24.
- Tyne* (NUI) 44/18.
- Kilmar (NUI) 43/22.
- Garrow (NUI) 42/25.

*Decommissioned.

Discovery Date: 1991.

Water Depth: 34m.

Environmentally Protected Areas: Southern North Sea SAC.

Onshore Terminal: Bacton.

Figure.8 Trent Platform

Hub Overview: The Trent Development comprises two wellhead steel platforms and targets the Trent gas field located within Block 43/24. Normal operational control of the Trent host facility is from the onshore Bacton Gas Terminal (BGT). The Trent platform acts as the host processing and discharge facility for a number of tie-backs which all export production to the onshore BGT via Trent. The Kilmar and Garrow fields (collectively referred to as 'Tors') are produced through two separate NUIs that export production to the Trent host facility. The Kilmar gas field and associated Kilmar NUI are located in Block 43/22 approximately 20 kilometres west of the Trent host facility. Production is routed to Trent via a 21 kilometre 12-inch infield pipeline. The Garrow field is located in Blocks 42/25 and 43/21. The Garrow NUI is located in Block 42/25 and produces indirectly to the Trent platform via the Kilmar platform. Production is exported from Garrow to Kilmar via a 22 kilometre 8-inch infield pipeline. Commingled gas and condensate from Tors and Trent is routed to the onshore BGT first via the 1-kilometre infield Trent spur line (PL253b) which in turn ties into the PUK operated EAGLES (the East Anglia Gas and Liquids Evacuation System) export pipeline (PL253).

PUK SNS ENVIRONMENTAL MANAGEMENT SYSTEM

PUK SNS operate under a Safety and Environmental Management System (SEMS), certified to ISO 14001. The PUK SNS (SNS) SEMS provides a uniform approach to every element of operations across our SNS assets. With regards to health, safety, security and environmental management the purpose of the SEMS is to ensure that, as far as reasonably practicable, all of the installation's activities are undertaken in accordance with PUK SNS commitment to its Quality, Safety, Security, Health and Environment (QSSHE) Policies and are in compliance with all relevant statutory provisions applicable to onshore and offshore operations within the SNS.

SEMS includes PUK, SNS and site-specific processes and procedures through which the local business is delivered. The SEMS framework comprises 15 key components which together provide a roadmap to safe, environmentally responsible and reliable operations.

Each of the 15 PUK SNS standards sets out high level targets which shall be complied with, a set of actions to be implemented, along with supporting information to provide guidance on implementation.

The standards consist of:

1. Leadership and Accountability.
2. Risk Assessment and Management.
3. Compliance.
4. Planning.
5. Personnel Competence.
6. Procurement.
7. Documentation and Communication.
8. Design and Construction.
9. Operations, Maintenance and Management of Change.
10. Emergency Response.
11. Social Responsibility.
12. Performance Monitoring.
13. Unplanned Event (Incident) Reporting.
14. Management System Auditing.
15. Review and Adjustment.

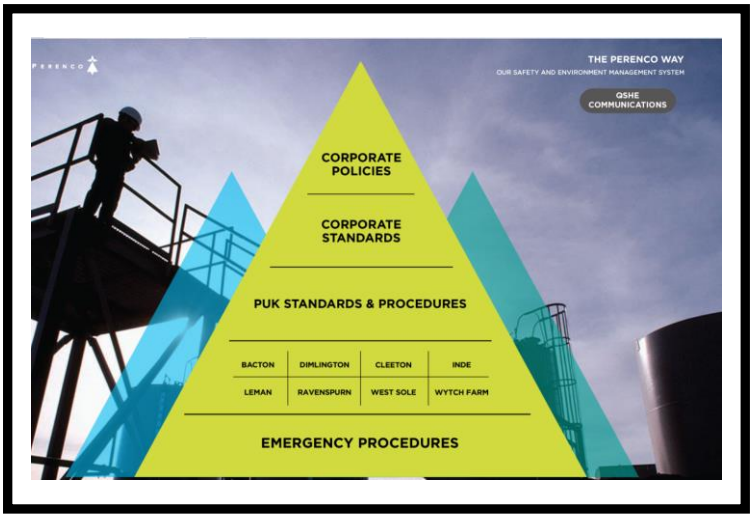
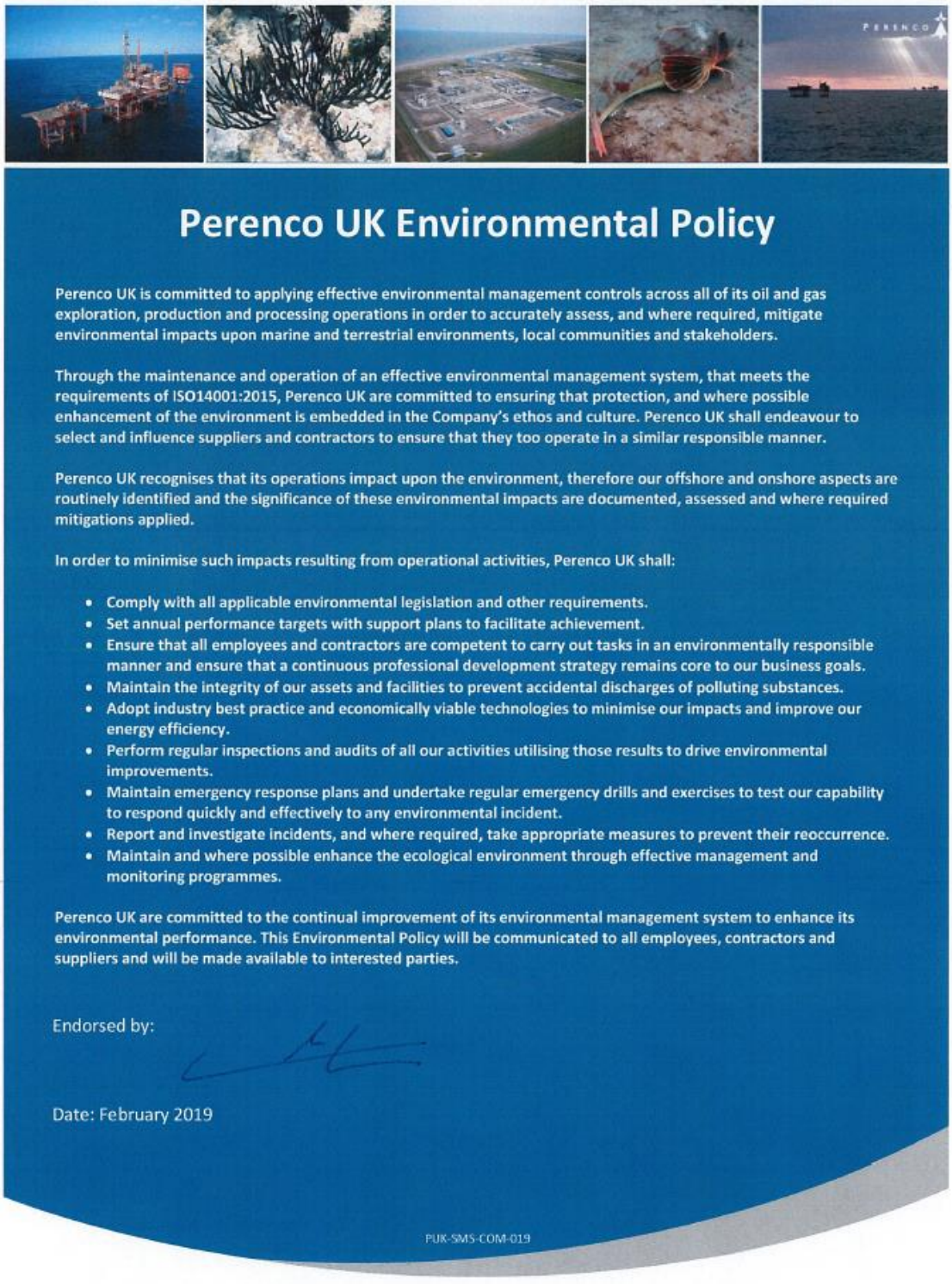


Figure.9 PUK SEMS Homepage

PUK SNS Environmental Policy

PUK SNS's Environmental Policy is presented in Figure 10 below. It defines the definition of the PUK SNS significant environmental impacts that are the focus of our environmental management activities.



Perenco UK Environmental Policy

Perenco UK is committed to applying effective environmental management controls across all of its oil and gas exploration, production and processing operations in order to accurately assess, and where required, mitigate environmental impacts upon marine and terrestrial environments, local communities and stakeholders.

Through the maintenance and operation of an effective environmental management system, that meets the requirements of ISO14001:2015, Perenco UK are committed to ensuring that protection, and where possible enhancement of the environment is embedded in the Company's ethos and culture. Perenco UK shall endeavour to select and influence suppliers and contractors to ensure that they too operate in a similar responsible manner.

Perenco UK recognises that its operations impact upon the environment, therefore our offshore and onshore aspects are routinely identified and the significance of these environmental impacts are documented, assessed and where required mitigations applied.

In order to minimise such impacts resulting from operational activities, Perenco UK shall:

- Comply with all applicable environmental legislation and other requirements.
- Set annual performance targets with support plans to facilitate achievement.
- Ensure that all employees and contractors are competent to carry out tasks in an environmentally responsible manner and ensure that a continuous professional development strategy remains core to our business goals.
- Maintain the integrity of our assets and facilities to prevent accidental discharges of polluting substances.
- Adopt industry best practice and economically viable technologies to minimise our impacts and improve our energy efficiency.
- Perform regular inspections and audits of all our activities utilising those results to drive environmental improvements.
- Maintain emergency response plans and undertake regular emergency drills and exercises to test our capability to respond quickly and effectively to any environmental incident.
- Report and investigate incidents, and where required, take appropriate measures to prevent their reoccurrence.
- Maintain and where possible enhance the ecological environment through effective management and monitoring programmes.

Perenco UK are committed to the continual improvement of its environmental management system to enhance its environmental performance. This Environmental Policy will be communicated to all employees, contractors and suppliers and will be made available to interested parties.

Endorsed by:

Date: February 2019

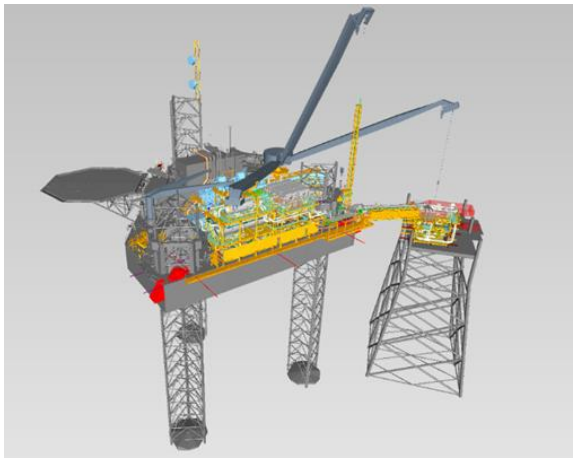
PUK-SMS-COM-019

Figure.10 PUK Environmental Policy

ENVIRONMENTAL IMPROVEMENTS 2019

PUK SNS is committed to continued improvements in environmental performance. In 2019, PUK SNS saw improvements in many environmental Key Performance Indicators (KPIs). Highlights include:

- An overall reduction in CO_2 emissions from 2014 – 2019;
- All PUK SNS imported electricity for 2019 was from renewable resources;
- Successfully diversion all general and all hazardous wastes, within the boundaries of the legal framework, from entering landfill;
- A reduction in the use of chemicals used and discharged; and
- A reduction of oil discharged to sea.



One of the key projects progressing during 2019, with significant environmental benefits, is the Southern Hub Area Rationalisation Project (SHARP), through Front End Engineering Design (FEED), which will significantly reduce the CO2 emissions by an estimated 100,000 tonnes of CO2 once it comes on stream in 2021.

Figure.11 Proposed SHARP Platform Design

2019 has also seen the roll out of a range of initiatives aimed at reducing impacts on the environment both marine and terrestrial, as well as raising awareness of the marine life around our platforms. This year also marked the introduction of the Environmental Reps role, a voluntary extension of the Safety Reps role, aimed at providing valuable support in both onshore and offshore workforce engagement.

An overview of our initiates are outlined below:

Plastic Reduction Offshore: Working closely with our catering contractors we have introduced a number of measures aimed at reducing our reliance on single use plastics including:

- Switching from polystyrene cups to re-usable mugs.
- Removal of plastic drinks stirrers.
- Switching from plastic to compostable food containers on our walk to work vessel.
- Continual raising of awareness through platform visits and liaison with waste contractor.

Marine Mammal Identification: The Eastern English Coastline provides a range of habitats crucial to both marine mammals and seabirds, both of which can be observed nearfield of the offshore assets. This year PUK SNS introduced a way for our offshore crews to record any sightings of both mammals and sea birds, our identification charts and record sheets are present on all manned platforms, and allow us to better understand the marine life around our platforms.

Environmental Representatives: PUK now have Environmental Representatives (E-Reps) on each manned platform as well as several at each terminal. Our E-Reps work closely with the Environmental Team and their Assets across various activities and initiatives. They also provide support on OPRED inspections and ISO14001 external audits.

ENVIRONMENTAL PERFORMANCE 2019

PUK SNS monitors and report on atmospheric emissions, the discharge in produced water, the use and discharge of chemicals, the disposal of waste, and hydrocarbon/ chemical spill incidents. This section the relevant information that was reported via the online Environmental and Emissions Monitoring System (EEMS) for operations during 2019.

Atmospheric Emissions

Carbon Dioxide (EU ETS)

Carbon dioxide (CO_2) emissions from five of our manned offshore installations are subject to control under the European Greenhouse Emissions Trading Scheme (EU ETS) (Amendment) Regulations (2014). Cleeton, Inde, Leman, RN and Trent have EU ETS permits due to the size of the compression/generation capacity and are required to surrender credits to the value of the CO_2 emissions on an annual basis.

During 2019 a total of 357,257 tonnes of CO_2e was emitted from the combustion and venting from our offshore assets, of this 313,772 tonnes CO_2e was from combustion emissions and 255,655 tonnes CO_2 were verifiable emissions under EU ETS. Cleeton, Inde, Leman, RN and Trent account for approx. 81.5% of the offshore CO_2 combustion emissions.

Using the verified EU ETS data PUK SNS are able to show real sustainable reductions in the of CO_2 emissions over time. Figure 12 shows reductions in CO_2emissions from 2016-2019.

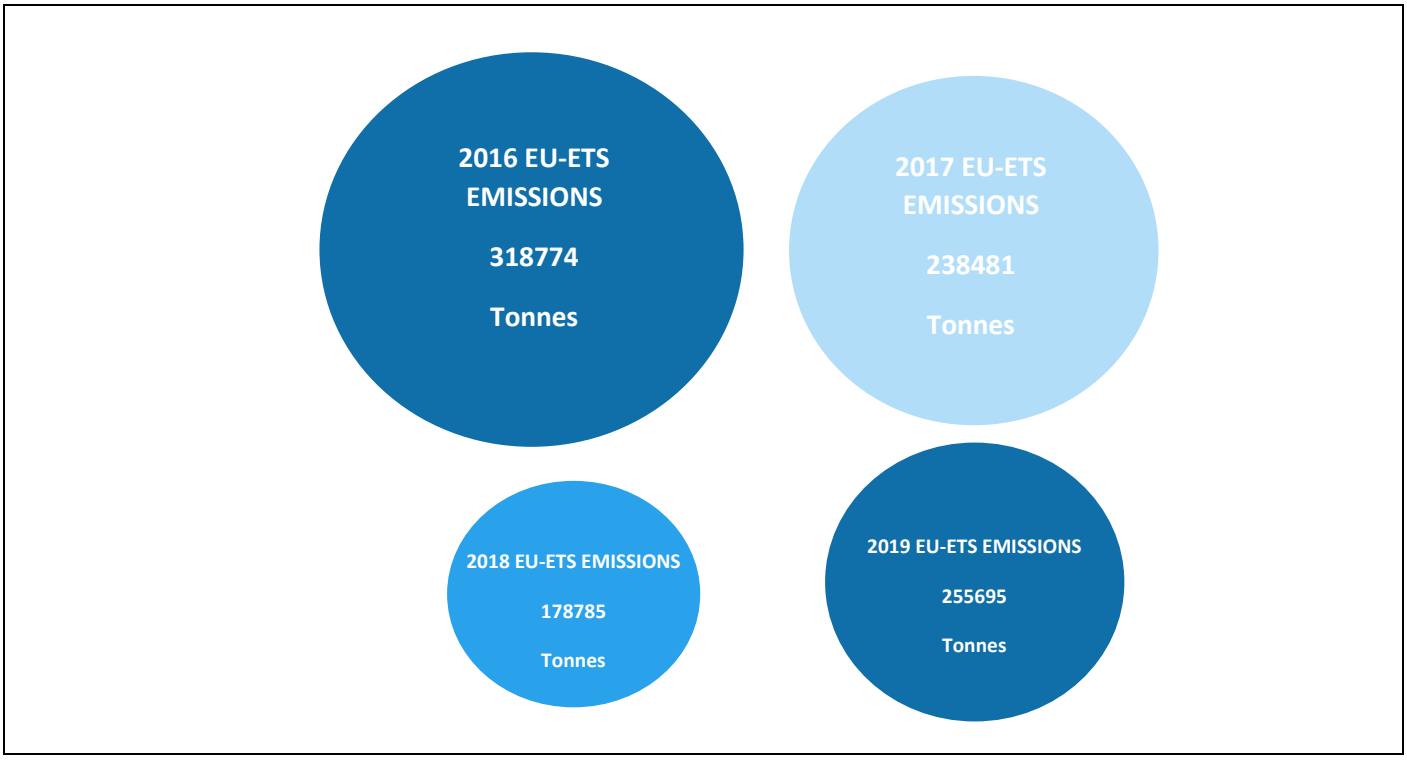


Figure.12 EU ETS Emissions (2016 – 2019)

PUK SNS operations continue a downward overall trend in CO_2 emissions across our assets as shown in Figure 13, with some increases such as 2018 – 2019 due to Leman being on stream for longer in 2019.

PUK SNS CO2 Intensity Ratio

In 2019 PUK SNS will be required to publish detailed CO_2 emissions data in the Director's Report submitted to companies' house, as defined by the Streamlined Energy and Carbon Reporting (SECR) guidelines. As part of this report PUK SNS have established an intensity ratio SECR defined emissions converted to CO_2e/ exported gas (expressed as barrels of oil equivalent (BOE)), in line with the industry norm. The PUK SNS 2018 Base Year intensity ratio is 14.19kg/ BOE, this rose slightly to 14.69kg/BOE in 2019. The intensity ratio will continue to be used as a measure of performance for CO_2 emissions.

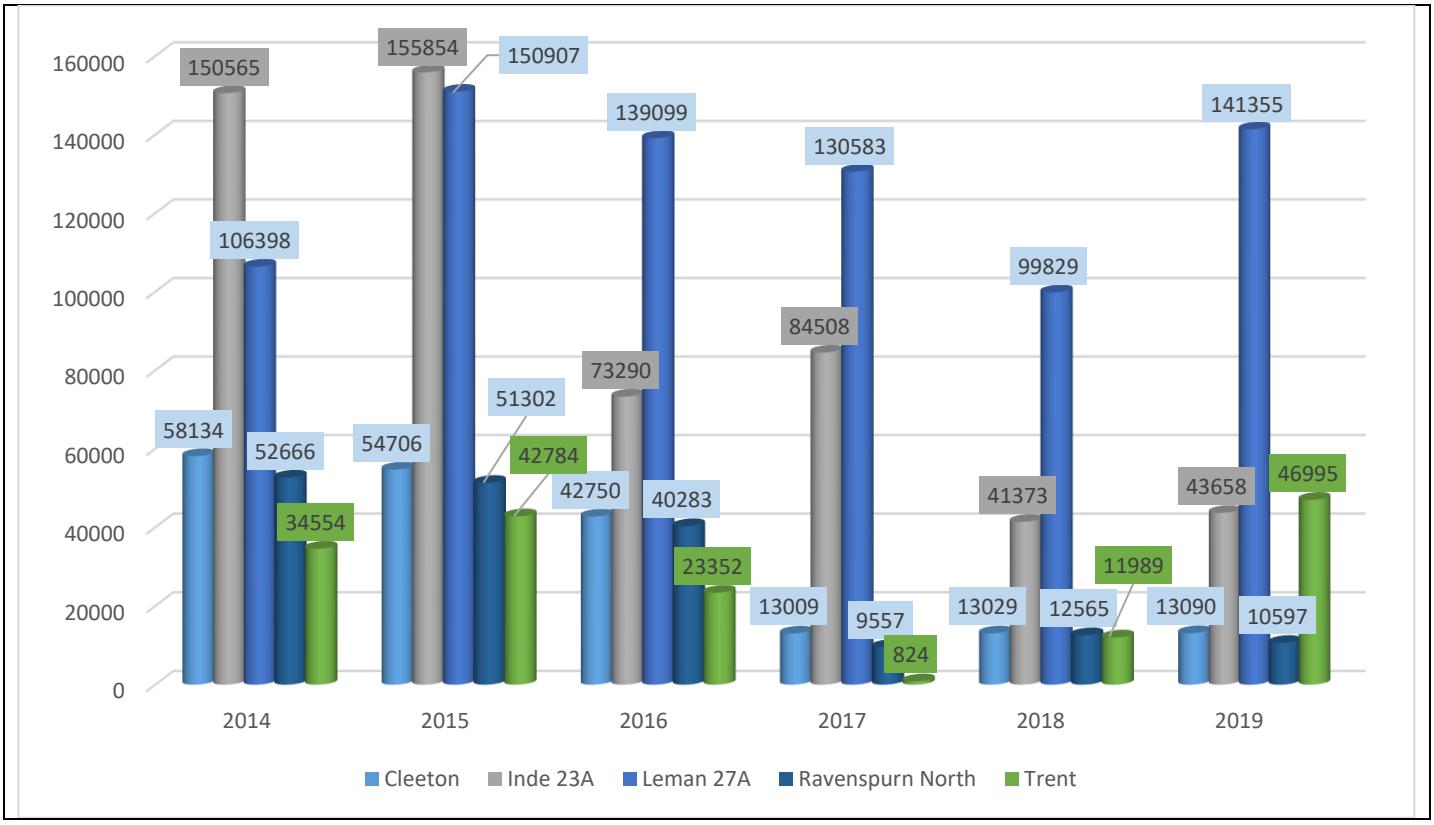


Figure.13 EU ETS CO2 Emissions by Platform 2014 - 2019

Key improvements in our CO_2 emissions include the following:

CO_2 Emissions – From a total peak in 2014 of **402,317 tonnes** to **255,695 tonnes** in 2019, a reduction of 36**% by;**

a. A phased reduction in aviation support;
b. The RADICLE project;
c. Inde Gas Compression Rationalisation Project;

Future projects include the introduction of a mooring buoy and SHARP project, with an approx. reduction of **100,000 tonnes** CO_2. The timeline below shows the reductions and the future projects.

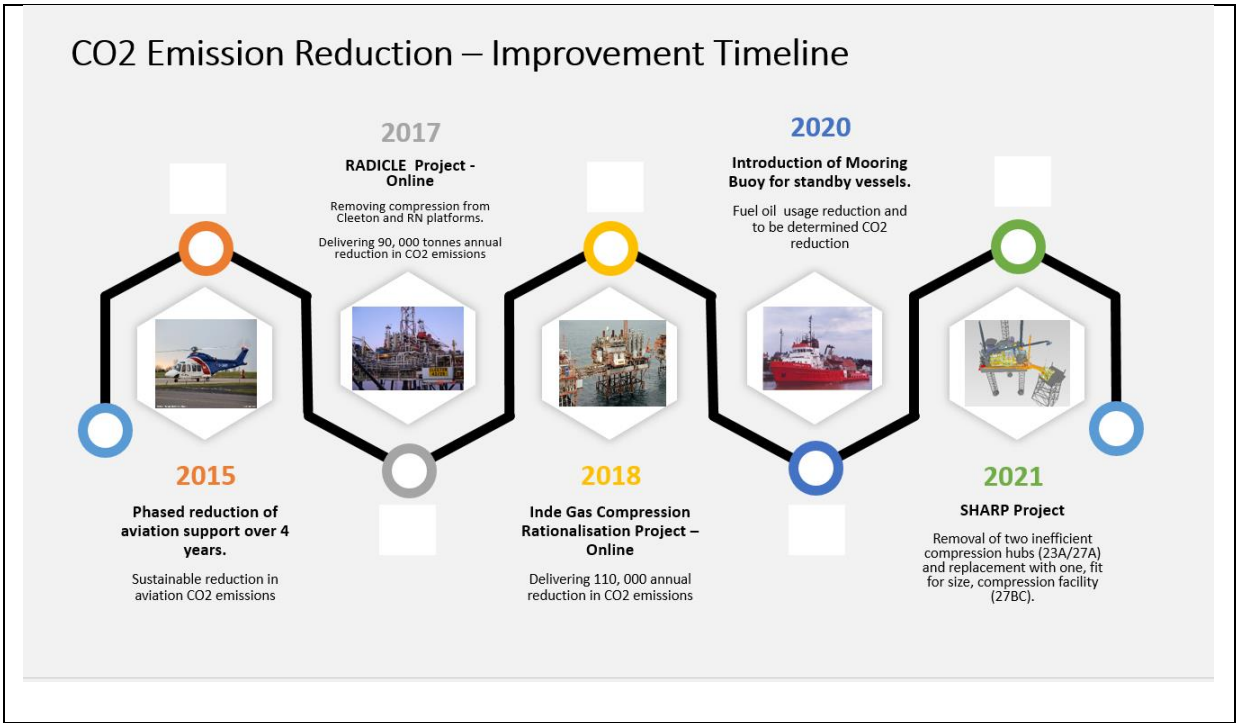


Figure.14 Timeline of CO_2 Reduction Activities

Other Emissions

The environmental impacts of concern attributable to combustion processes also include the emissions to atmosphere of Nitrogen Oxides (NOx). These have the potential to cause health impacts, and also contribute to acid rain. Offshore receptors are broadly insensitive to the amounts of NOx that are emitted from the combustion of gas. The SNS assets; Indefatigable, Leman and Trent have an installed capacity exceeding 50 MW (th) and are subject to regulatory controls under the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013. Figure. 15 outlines the 2019 NOX emissions.

Note: Leman has a considerably higher level of NOx due to the large power generation driving the compression. This is expected to reduced in line with the reduction of CO2 emissions once SHARP project comes onstream in 2021.

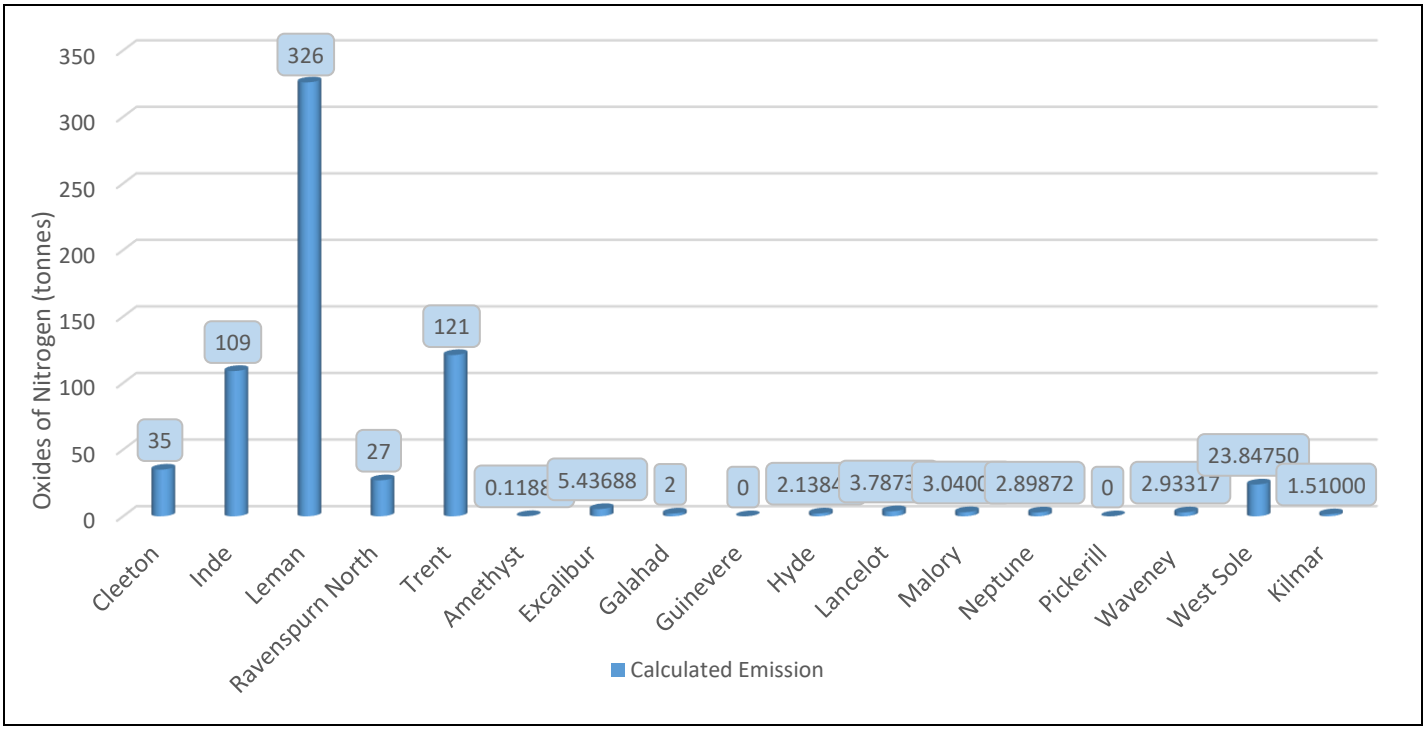


Figure.15 Total NOx Emissions per Platform (2019)

Waste

In 2019 PUK SNS successfully diverted all general and hazardous wastes* from entering landfill.

This was achieved by working closely with our principle waste management contractor and proactively managing the wastes generated as a result of operational activities by application of the waste hierarchy.

*The only exception being asbestos and asbestos contaminated waste where 2.97 tonnes have been disposed of via licenced landfills during 2019. This is however the required disposal route for such wastes.

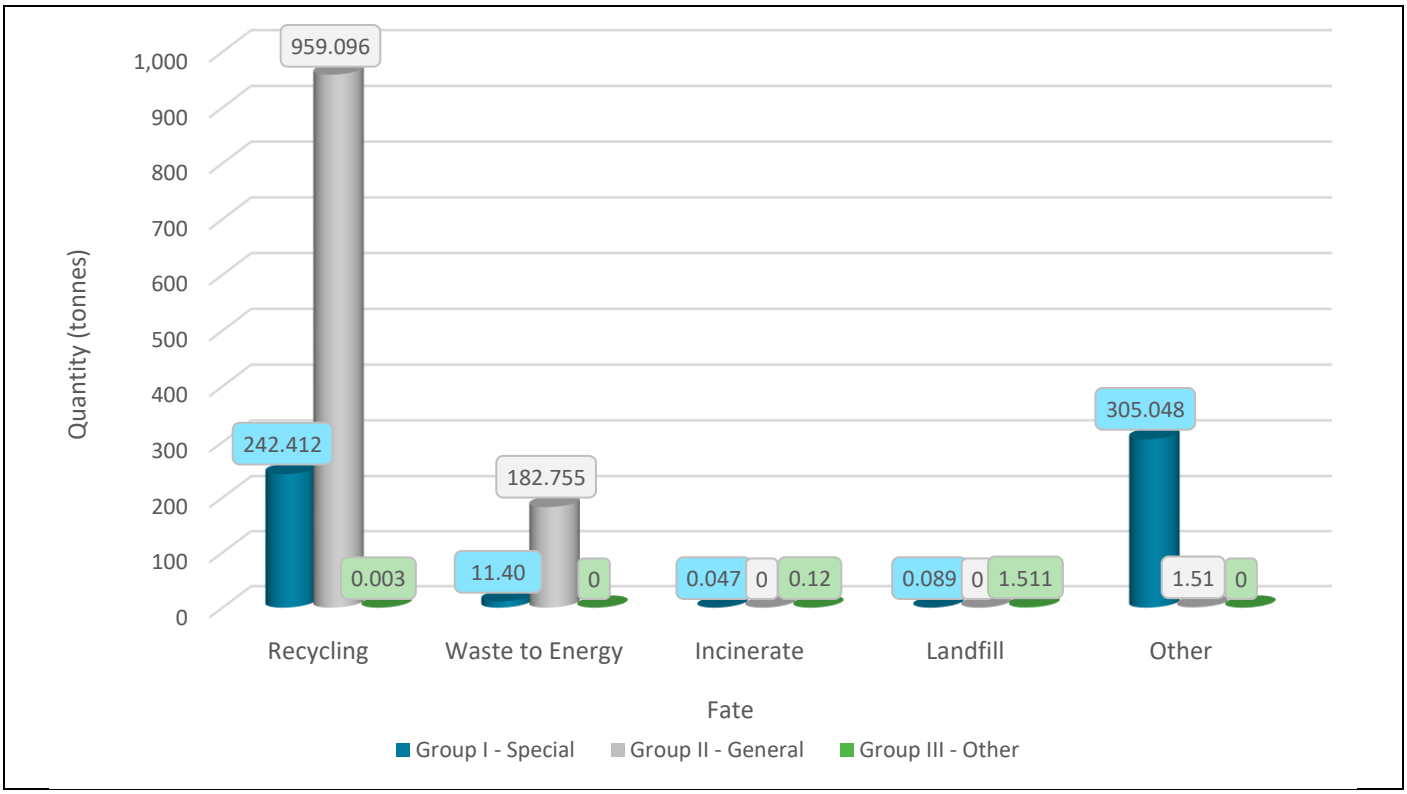


Figure.16 Total Operational Waste (2019)

Operational Waste by Manned Platforms

Figure.17 Total Operational Waste by Manned Platforms (2019)

Decommissioning Waste

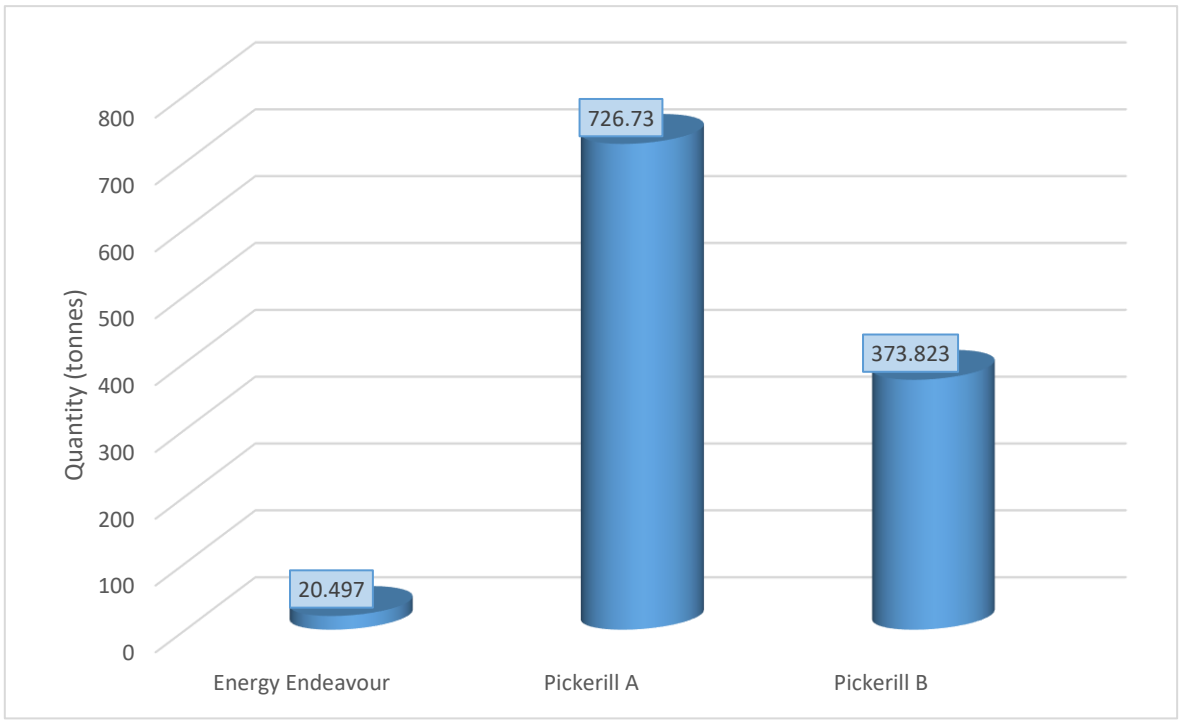


Figure.18 Total Produced Waste from Decommissioning Operations (2019)

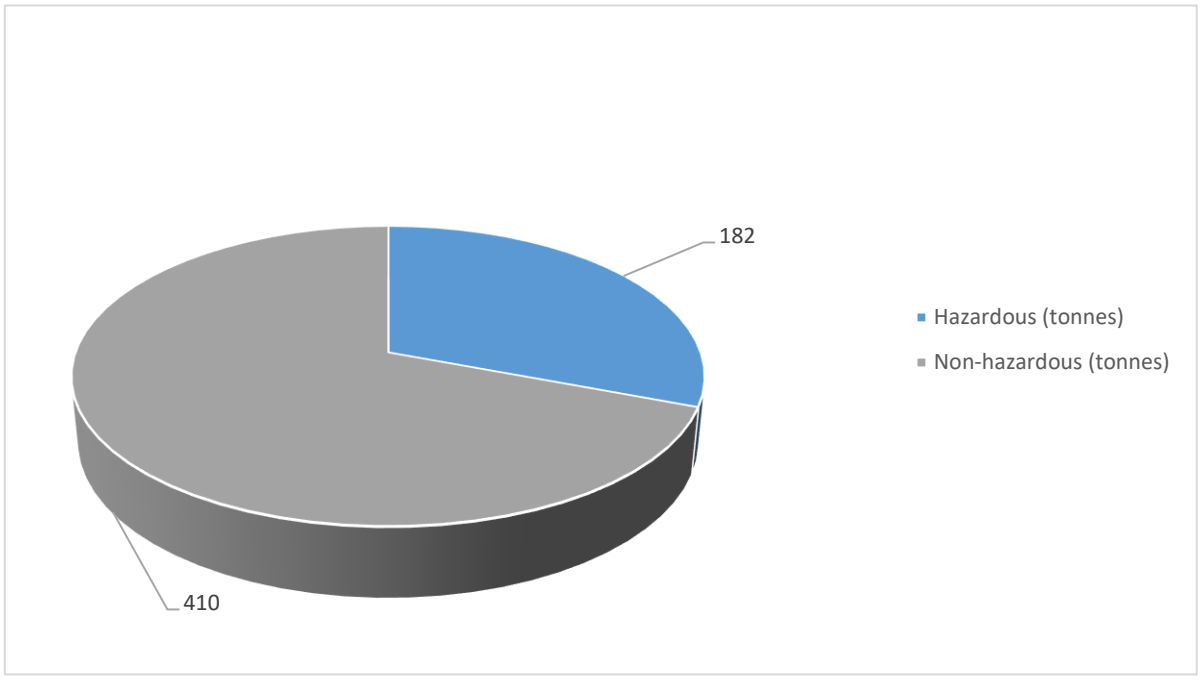


Figure.19 Category of Produced Waste from Decommissioning Operations (2019)

Decommissioning waste was generated during the 2019 HCF campaign on the Pickerill A and Pickerill B platforms, both of these campaigns were completed by the Energy Endeavour Jack up barge.

The Pickerill A HCF campaign generated almost 50% more waste than the Pickerill B HCF campaign primarily due to the greater amount of work required, a total nine wells were plug & abandonment (P&A) as opposed to seven on Pickerill B. Of the total decommissioning waste generated during 2019 the majority was classified as non-hazardous (69.2%) (Figure 19), including general waste and non-hazardous scrap metal, 87t and 85t during Pickerill A and 81t and 51t for Pickerill B.

While the total hazardous waste generated included a number of different waste types, the majority of hazardous waste generated during 2019 was dominated by dirty water contaminated with hydrocarbons, oil based mud, rags contaminated with oil and empty contaminated plastic drums.

Other Waste

The Sea Fox 1 was used as an accommodation vessel alongside West Sole Alpha, this departed in Q4 2019.

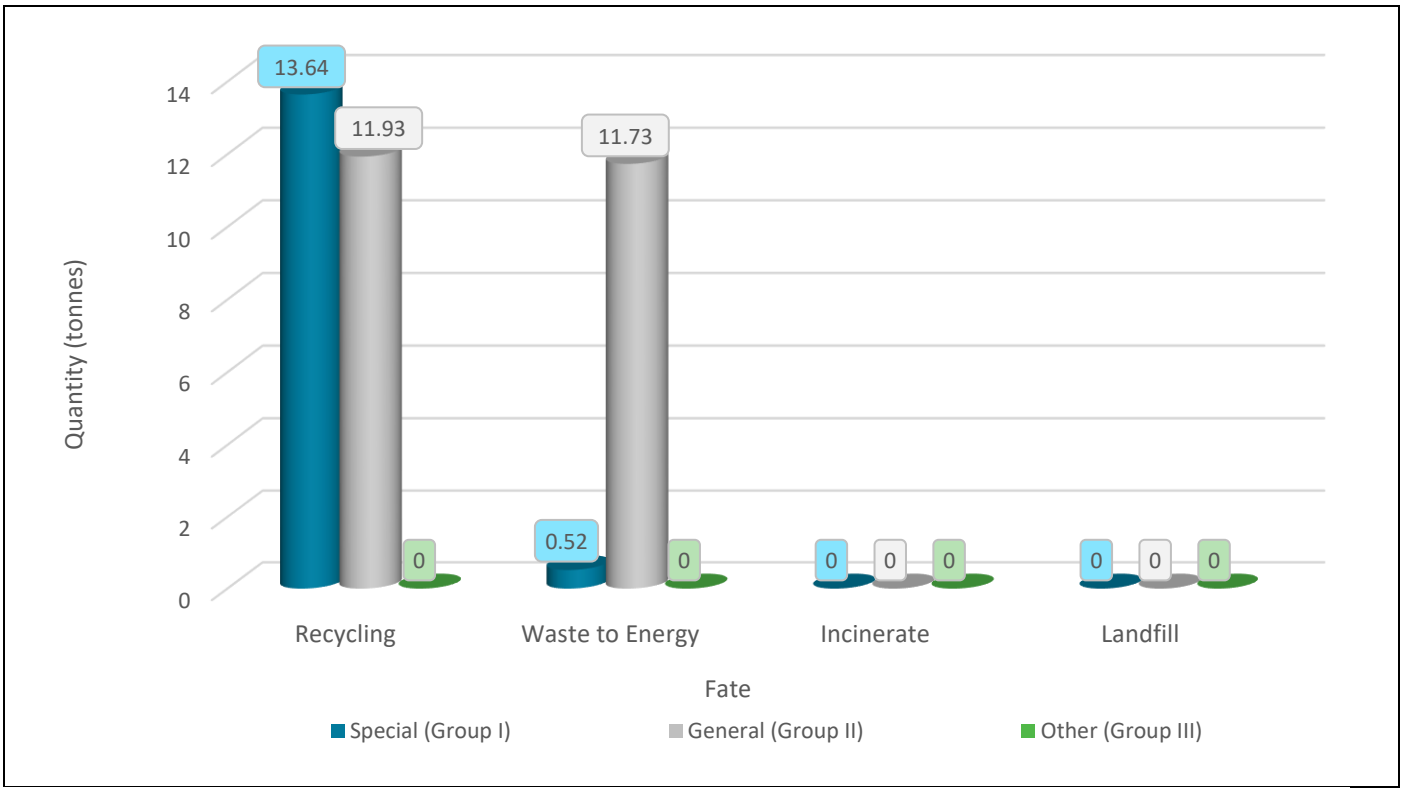


Figure.20 Annual operational waste from Sea Fox 1 (2019)

Chemical Use and Discharge

The use and discharge of chemicals is subject to control under the Offshore Chemicals Regulations 2002 (as amended). This requires regulatory approval following an assessment of the predicted environmental impacts of any proposed discharges. In addition, only chemicals that have been registered by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) may be used.

All chemical products used offshore undergo a hazard assessment, using the Chemical Hazard and Risk Management (CHARM) model, to calculate the ratio of Predicted Effect Concentration against No Effect Concentration (PEC:NEC). This is expressed as a Hazard Quotient (HQ), which is converted to a colour banding (Purple, Orange, Blue, White, Silver and Gold, in order of environmental hazard level (highest to lowest)) and used to rank the product.

Products that are not subject to CHARM modelling (i.e. inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an Offshore Chemical Notification Scheme (OCNS) grouping, A - E. Group A includes products considered to have the greatest potential environmental hazard and Group E the least. As seen from Table 1 below, PUK SNS strive to use chemicals which are as friendly to the environmental as possible.

Table.1 Chemical Use and Discharge Quantities According to OCNS Category (2019)

			TOTAL USAGE (KG)	TOTAL DISCHARGE (KG)
NON-CHARM MODEL CHEMICAL CATEGORISATION	A	HIGH HAZARD	0	0
	B		0	0
	C		0	0
	D	POSES	101,644	101,644
	E	LITTLE OR NO RISK	1630624.97	56929.03
CHARM MODEL CHEMICAL CATEGORISATION	PURPLE	HIGH RISK	0	0
	ORANGE		0	0
	BLUE		0	0
	WHITE		0	0
	SILVER		40,225	53.05
	GOLD	LOW RISK	61653.39	16415.42
			1834146.96	**175041.05**

In 2019 PUK SNS used a total of 1834.15 tonnes of chemicals, of which 165 tonnes were discharged. The usage of chemicals over the last 4 years has seen an overall downward trend. This is due to a combination of factors: removal of a number of platforms during decommissioning automatically reducing the volume of chemicals used; removal of the need to constantly inject large quantities of chemicals such as Monoethylene

Glycol (MEG) and replaced it with far smaller amounts of corrosion inhibitor; and a move away from continuous dosing and use more infrequent batch dosing, where technically feasible to do so.

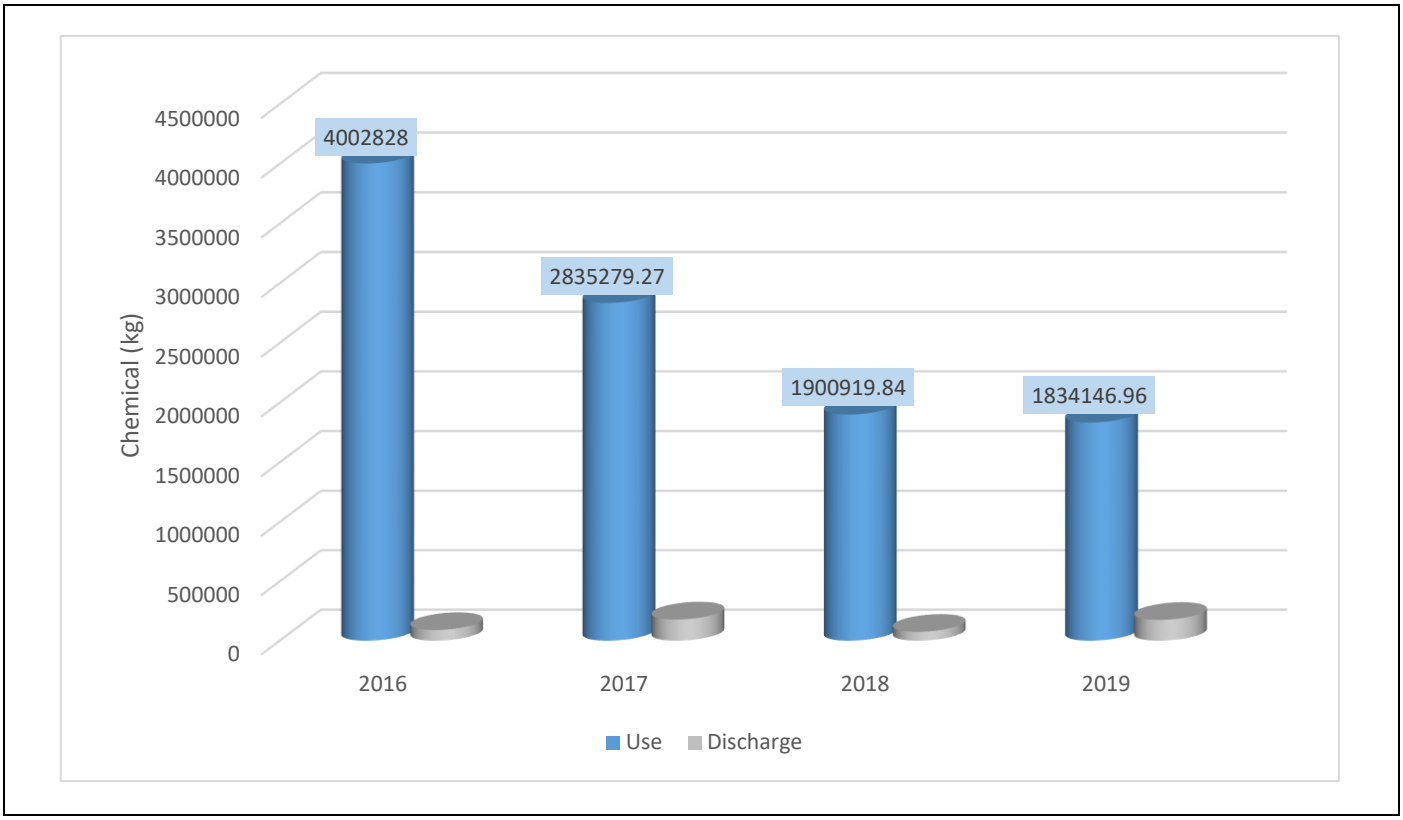


Figure.21 Annual Chemical Usage and Discharge (2016-2019)

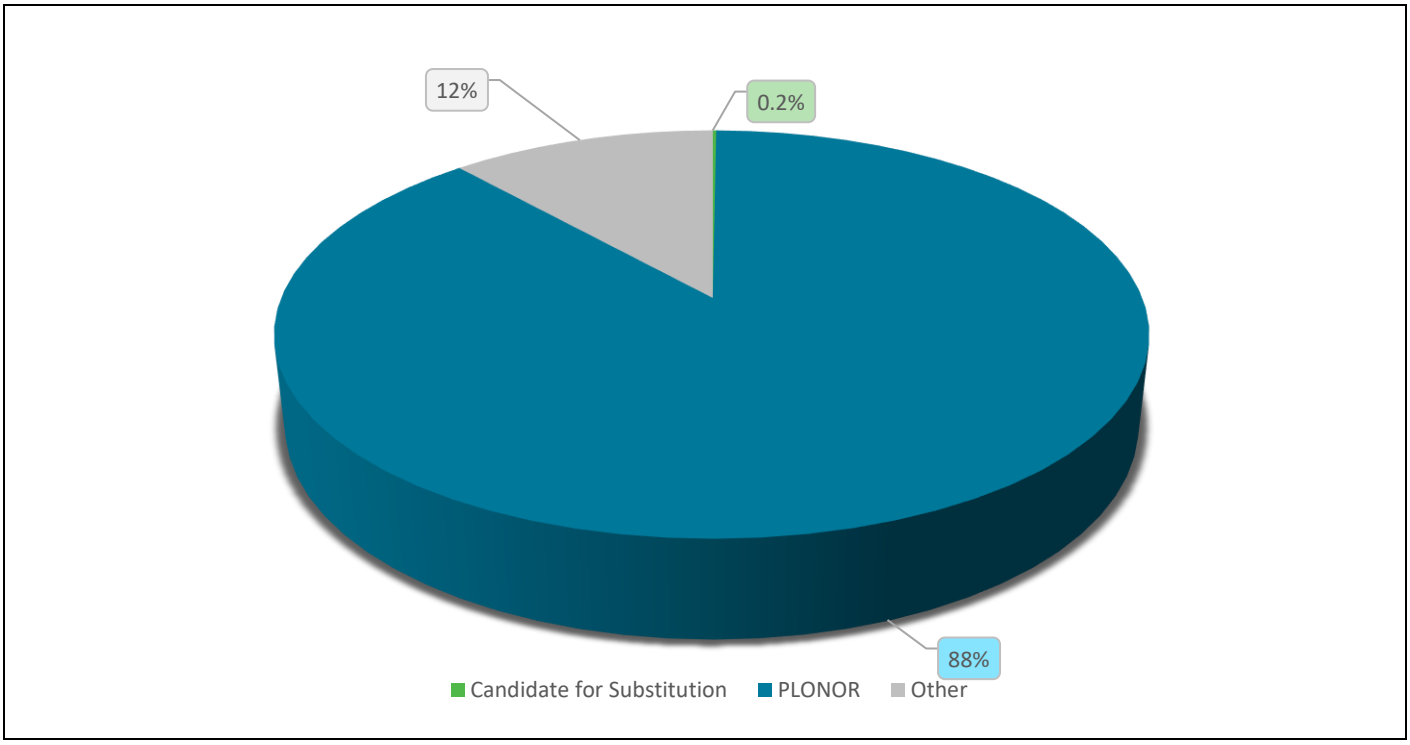


Figure.22 Chemical Usage by Category (2019)

During 2019, the majority of the chemicals used in production operations pose little or no risk (PLONOR). Only 15 chemicals identified as candidates for substitution were used in production operations.

PUK SNS is continuing to reduce chemical use at our SNS production assets, focusing on phasing out the use and discharge of chemicals with substitutional warnings and a programme of compatibility testing is ongoing to facilitate this.

Decommissioning Chemicals

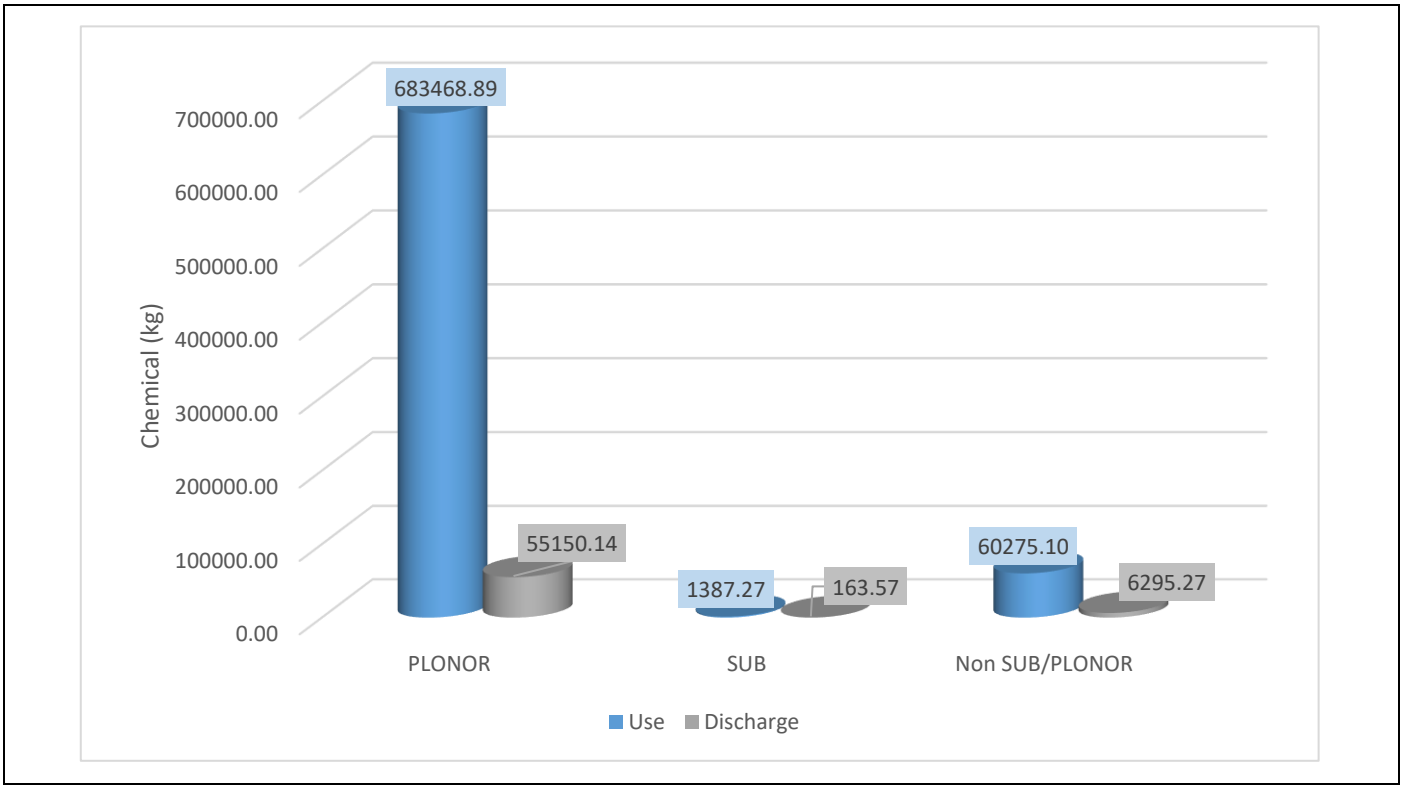


Figure.23 Decommissioning Chemical use by Grouping (2019)

A total of 745.13 tons of chemicals were used for decommissioning operations during 2019. Of this 61.60 tonnes were discharged to sea (8.2%).

The majority of chemicals used were designated as PLONOR, of which Class 'G' Oilwell (Portland) Cement made up the largest volume (Figure 23). This chemical provides the bulk powder used in the production of cement plugs which were applied to the Pickerill A and Pickerill B wells during P&A operations.

The use of chemicals with a SUB warning was limited during 2019 with SUB chemicals representing 0.2% of total chemical use (Figure 23). This use was entirely made up of the chemical BA-10. This polymer is included in the cement slurry system used to improve fluid loss properties. The additive's film-forming tendency limits interparticle flow within the matrix of the cement to control fluid loss from the slurry to permeable formations and was required for use in all wells.

Despite having a SUB warning, the use of BA-10 during decommissioning operations generated an RQ<1 indicating that there was no significant impact to the marine environment from the discharge of BA-10 during operations.

While the discharge of cementing chemicals is usually limited to the cleaning out of lines and dead volumes within the mixing pits, during 2019 two emergency aborted cement batches were discharged to sea resulting in a higher discharge volume than would be expected for normal operations.

Oil in Produced Water

The discharge of oil is subject to control under the Oil Pollution Prevention and Control (OPPC) Regulations 2005 (as amended). After treatment, oil in produced water was discharged from 9 of our operated assets in the SNS. The volume of produced water discharged from each asset during 2019 is presented in Figure 25 **and** the monthly flow-weighted average concentration of oil in produced water for each asset, along with the consented limit, are presented in Figure 26.

Please Note: There are produced water re-injection systems at Cleeton, Leman and Amethyst.

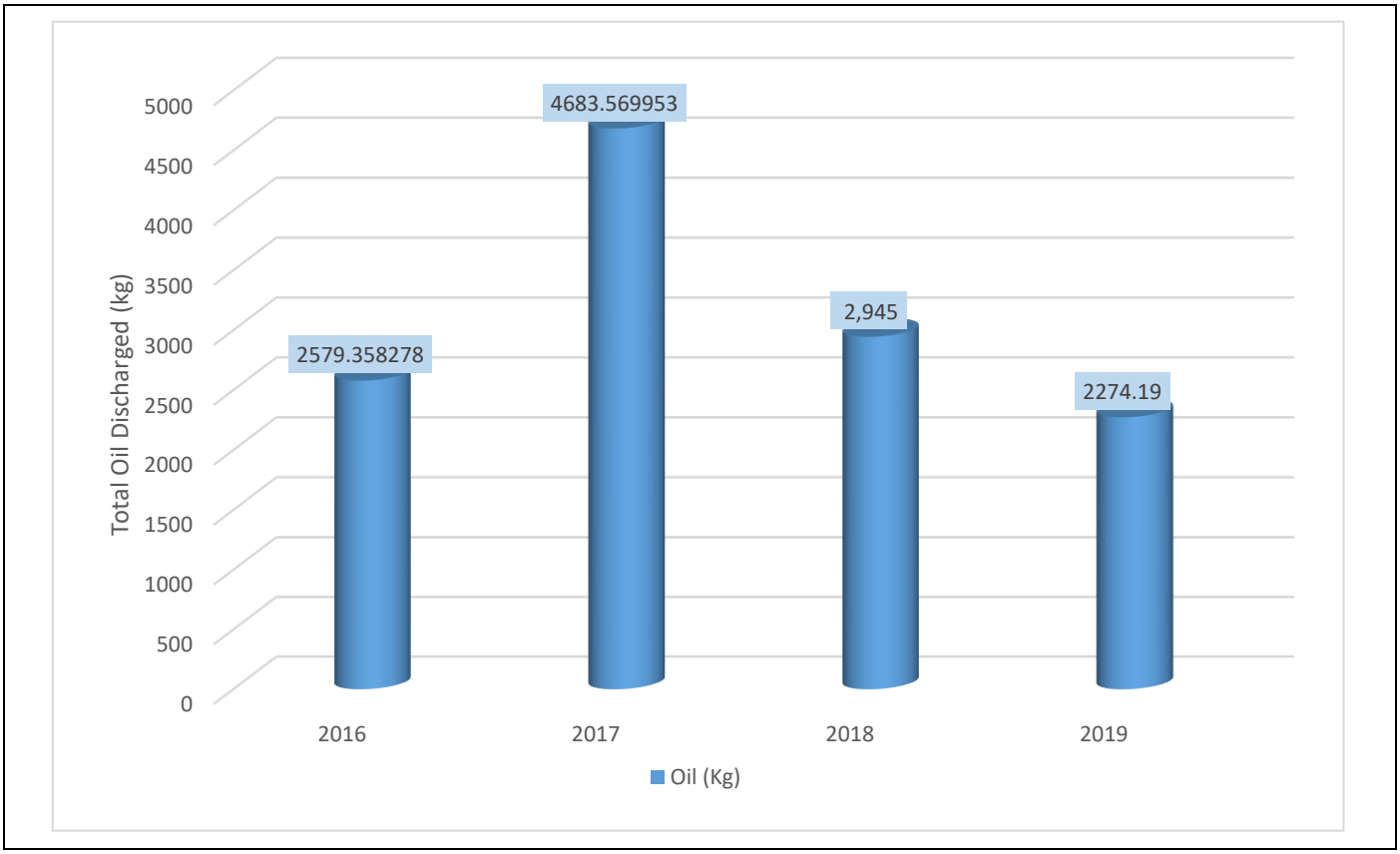


Figure.24 Annual Oil Discharged (2016-2019)

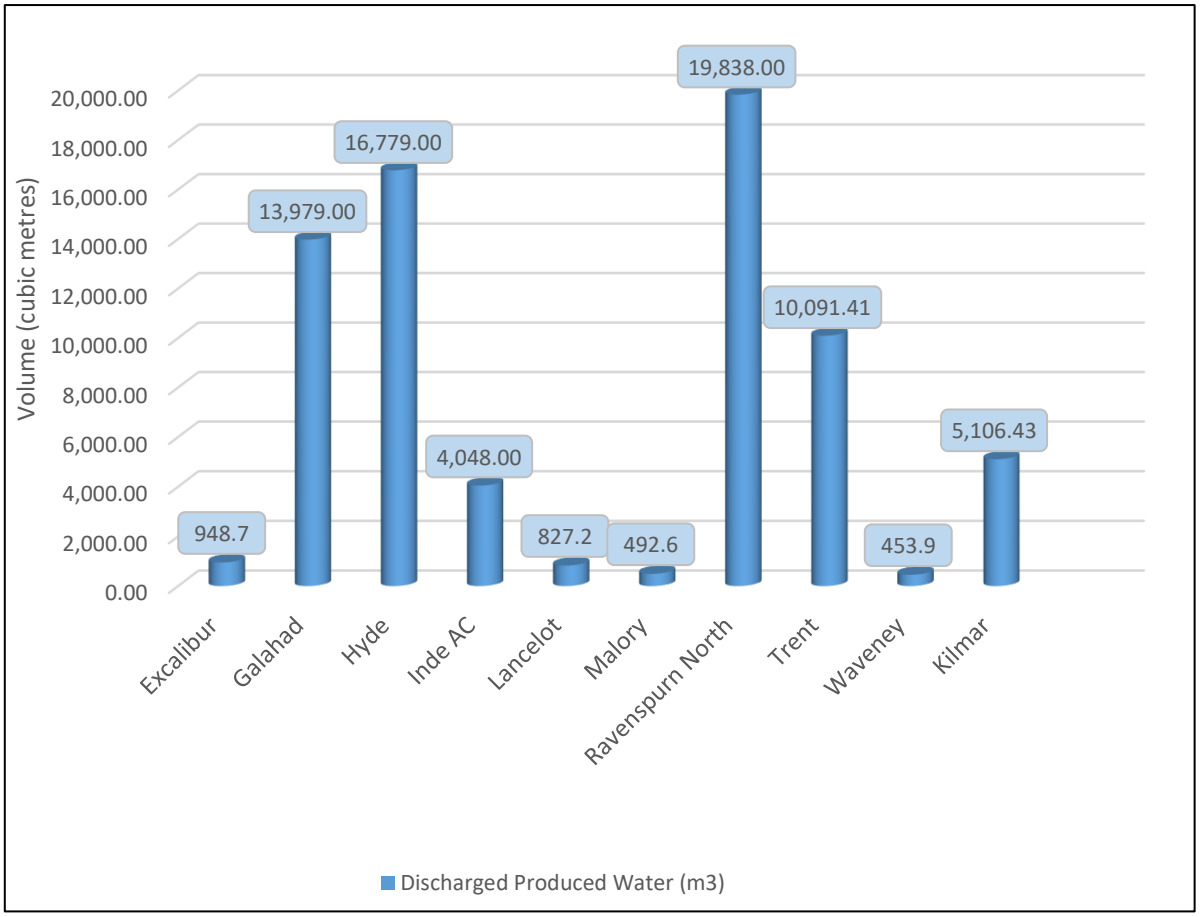


Figure.25 Produced Water by Asset (2019)

Overall the total volume of hydrocarbons being discharged to sea is decreasing. Through decommissioing we are reducing the number of platforms that operate with a discharge to sea and using produced water reinjection systems where possible. In addition to this, as the fields are maturing the recovery of hydrocarbons is decreasing meaning there are less discharges containing oil to sea.

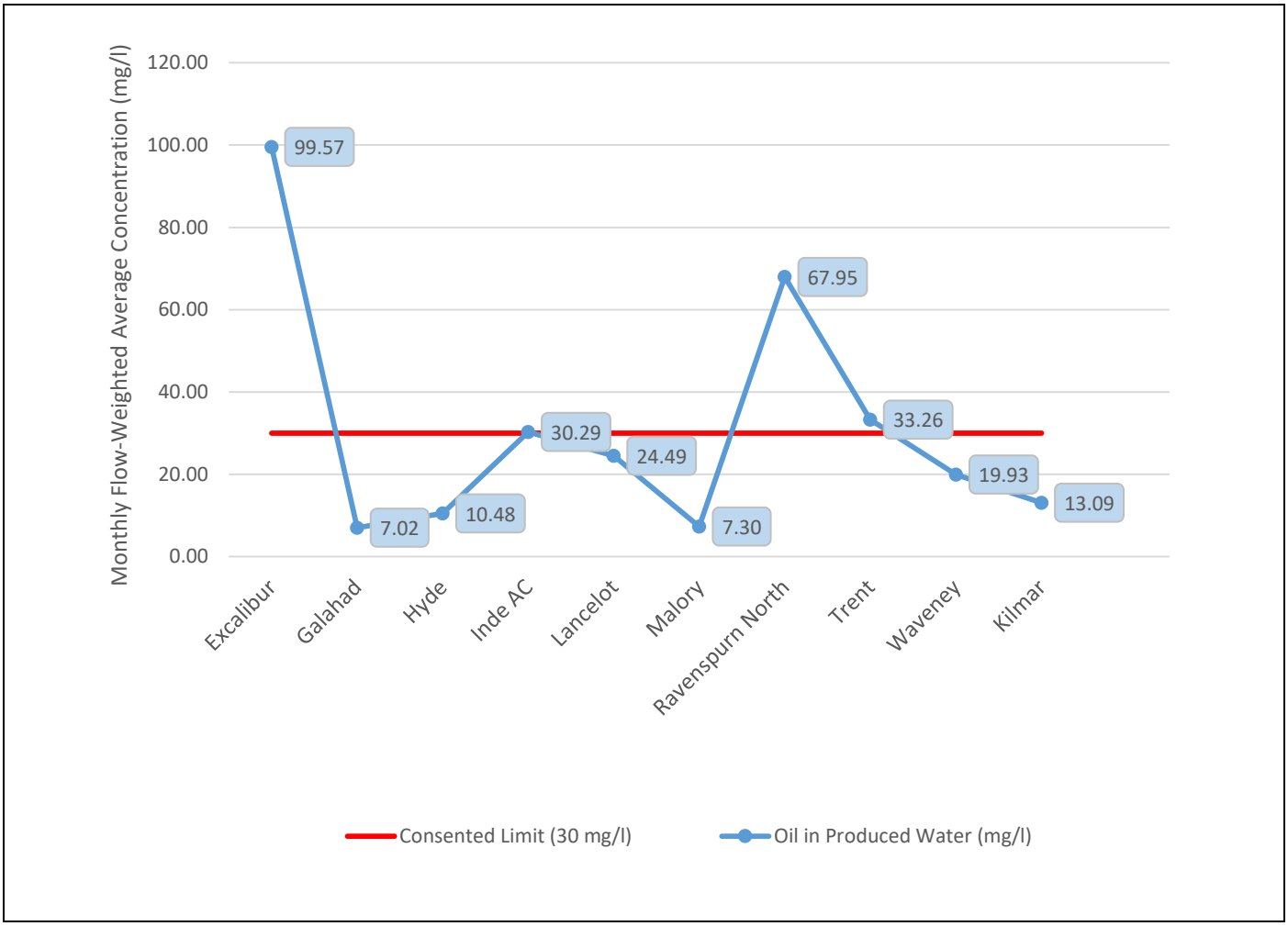


Figure.26 Monthly Oil in Produced Water vs. Consented Limit (2019)

During 2019, the monthly flow-weighted average concentration of oil in produced water for the majority of our SNS assets was below the consented limit (30 mg/l). However, this limit was exceeded at four of our assets (Inde, Trent, Excalibur and Ravenspurn North (Johnston tie back)). The reason for this exceedance is provided below.

Inde

The SEREP tower number two was not working correctly, the filter medium (beads) were washed out, thus not filtering the produced water. In addition, the fuel gas compressor was being drained on a regular basis. This system contains a high percentage of condensate in the oil. We have now modified the way the system is run to rectify this.

Trent

Liquid handling issues were encountered from a well feeding into the Trent platform impacting the de-watering package. A level indicator fault resulted in the de-watering package being bypassed meaning Trent handled a higher volume of process liquids. This increase caused the retention time of the process water to be less and resulted in an elevated result being recorded.

Excalibur

Condensate and produced water Level Control systems were identified as possible contributors to the elevated oil in water concentrations encountered in 2019 and were subsequently overhauled during the annual shutdown period.

Ravenspurn North (Johnson)

The Ravenspurn North Johnson Tie-In had a non-compliance for exceeding the permitted limit (30 mg/l) of oil in water concentration. The Johnston coalescer is oversized for the amount of water and therefore does not operate effectively. The remedial works carried out on Johnston well J6 by Premier Oil to ensure well flow creates a large amount of produced water. Insufficient separation causes an emulsion to be formed within the produced water, resulting in high readings. Occasional excursions of this produced water occurs when the well is brought online after resting and a slug of liquid is received. Normal operation is to process all produced water through the Ravenspurn North system, however both Ravenspurn North and Johnson have historically discharged produced water which was a far higher level than the 30 mg/l limit set in the permits.

In order to improve performance, further modifications to the produced water process are being commissioned. The new oily water treatment package consists of a bespoke filtration system with coalescer as a further means of removing hydrocarbons.

Accidental Releases

As spills at sea can have consequences for the marine environment, PUK SNS work to minimise the risk with a focus on prevention. We have BEIS OPRED approved oil emergency pollution plans (OPEPS) in place across all our assets.

The Oil Pollution and Control Regulations apply to hydrocarbon and chemical spills to sea and these have to be reported and are subject to detailed investigation to ascertain the cause and prevent recurrence. A total of 22 spills were reported during 2019. Brief details of the hydrocarbon and chemical spills are provided in Table 2. Figure 27 shows the majority of substances spilt were chemicals (95 percent) and approximately 70% of the chemical releases were from one source, a passing valve on a subsea control module (SCM) on the third party Johnston field, a subsea tieback to the Ravenspurn North Hub. The faulty SCM has since been changed out.

Table.2 details of 2019 Hydrocarbon and Chemical Spills

Location	Description	Hydrocarbon (kg)	Chemical (kg)
Cleeton Hub	Unknown. Possible hose leak or sticking vent valve.	0	300
	Common LP dump valve is permanently passing.	0	950
	Failure of vent and plug on instrument manifold.	0	38
	Unknown at present but suspect a passing and relieving control regulator.	0	2055
Hoton	Solenoid may not be fully engaging allowing a leak path via the return line which goes into the platform caisson.	0	240
Inde Hub	Firewater pump diesel tank overflow.	0.02	0
	Valve in incorrect position resulting in spill to vessel deck.	20	0
	Crane hose failure.	5.08	0
Johnston	Pipeline Leak.	0.001	0
Lancelot	Hydraulic supply hose (connected to the Well G8) ruptured.	406	0
Leman	Crack in weld on redundant pipeline leaking residual oil remaining in pipeline.	1.01	0
	Condensate line suffered integrity compromise.	113	0
	Standby vessel backed over diesel bunkering hose during bunkering operations.	111	0
	Failure of the diaphragm seals on a Differential Pressure (DP) transmitter.	0	70
Neptune	Leak from annulus.	0.002	0
Pickerill	Oil leak from gearbox shaft.	0.86	0
	Unconfirmed.	0.001	0
Ravenspurn	Faulty component on the subsea system (Johnston).	0	10885.7
	Leak from 1/4" small bore tube fitting to pressure gauge.	0	215
Thames	Damaged Subsea hydraulic line on subsea equipment.	91	0
Thames	Cutting of Conductor during decommissioning.	0.002	0
West Sole	Controlled testing of umbilical cores to try and ascertain integrity.	0	40
TOTALS		747.976	14793.7

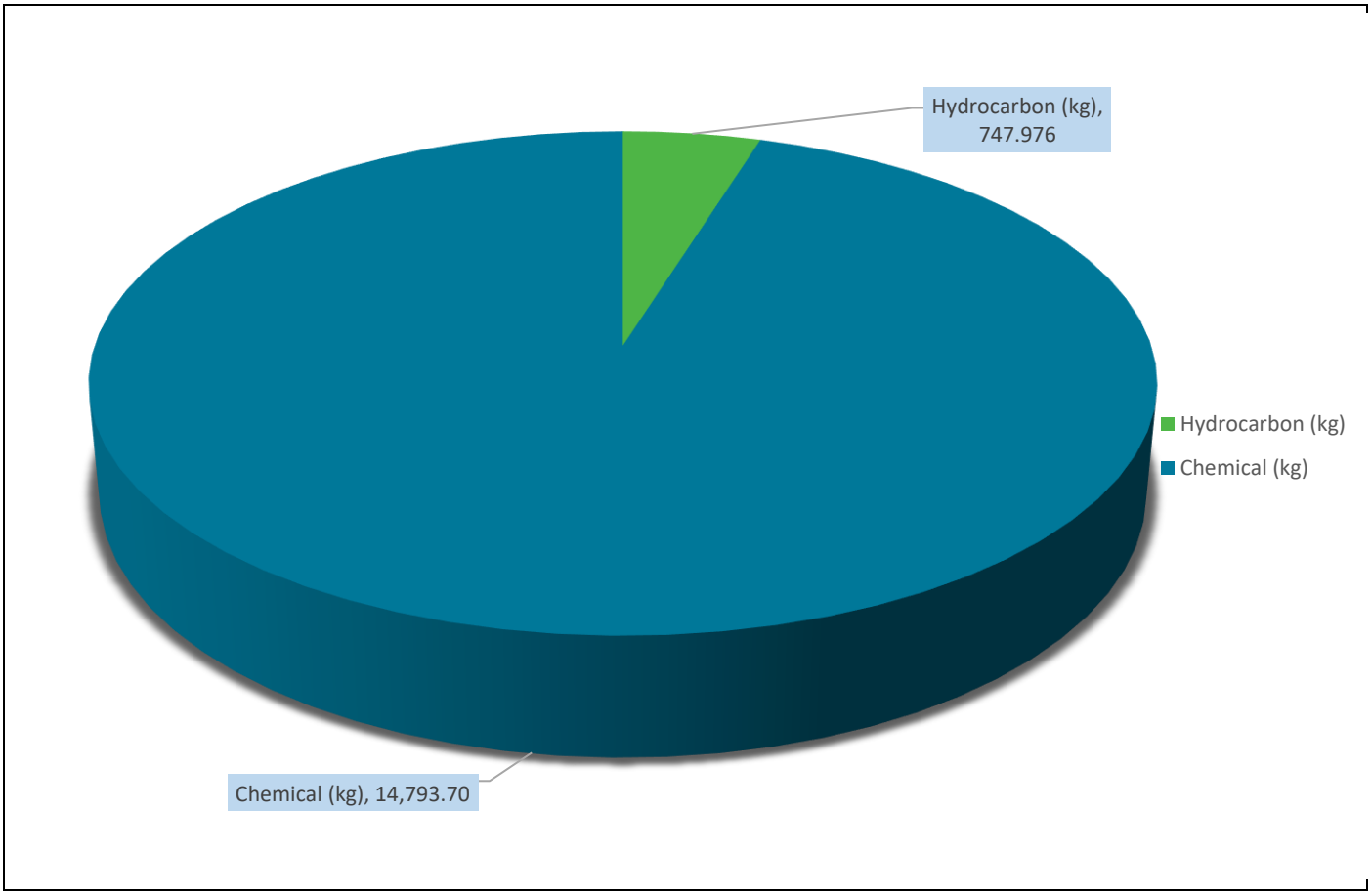


Figure.27 Chemical Spills Hydrocarbon vs. Chemical (2019)

PERFORMANCE AGAINST ENVIRONMENTAL OBJECTIVES

Each year PUK SNS set environmental objectives to ensure we are continually improving our environmental performance, in line with the requirements of ISO14001 2015. In 2019 the majority of our objectives were met, approx. 75%, the progress we have made against each is outlined in Table 3 below.

Table.3 Environmental Objectives 2019

Overall Objective	Action	Progress	Status
Improving compliance through visibility and of data and non-compliances.	Formalise the reporting of F-Gases into an online system 'Tracker'.	Tracker is now used for FGAS	Complete
	Complete the feasibility study for moving all atmospheric emissions data to the online 'Tracker' system.	This is considered feasible. Implementation project ongoing for 2020	Complete
	Formalise the reporting of waste into an online system 'Tracker'.	Tracker is now used for Waste	Complete
	Develop and implement a system for tracking regulatory non-compliance (OPPC/ OCR/ waste).	System is currently being developed	Ongoing
To ensure that the environmental training requirements are fit for purpose and targeted for most impact.	Review the training offer and develop an offshore awareness training package with HR.	Training requirements were identified during 2019	Ongoing
Improve the water quality at Bacton to move towards discharge within the regulatory limits	Complete the small projects at Bacton (wash-down pit; maintenance of interceptor; flushing of infrastructure) to enable the site to 'not exceed' water emissions limits.	**Wash-down Bay** Existing wash-down bay now sealed from site drainage. Several wash-down pit designs obtained. New location selected. **Infrastructure** 3 phase separator cleaned during LAPS shutdown.	Complete

		External sampling and analysis undertaken to determine Bio-digester efficiency and potential contributions to poor water quality. Biological additives now in use to increase efficacy. Drain surveys and repairs undertaken for main site and Annex. Site interceptors' undergone extensive drain down and cleaning process. Oily Water Skimmer pits drained down, cleaned and integrity assessed. **Water Treatment Project** Several technological solutions were explored. An in-depth feasibility study undertaken to assess viability. Due to reducing produced waters volumes the proposed options were not financially viable. Assessment of individual incoming produced water stream continues.	
To make sustainable improvements within the supply chain.	Review the current procurement strategy and integrate sustainable considerations into the existing company procurement strategy.	Sustainable procurement policy developed and now in use.	Complete
	Undertake 4 supply chain audits with high risk E or regulatory compliance in line with QA Supplier Procedure.	4 audits completed and reports issued.	Complete

ENVIRONMENTAL OBJECTIVES AND TARGETS FOR 2020

Table.4 2020 Environmental Objectives and Targets

Business Objective	Overall Objective	Aspect
Extending the field life whilst Maximising Economic Recovery (MER) in line with the UK Net Zero Strategy	Delivery of the Southern Hub Asset Rationalisation Project (SHARP) project detailed define phase. (Note: SHARP is the removal of two inefficient compression hubs and replace with one, fit for size, compression facility).	Air Emissions
	Identification of behavioural and operational changes to drive efficiency/ limit emissions (CO2 equivalent) on the Northern Hub manned platforms and terminals.	Air Emissions
	Establish an understanding of sources of methane emissions (both in design and fugitive) on manned platforms and terminals	Air Emissions