



UK ENVIRONMENTAL STATEMENT 2017



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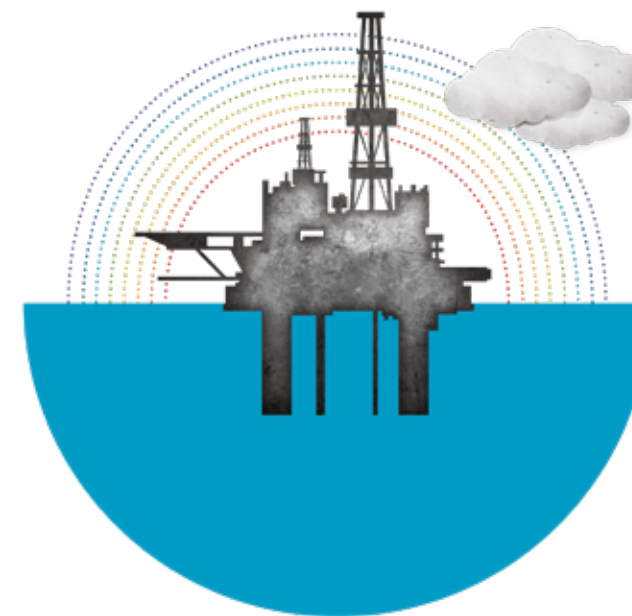
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At TAQA, we are committed to world-class health, safety, security, environmental and quality (HSSEQ) performance. We work to respect the natural environment and to achieve our goals of ensuring that no harm comes to people; to providing a safe, secure workplace; and carrying-out our activities with minimal impact on the environment. Our commitment to safe and incident-free operations goes hand-in-hand with improved operational reliability, lower costs and higher productivity.





Introduction

Welcome to TAQA's 2017 Environmental Statement

I am pleased to present the 2017 Environmental Statement for TAQA's UK business. At TAQA, we are committed to world-class health, safety, security, environmental and quality (HSSEQ) performance.

As a result 2017 saw some significant work taking place to ensure the integrity of our assets with planned shutdowns across our northern North Sea assets. Some major milestones were achieved during this period, including the successful completion of the Direct Export project on Cormorant Alpha, with oil now being transported directly to Sullom Voe terminal, eliminating risks posed by potential integrity issues in the pipework associated with the oil storage system. In addition, a bypass project, successfully completed in late 2017, now redirects production from the Otter field - which previously produced to TAQA's Eider platform - to TAQA's North Cormorant platform. We are now moving forward with the transition of Eider to a utility platform during 2018. This new mode of operation ensures continued production from the Otter field and extends the life of our oil and gas fields in the northern North Sea.

In 2017 we saw some positive results across the main environmental impacts including decreased CO₂ emissions, reduced permitted discharges to sea, less diesel usage and also a reduced number of spills to sea reported. There was an increase in waste recycled on our assets (mainly attributed to scrap metal), however decreased availability of Waste-to-Energy (WtE) led to a small increase in waste sent to landfill. Flaring and venting performance was also well below consent limits on all assets in 2017, showing good operational management to meet targets.

Despite the positive trends highlighted above we recognise that we can reduce our impact to the environment further through continual improvements driven by work to transition our environmental management system to the ISO 14001 2015 standard, which is progressing well into 2018. We continue to implement the best possible environmental practices and processes by utilising Best Available Techniques (BAT) and, in addition, identify potential environmental issues and share and implement lessons learned as activity increases.

Our procedures for dealing with a large-scale environmental incident were also given a formal seal of approval. The Secretary of State Representative (SOSREP) major oil spill exercise (a three yearly occurrence) took place in November, and following input and support from all levels of the business the exercise was successfully executed to meet the regulator requirements.

Sustainability continues to be a key business focus at TAQA and this goes hand in hand with good environmental performance. We will continue to make this a priority and look at new ways to improve or further reduce our impact on the environment to ensure a safe and successful future in the UKCS.



“
Sustainability continues to be a key business focus at TAQA and this goes hand in hand with good environmental performance.
”

Donald Taylor

Donald Taylor
Managing Director, TAQA Europe

Health, Safety, Security & Environment Policy

The health, safety and security of our employees, contractors and the public is our highest priority; it is more important than any operational priority.

We must also:

- Ensure that our assets are operated safely
- Assure the integrity of our assets
- Respect, protect and understand the natural environment

HSSE = Health, Personal Safety, Major Accident Prevention, Security and Environment

We strongly believe that excellent business performance requires excellent HSSE performance – we recognise this as a core value.



Employees and contractors are required to focus on these four areas:

Leadership

- Everyone within TAQA understands their accountabilities for the management of HSSE
- The structure and resources necessary to achieve and measure HSSE accountabilities are provided
- Requirements of applicable legislation and standards are identified, understood and complied with
- Personnel have the required competencies and are fit for work
- Our workforce is aligned, involved and empowered in the identification and management of HSSE hazards and the achievement of our HSSE goals
- Key stakeholder groups are identified and a good working relationship is maintained with them (understanding and addressing their issues and concerns)
- Everyone within TAQA demonstrates commitment and accountability to implement this policy and to work in accordance with the TAQA Management System Elements and Expectations

Operational Risk Identification and Assessment

- Risks are identified, assessed and appropriately managed
- Information required to support safe operation is identified, accurate, available and up to date

Operational Risk Management

- The standards, procedures and operating manuals required to support project, maintenance and operational activities are identified, developed, understood and consistently applied
- Process and operational status monitoring and handover requirements are defined, understood and carried out
- Operational interfaces with third parties are identified, assessed and appropriately managed
- Risks arising from any form of change are systematically identified, assessed and managed
- A systematic process is in place to verify the safe condition of plant and equipment and to ensure that personnel are appropriately prepared (before start-up or return to normal operations)
- We are appropriately prepared for all necessary actions which may be required for the protection of the public, personnel (including contractors), the environment, plant equipment and reputation in the event of an incident
- We aim to prevent pollution and protect the environment from the impact of our operations

Review and Improvement

- We routinely monitor our activities through internal/ external audits and produce key performance indicators – we review these indicators and intervene as necessary
- Compliance with our expectations is routinely reviewed and audited to determine whether this policy remains appropriate and is being implemented effectively
- The management system is routinely reviewed for continual improvement and to enhance HSSE performance
- All incidents, near misses and opportunities for improvement are consistently reported and investigated, and that identified actions and learnings are implemented on a timely basis

We all have a personal responsibility to work safely and protect the environment. We are all safety leaders, irrespective of our role or location. Everyone is empowered to challenge and stop work if they are in any doubt regarding a job they are involved in or observing.

Donald Taylor
Managing Director

René Zwanepol
NL Country Manager

Neil Fowler
HSSEQ Director

Sandy Hutchison
Legal, Commercial and Business Services Director

Helen Stuart
Human Resources Director

David Gibson
Technical Director

Calum Riddell
Operations Director

Iain Lewis
Finance Director



North Sea Operations



Abu Dhabi National Energy Company PJSC (known as TAQA)

TAQA, meaning energy in Arabic, is the brand name of Abu Dhabi National Energy Company PJSC. TAQA is an international energy and water company listed on the Abu Dhabi Securities Exchange. TAQA strives to be safe and sustainable, and embrace the challenge of delivering affordable and reliable energy and water. TAQA is proud to align its strategy with Abu Dhabi's Economic Vision 2030, a roadmap for a sustainable economy with a focus on knowledge-based industry. TAQA's interests lie in conventional and alternative power generation, water desalination, oil and gas exploration and production, pipelines and gas storage. TAQA operates in Canada, Ghana, India, Iraq, Morocco, the Netherlands, Oman, Saudi Arabia, the United Arab Emirates, the United Kingdom and the United States.



TAQA in the UK

TAQA's UK business was incorporated in 2006 and is a wholly owned subsidiary of Abu Dhabi National Energy Company. Since acquiring its first North Sea interests in 2007, TAQA has created a business which is now ranked amongst the top exploration and production companies in the UK North Sea.

The majority of TAQA's UK portfolio is wholly owned and operated. In the northern North Sea it consists of 100% operated equity in the Tern, Kestrel, Eider, Otter, Cormorant North, South Cormorant, Falcon and Pelican fields. It also has a 64.5% operated interest in the Cladhan field, 60% operated interest in the Cormorant East field and a 26.73% non-operated interest in the Hudson field. TAQA has a 24% non-operated interest in the Sullom Voe Terminal and operates the Brent System, where it has a 16% interest.

In the central North Sea TAQA has a 70% operated interest in the Harding field, 70% in the Morrone field, 88.7% in the Devenick field and 37.04% non-operated interest in the Maclure field. In the Brae area TAQA has non-operated interests of 45.7% in Block 16/7a, 50.1% in East Brae and 65% in the Braemar field. It also has an interest in the SAGE pipeline and onshore terminal.



2017 overview

2017 was a milestone year for TAQA in the UK, when we completed the transition into the post-transformation TAQA. We maintained our focus on late life extension of our northern North Sea (NNS) assets, including managing the integrity of our assets, to ensure our safe and successful future in the UKCS.

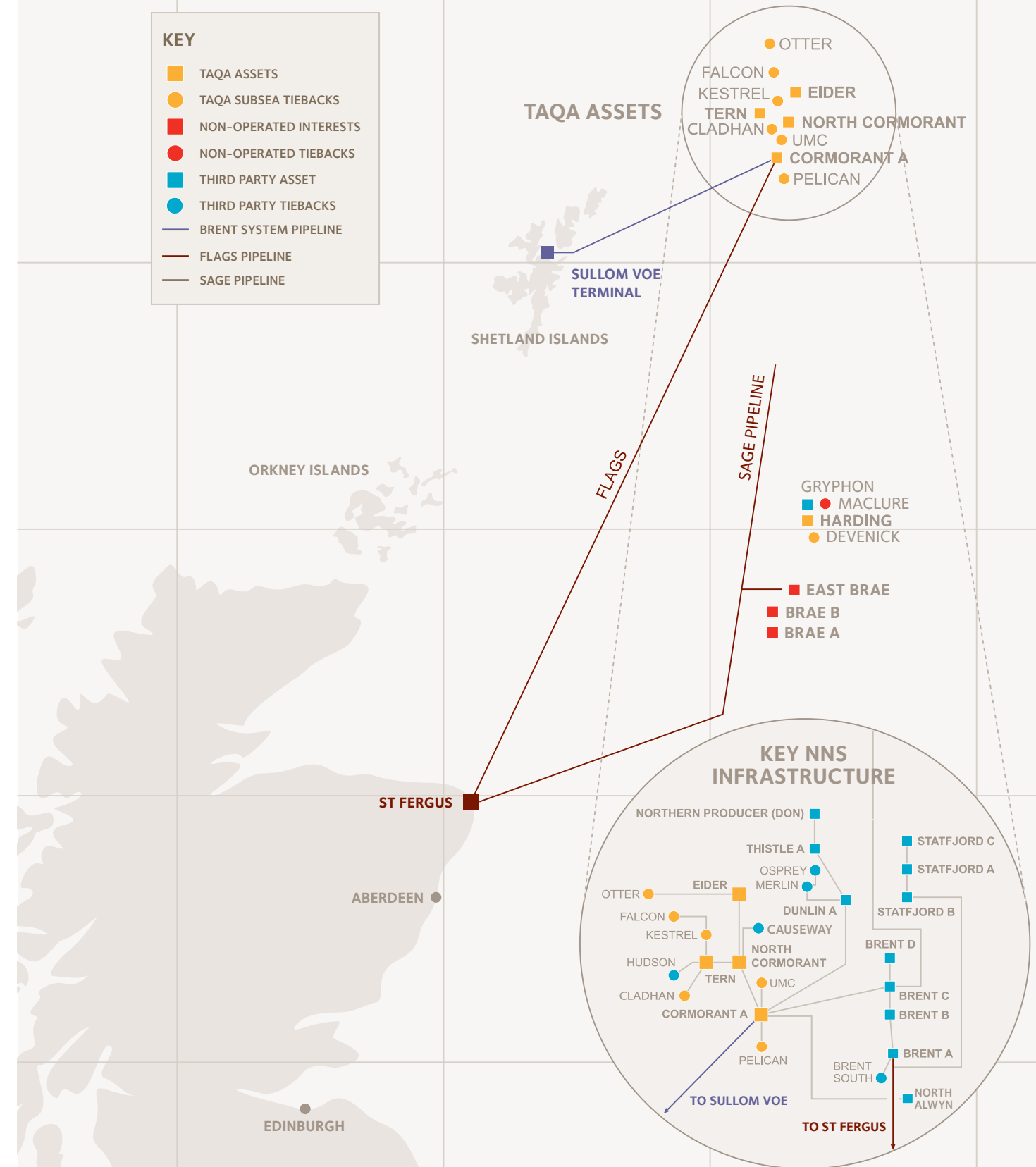
In 2017, production from our Europe operations averaged 46,000 boed. A comprehensive planned shutdown programme got underway in September on Cormorant Alpha, North Cormorant and Eider. Primary tasks were facilitation of the Otter bypass around Eider to North Cormorant, progressing direct export on Cormorant Alpha and integrity related work scopes on all three facilities. In addition, Tern undertook a planned shutdown in July for three weeks. Shutdown performance across our assets was exceptional, helping us to achieve 2017 operated and non-operated production volumes very close to our target. Only the December shutdown of the Forties Pipeline System prevented us from achieving it.

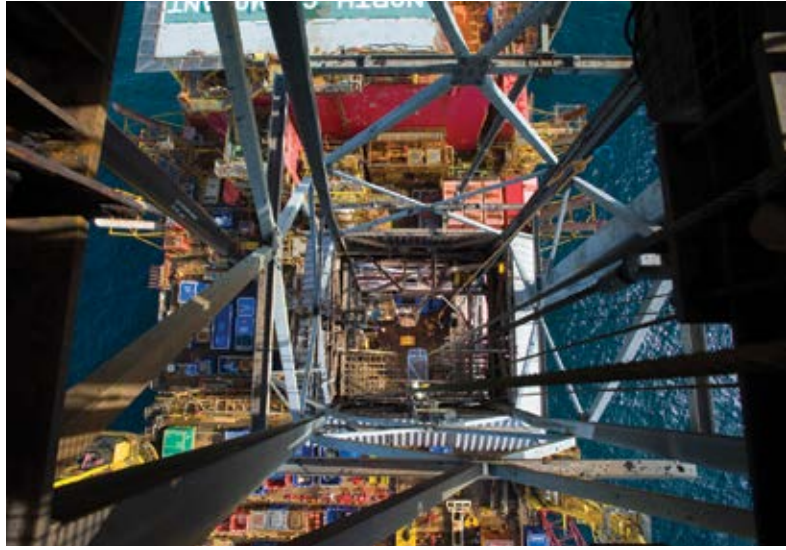
As part of our strategy to maximise economic recovery and extend the life of our oil and gas fields in the northern North Sea (NNS), work began in 2017 to ensure continued production from TAQA's Otter field. A bypass project, successfully completed in late 2017, now redirects production from the Otter field – which previously produced to Eider – to the TAQA-operated North Cormorant platform. Additionally, the late-life extension strategy involves converting the TAQA-operated Eider Alpha platform – which is no longer economically viable as a production platform – into a utility platform. As a result, the life of both the Otter field and the North Cormorant platform wells are being extended.

Furthermore, a project to address an integrity risk at Cormorant Alpha was also completed in 2017. Following the multi-faceted project that took the storage cells at Cormorant Alpha out of commission, all hydrocarbons are now directly exported to Sullom Voe terminal in the Shetland Isles. The project was

devised and executed to eliminate risks posed by potential integrity issues in the pipework associated with the oil storage system. The reconfigured export systems started up in October 2017.

The drilling rig WilPhoenix was deployed on our Sturgeon exploration well, before performing plug and abandonment (P&A) work at Devenick in early 2017. Upfront P&A work took place on six Eider wells. The safe and below budget delivery of phase one enabled the second phase to commence in September 2017 of the full P&A of all 18 wells on Eider. The 2017 wells schedule also included workovers on two aquifer Electronic Submersible Pump (ESP) wells on Harding, that were both completed successfully. In addition, significant well intervention and integrity campaigns were completed on North Cormorant and Cormorant Alpha throughout the year, including downhole safety valve replacements, data acquisition, tree repairs and bringing wells back online.





North Cormorant

Position:
177km (110 miles) north-east of Lerwick, Shetland

Block number:
211/21a

Operator/Duty Holder:
TAQA

Equity:
100% TAQA

Discovery date:
August 1974

Water depth:
161m (528ft)

Est ultimate recovery:
Approx. 461 million barrels of oil (61 million tonnes)

Reservoir depth:
2710m (8900ft)

Producing horizon:
Middle Jurassic

Oil production:
Via Brent System

Storage capacity:
Nil

Type of installation:
8 legged steel jacket

Function:
North Cormorant is a drilling and production facility for the North Cormorant field. Oil and gas is imported from Eider before being separated and processed via the North Cormorant process facilities. The oil is then routed to Cormorant Alpha for onward transmission through the Brent System to Sullom Voe Terminal.

Since 2012 the North Cormorant platform is also a production facility for the TAQA Cormorant East field and the third party Causeway and Fionn fields.

Associated gas, and gas imported from Tern, is exported through the Western Leg via Brent A and the Far North Liquids and Associated Gas System (FLAGS) Pipeline to St Fergus Terminal. Crude oil, imported from Tern, is exported to Cormorant Alpha.



Eider

Position:
184km (114 miles) north-east of Lerwick, Shetland

Block number:
211/16a and 211/21a

Operator/Duty Holder:
TAQA

Equity:
100% TAQA

Discovery date:
May 1976

Water depth:
157.5m (517ft)

Est ultimate recovery:
Approx. 109 million barrels of oil (14 million tonnes)

Reservoir depth:
2620 - 2750m (8600 - 9030ft)

A bypass project, successfully completed in late 2017, now redirects production from the Otter field - which previously produced to Eider - to the TAQA-operated North Cormorant platform. Additionally, the late-life extension strategy involves converting the Eider Alpha platform - which ceased production in January 2018 - into a utility platform.

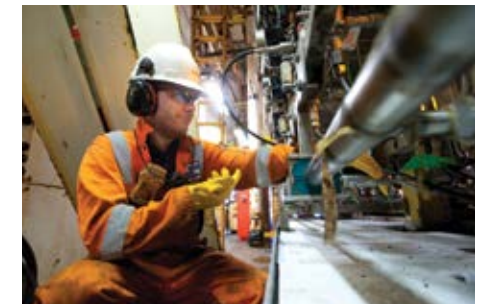
Producing horizon:
Middle Jurassic (Brent) sands

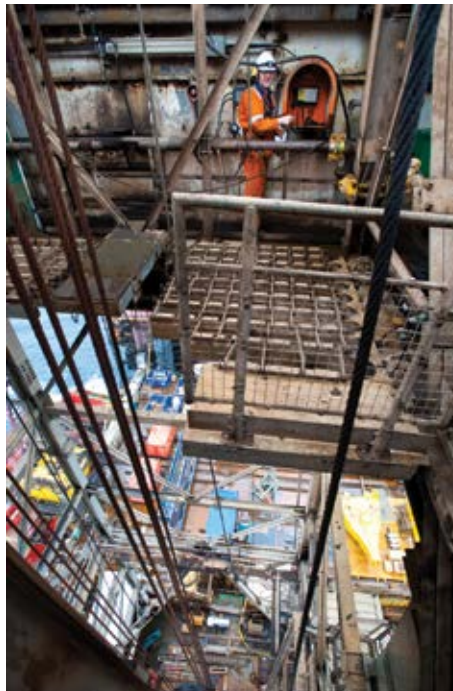
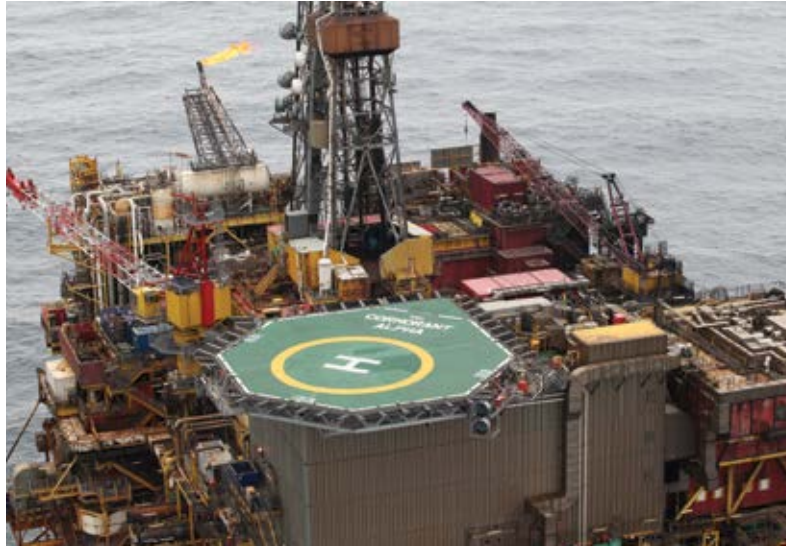
Oil production:
Via Brent System

Storage capacity:
Nil

Type of installation:
8 legged steel jacket

Function:
Eider produces, meters and pumps oil and also operates as an oil producing satellite for the North Cormorant installation. Oil and gas is exported to North Cormorant via a subsea pipeline before being exported via the Brent System to Sullom Voe Terminal. The Eider platform is also an oil and gas production facility for the Otter field.





Cormorant Alpha

Position:
161km (100 miles) north-east of Lerwick, Shetland

Block number:
211/26a

Operator/Duty Holder:
TAQA

Equity:
100% TAQA (not including Brent System owners' interest)

Discovery date:
September 1972

Water depth:
150m (492ft)

Est ultimate recovery:
Approx. 90 million barrels of oil (12.4 million tonnes)

Reservoir depth:
2895m (9500ft)

Producing horizon:
Middle Jurassic (Brent) sands

Oil production:
Via Brent System

Gas production:
Commingled in process separation then via Western leg to FLAGS line to St Fergus.

Storage capacity:
1 million barrels

Type of installation:
Concrete gravity structure – 4 legs

Function:
Cormorant Alpha was designed to drill, produce, meter and pump oil and gas. Cormorant Alpha also receives oil via pipelines from Thistle, Brent C, North Alwyn and North Cormorant platforms as well as from the Underwater Manifold Centre (UMC) and Pelican subsea tie-backs. Oil from Cormorant Alpha is exported to Sullom Voe Terminal in the Shetlands via the Brent System. Gas from Cormorant Alpha also joins the Western Leg Gas Pipeline link to the FLAGS.

Tern

Position:
169km (105 miles) north-east of Lerwick, Shetland

Block number:
210/25a

Operator/Duty Holder:
TAQA

Equity:
100% TAQA

Discovery date:
April 1975

Water depth:
167m (548ft)

Est ultimate recovery:
Approx. 295 million barrels of oil (39 million tonnes)

Reservoir depth:
2440m (8005ft)

Producing horizon:
Middle Jurassic (Brent) Sands

Oil production:
Via Brent System

Gas import/export:
Via Western leg

Storage capacity:
Nil

Type of installation:
8 legged steel jacket

Function:
The Tern platform serves as a production and drilling facility for the Tern, Kestrel, Hudson, Falcon and Cladhan fields. It also provides production, gas lift and water injection facilities for the Hudson field, water injection facilities for the Eider and Kestrel fields and gas lift to the Falcon field. Crude oil is exported to North Cormorant before joining the Brent System via Cormorant Alpha. The separated gas is compressed and used as fuel gas. It is also used as lift gas for Tern, Hudson, Kestrel, and Cladhan production wells.





Harding

Position:
320km (200 miles)
north-east of Aberdeen

Block number:
9/23b

Operator/duty holder:
TAQA

Equity:
70% TAQA
30% Maersk

Discovery date:
1987

Water depth:
110m (330 ft)

Est ultimate recovery:
>250 million barrels of oil

Reservoir depth:
1676.4m (5500ft)

Producing horizon:
Tertiary (Balder)

Oil production:
Oil from Harding is exported via 24-
inch diameter oil export pipeline to a
submerged tanker loading system.

Storage capacity:
600,000 barrels

Type of installation:
Harding is a heavy-duty jack-up
production unit, resting on a gravity
base/storage tank.

Function
The basis of the Harding development is
a large, heavy-duty jack-up platform.
It is a fully integrated drilling and
production platform for the Harding field.
The topsides structure sits on the Gravity
Base Tank (GBT), a reinforced concrete
structure that provides the foundation.
The GBT is also a T-shaped storage tank,
which acts as a large storage tank for
the export of crude oil. Oil production is
exported from the GBT around every 4-6
weeks via a short (2km), 24" pipeline
and submerged Offshore Loading System
(OLS) to shuttle tankers.



Brent System

The Brent System is responsible for transporting
around 75,000 barrels of oil a day from some
26 North Sea fields. This accounts for almost
67% of the oil processed by the Sullom Voe
Terminal and around 5% of UK offshore oil
production.

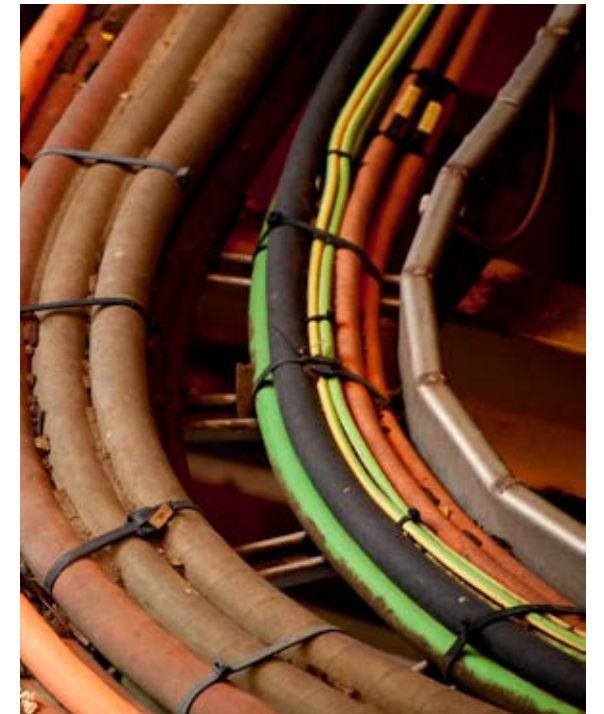
75,000 barrels – Average amount of oil
transported per day.

153km – Transportation distance from
Cormorant Alpha to Sullom Voe.

16% – TAQA interest.

The Brent System is a joint venture between
21 participants who each own a percentage
interest in the system. Brent System consists of
a proportion of the processing system on, and
structure of, the TAQA operated Cormorant
Alpha platform, as well as the 153km pipeline
connecting Cormorant Alpha to the Sullom Voe
Terminal in the Shetland Islands.

TAQA has been operator of the Brent System
since 2009.



TAQA'S HSSE Management System Elements And Expectations

Leadership

01. Leadership Involvement and Responsibility
02. Compliance with Legislation and Standards
03. Employee Competence
04. Workforce Engagement
05. Communication with Stakeholders

Risk Identification and Risk Assessment

06. Hazard Identification and Risk assessment
07. Documentation, Records and Knowledge

Risk Management

08. Operating Manuals and Procedures
09. Process and Operational Status Monitoring and Handover
10. Management of Operational Interfaces
11. Technical Standards
12. Management of Change and Project Management
13. Operational Readiness and Process Start-up
14. Emergency Preparedness
15. Inspection and Maintenance
16. Management of Safety Critical Devices
17. Work Control, Permit to Work and Task Risk Management
18. Contractor Management

Review and Improvement

19. Incident Reporting and Investigation
20. Audit, Assurance and Management Review



TAQA Commitment to Operational Excellence

Health, Safety, Security and Environment (HSSE) Management Programme

TAQA is committed to the pursuit and attainment of a world class health, safety, security and environmental performance. It pledges to respect the natural environment, and to work to achieve its goals of ensuring that no harm comes to people; to provide a safe, secure workplace; and to carry out its activities with minimal impact on the environment. To meet this commitment, TAQA has established an HSSE policy that describes its core principles for HSSE management.

To implement the HSSE programme, TAQA utilises 20 elements and expectations that make up its HSSE Management System. The elements correspond to the "Plan-Do-Check-Act" elements of ISO standards for health, safety, environment and quality management systems.

The HSSE programme ensures that within all of its activities and operations, TAQA will as a minimum:

- Ensure all TAQA leaders demonstrate leadership and commitment to the programme throughout the organization, ensuring that the commitments set out in the HSE Policy are achieved
- Ensure compliance to legislation is maintained, whilst working constructively to influence proposed laws and regulations and debate on emerging issues
- Provide assurance that personnel are competent; that they possess the requisite underpinning working knowledge, understanding, skill & attitude, and clearly demonstrate the ability to routinely undertake the tasks and activities of the designated work roles, safely, consistently & reliably to the minimum defined standard of performance
- Identify key stakeholder groups and develop and maintain a good working relationship with them, understanding and addressing their issues and concerns
- Manage risks by performing comprehensive risk assessments to provide essential decision making information. Develop and implement plans to manage significant risks to an acceptable level
- Identify, maintain and safeguard important information. Ensure personnel can readily access and retrieve information. Required standards and safe working practices are provided to support project, maintenance and operational activities
- Design, construct, install, commission, operate, maintain, assure and decommission all TAQA assets in a healthy, safe, secure, environmentally sound, reliable and efficient manner
- Incidents will be prevented by identifying and minimising workplace and personal health risks, through implementation of robust and effective work control, permit to work and task risk management arrangements. Promote and reinforce all safe behaviours
- Identify all necessary actions to be taken to protect people, the environment, TAQA's assets and reputation in the event of an emergency or security threat
- Maintain operations stability and integrity throughout lifecycle of facility by use of clearly defined and documented operational, maintenance, inspection and corrosion control programs. Seek improvements in process and equipment reliability by systematically eliminating defects and sources of loss. Assessment of the degree to which expectations are met is essential to improve operations Integrity, maintain accountability and reliability
- Ensure that risks and exposures from proposed changes are identified, evaluated and managed to remain within pre-set (design) acceptance criteria
- Ensure contractors and suppliers perform in a manner that is consistent and compatible with TAQA policies and business performance standards. Ensure contracted services and procured materials meet the requirements and expectations of TAQA standards
- Report and investigate all incidents. Learn from incidents and use the information to take corrective action and prevent recurrence
- Confirm that TAQA processes are implemented and assess whether they are working effectively. Measure progress and continually improve towards meeting TAQA HSSE objectives, targets and key performance indicators

Environmental Management System and ISO 14001

TAQA currently operates an Environmental Management System (EMS) which is set out in accordance with the requirements of the ISO 14001:2004 standard. 2018 will see a transition to the new 2015 standard.

The EMS details the environmental aspects of all activities associated with TAQA's offshore operations and onshore offices, including risk ranking and mitigation measures. It also documents the procedures for monitoring and reporting environmental performance and for ensuring that TAQA's activities are in compliance with all relevant environmental legislation. At a location level TAQA's Environmental Management System addresses the following:

- Identifies possible environmental aspects, their consequences and how to control them;
- Identifies processes, roles and responsibilities;
- Oil spill management and response;
- Confirmation of operations to legal, statutory and regulatory requirements.

The EMS provides control of processes or activities which may have a potential environmental impact by means of procedures, instructions, training and education, in addition to assisting with:

- Preventing pollution;
- A systematic approach to working processes;
- Identifying potential or actual problems and finding/ implementing solutions;
- Tracking environmental performance;
- Utilising natural resources effectively;
- Managing legal compliance;
- Improving awareness of workforce.



Key elements of TAQA's EMS

ENVIRONMENTAL ASPECTS - These are elements or activities that may result in a positive or negative impact on the environment. TAQA has an Aspects Register which identifies each operation (activities, products and services) with potentially significant environmental impacts or risks by function. This ensures the risks are addressed by appropriate management systems, objectives and targets, controls and measures.

High significant risk activities and their potential aspects and environmental effects are identified in the Aspects Register.

The impacts of these activities were consequently reduced to medium significance due to various operational controls including:

- **Procedures;**
- **Contractor management;**
- **Inspection and audit;**
- **Design and maintenance;**
- **Physical controls and barriers and**
- **Risk assessment.**

THE HIGH SIGNIFICANCE ACTIVITIES FOR TAQA IN 2017 ARE IDENTIFIED BELOW:

- Use of offshore space due to the **physical presence** of structures and associated subsea infrastructure offshore
- **Discharge of produced water** from process separation operations which contains hydrocarbons, NORM and any added chemicals
- **Atmospheric emissions from process flaring / venting** and possible oil drop out to sea due to flaring operations
- **Generation of waste** including hazardous, NORM and non-hazardous solids and liquids from offshore activities
- **Power generation leading** to atmospheric emissions (CO, CO₂, NOx and SOx, CH₄, soot) from diesel and fuel gas use
- Bulk fluid transfer, handling and storage (**oil and chemicals**) resulting in potential loss of containment
- Operation of **subsea control systems** resulting in hydraulic fluid discharges
- **Chemical use** during operations including the manufacture, storage, use and discharge of chemicals.
- Hydrocarbon extraction and **use of finite resource**
- **Storage and export of hydrocarbons** with potential for uncontrolled loss of hydrocarbon leading to water pollution
- Routine operation of **Mobile Drilling Unit** and use of **resources** with physical presence resulting in potential **noise and vibration, emissions** from power generation, **fugitive emissions, chemical** use and discharge and **waste** generation
- Return of **drill cuttings for onshore treatment and disposal. Discharge of cuttings and cement** to sea
- **Drill fluid usage** and changes during mud during operations resulting in potential release of OBM to sea

LEGAL REQUIREMENTS - Identification of applicable legal regulations is an integral part of the Environmental Management System.

OBJECTIVES, TARGETS AND PROGRAMMES - The TAQA 'Objectives and Targets List' with respect to environmental performance is reviewed annually then translated into plans and programmes to ensure effective and successful implementation.

TRAINING, AWARENESS AND COMPETENCE - Periodic training and awareness are cornerstones of the TAQA Learning and Development Programme.

COMMUNICATION - Effective external and internal communication of environmental issues by TAQA contributes to the success of the EMS. This is carried out internally through regular meetings and offshore visits and externally with authorities and third parties.

DOCUMENT CONTROL - All EMS documentation is systematically managed to ensure it is up to date, accurate and complied with.

OPERATIONAL CONTROL - TAQA's procedures are set up to minimise and control the impact of environmental aspects.

EMERGENCY PREPAREDNESS AND RESPONSE - Location Oil Pollution Emergency Plans (OPEPs) plans are in place and are designed to effectively manage a wide variety of emergency scenarios.

MONITORING AND MEASUREMENT - All incident reports, such as near misses, incidents and accidents are systematically recorded, root causes identified, lessons reviewed for sharing and preventative/corrective actions are tracked.

AUDITING - Regular auditing ensures the continued effectiveness of the EMS. All internal audits are performed according to the TAQA audit procedure, results are then discussed in cross functional meetings and corrective actions are tracked for progress.

MANAGEMENT REVIEW - Management reviews are crucial to the cycle for continuous improvement. Regular Management Review meetings initiate and evaluate improvement programmes.

ISO 14001

The International Standards Organisation (ISO) is a non-governmental network of global national standards institutes. ISO 14001 is the main management systems specification document in the ISO 14000 series containing the essential elements that must be satisfied by an organisation seeking registration or certification for its Environmental Management System. The backbone of ISO 14001 systems are:

- Senior management support and participation;
- Explicit organisational structures and responsibilities;
- Good communication;
- Competency reviews and training;
- Efficient document management and recording procedures;
- Audit capabilities;
- Regular well planned management reviews;
- Continual improvement and robust corrective action culture.

The ISO 14001 philosophy is based on the **Plan-Do-Check-Act (PDCA)** management model, originally known as the Deming cycle. In continuously going through each individual step, environmental management can result in improved environmental performance.

Plan: tools for identification of targets in environmental performance.

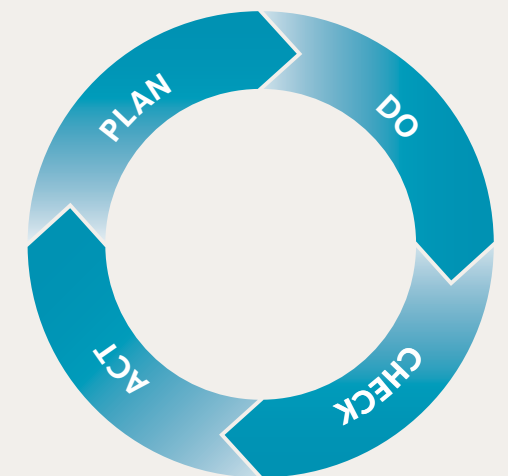
Do: tools for achieving goals of environmental management.

Check: tools for checking the effect of environmental management.

Act: tools for taking effective adjusting measures in environmental management.

The use of the PDCA cycle helps in keeping the environmental management system a continuous process instead of an individual event. This continuous process is illustrated in the graphic opposite. In designing TAQA's Environmental Management System to meet the requirements of ISO 14001, TAQA is effectively optimising the company's opportunity to reduce risk and liability within a structured system while enhancing its commitment to pollution control. Two independent ISO 14001 surveillance audits were undertaken in 2017, both on and offshore. These audits covered all of the elements of ISO 14001. Both audits produced positive results with only two minor findings and a small number of observations identified. TAQA plan to transition to the new ISO 14001 standard in 2018.

“
[The Environmental Management System details the environmental aspects of all activities associated with TAQA's offshore operations and onshore offices, including risk ranking and mitigation measures. It also documents the procedures for monitoring and reporting environmental performance and for ensuring that TAQA 's activities are in compliance with all relevant environmental legislation.](#)
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Environmental Performance



During 2017 TAQA saw the completion of works on Cormorant Alpha to allow direct export of oil to Sullom Voe and the Eider Otter Field bypass to North Cormorant, delivery of planned shutdowns and a continued focus on safe, efficient and sustainable operations.

Atmospheric Emissions

Atmospheric emissions from TAQA's offshore activities arise primarily from the combustion of fuel gas and diesel for power generation and the flaring of associated gas that cannot be used or exported for safety reasons (an integral part of the platform safety systems).

CARBON DIOXIDE EMISSIONS

The Greenhouse Gases Emissions Trading Scheme (Amendment) Regulations (2014) is the statutory mechanism used to regulate and reduce CO₂ emissions to the atmosphere. All TAQA assets account for carbon dioxide (CO₂) emissions by means of the cap and trade system, which allows for an allocated allowance of CO₂ to be emitted and then allowance for all subsequent releases have to be purchased.

The major combustion processes on TAQA's platforms resulting in the production of CO₂ is the generation of electrical power and the compression of gas for transportation to shore. Reservoir gas provides the primary fuel source with diesel acting as back up.

Figure 1 shows the actual (full year) amount of CO₂ emitted in 2017 against the amount of CO₂ emitted in 2016. CO₂ emissions in 2017 were approximately 65% greater than the ETS allowance however they were 4% lower than in 2016. The introduction of ETS Phase III in 2013 saw a significant reduction in allowances which continue to decrease each year. TAQA's overall allowance decreased by 3,763 tonnes, 1.9%, between 2016 and 2017. To account for the deficit between allowance and emissions TAQA purchased additional allowance from the trading scheme.

FIGURE 1: 2017 VS 2016 FULL YEAR CO₂ EMISSIONS

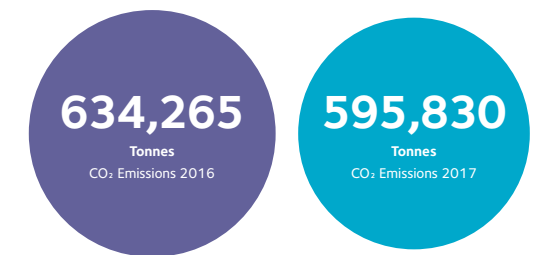


Figure 2 (overleaf) shows that the largest proportion of CO₂ discharge comes from turbine gas usage. The emissions from gas turbines were lower in 2017 compared to 2016. This was due to planned shutdowns on the NNS assets, unplanned outages on Harding and operational efficiencies including management of water injection with a single injector pump used on Cormorant Alpha. CO₂ production from flaring in 2017 was reduced compared to 2016 due mainly to planned shutdowns and gas use / flare purge optimisation.

FIGURE 2: TAQA CO₂ DISCHARGES BY SOURCE

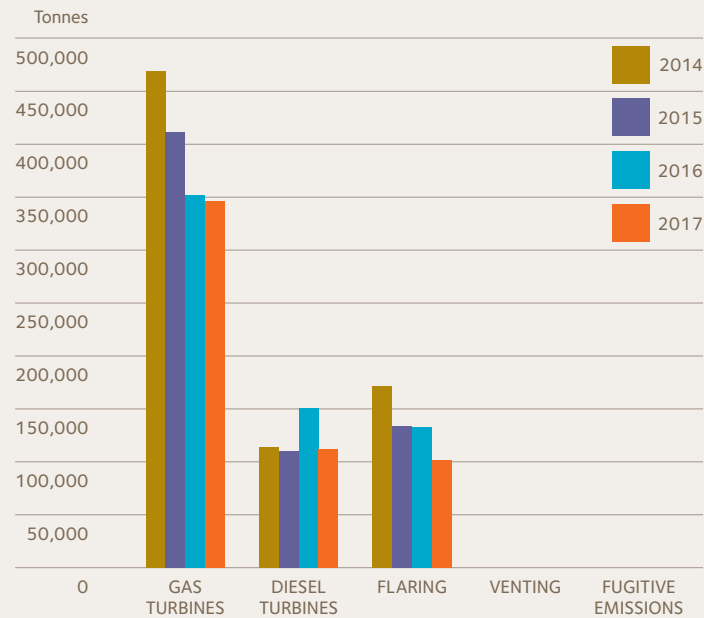
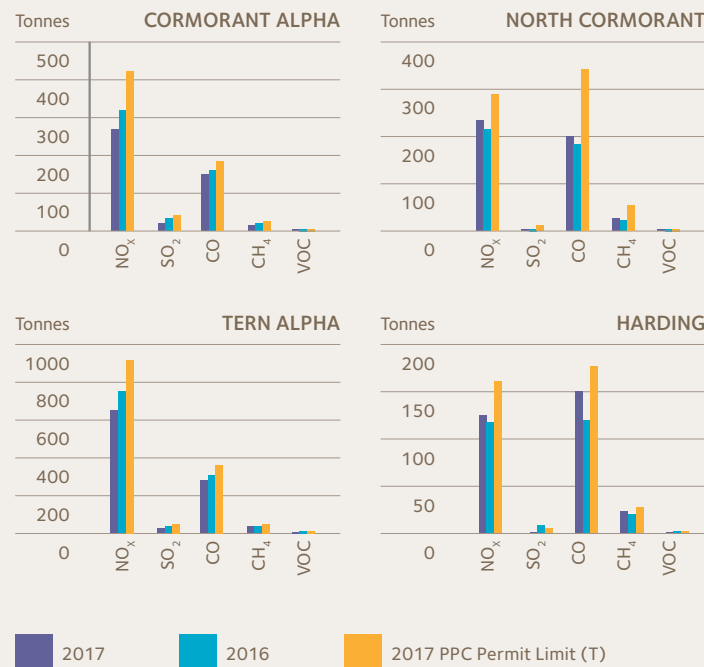


Figure 3: 2017 TAQA ACTUAL NON CO₂ ATMOSPHERIC EMISSIONS VS PERMIT ALLOWANCE



NON CO₂ ATMOSPHERIC EMISSIONS

The main combustion emission from TAQA's operations is carbon dioxide, however smaller emissions of nitrous oxide, sulphur dioxide, carbon monoxide, methane and volatile organic compounds are also produced. Non CO₂ atmospheric emissions from TAQA installations are regulated via legislation covering flare emissions, vent gas emissions and combustion plant emissions.

As shown in Figure 3 all platforms were within the permitted allowance for all non CO₂ atmospheric emissions. However, North Cormorant diesel and fuel gas use increased from 2016 to 2017 and Harding non CO₂ emissions increased in 2017 due to operating two power turbines on diesel during a number of unplanned shutdowns including periods when the gas compressor was not available. Both Tern and Cormorant Alpha had reduced non CO₂ atmospheric emissions in 2017 compared to 2016 mainly due to turbine management and water injection pump optimisation.

It is noted that Eider is the only platform that does not have a PPC permit because the installed combustion plant on board is below the threshold required to hold a permit.

Produced Water

Produced water is created during the extraction of oil and gas from subsurface. The produced water may contain water which has come directly from the reservoir, water injected into the formation to aid the extraction of oil or gas and any chemicals added during the production/treatment process. Oil reservoirs typically produce more water during extraction compared to gas reservoirs and as the reservoirs mature the proportion of water increases. The produced water is separated from the hydrocarbons so it contains dissolved and dispersed hydrocarbons.

The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (OPPC) (as amended) regulate all oil discharges to sea and require that all of these discharges must be permitted by the Offshore Petroleum Regulator for Environmental and Decommissioning (OPRED). OPRED place strict limitations on both the concentration and quantity of oil discharged within the produced water in order to protect the marine environment.

The five TAQA installations report a total of nine individual discharge streams – two on Cormorant Alpha, one on Eider, two on North Cormorant, two on Tern and two on Harding – all of which must meet the legal monthly oil in water discharge average of 30mg/l. The exception to this is the second discharge stream on Harding which comprises of displacement water discharged from the Buffer Cell (during oil production water is displaced through the buffer cell and discharged to sea to a legislative limit of 40mg/l). A third discharge from Tern, the Hudson subsea tieback, is operated by Dana Petroleum; therefore the produced water discharge data is not included in this report.

Reporting discharge streams on an individual basis ensures that a constant focus can be maintained on the quality of each discharge stream via the required sample regime. If any deterioration in quality is observed then subtle process adjustments can be made (e.g. skimming produced water flash drums or changing vessel liquid interface levels) to minimise the overall quantity of dispersed oil being discharged to sea.

Figure 4 shows that the TAQA internal target for average oil in produced water (OIPW) concentration for each discharge stream was met in 2017, except for Cormorant Alpha oily water separator (OWS), Eider and Tern A/B trains. The Cormorant Alpha OWS, Eider and Tern train A and B exceeded the internal targets by 10%, 3%, 12% and 11% respectively. The exceedance on Cormorant Alpha was due to column flushing in the storage cells and on Eider this was due to increased oil throughput versus volume as wells were plugged and abandoned. The Tern exceedances were a result of an increased produced water throughput on both trains compared to previous years due to process optimisation and Cladhan routing through train A.

FIGURE 4: 2017 TAQA ACTUAL OIPW VS TARGET OIPW CONCENTRATIONS

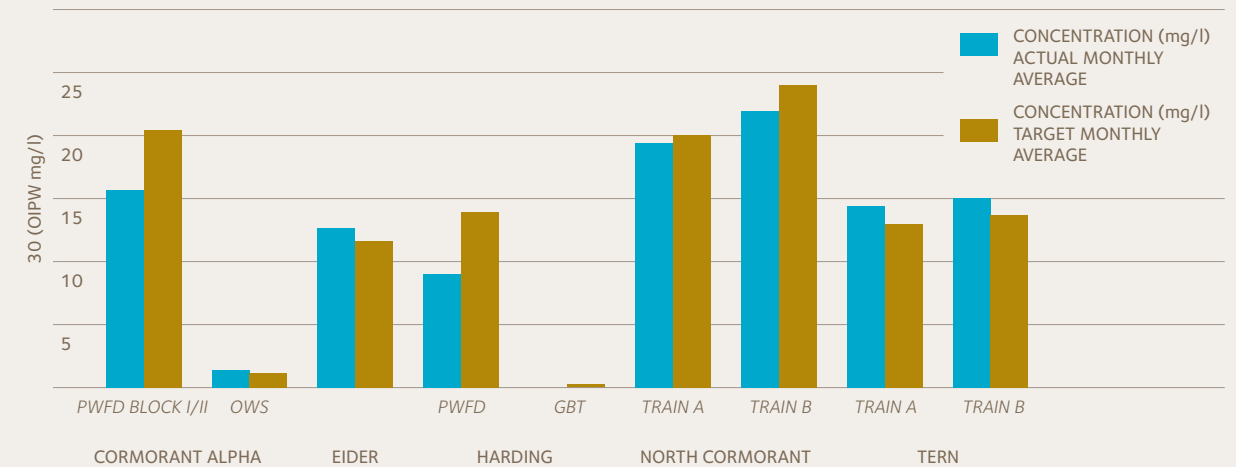


Figure 5 (overleaf) illustrates that all platforms met their internal produced water discharge targets for 2017. 2017 saw a 3% decrease in the volume of discharged produced water compared to 2016, due to platforms undertaking planned and unplanned shutdowns and Eider reduced produced water throughput. Harding is the only platform that has the capability to re-inject produced

water. 2017 saw 98% (4,597,771m³) of the total produced water on Harding being re-injected back into the reservoir which decreases the volume discharged to sea. It is also noted that produced water comprised of 17% of all Harding discharges to sea (93,172m³) with the remaining 83% from displacement water from the Gravity Based Tank (GBT) (451,258m³).

FIGURE 5: TAQA ACTUAL vs TARGET PRODUCED WATER DISCHARGE

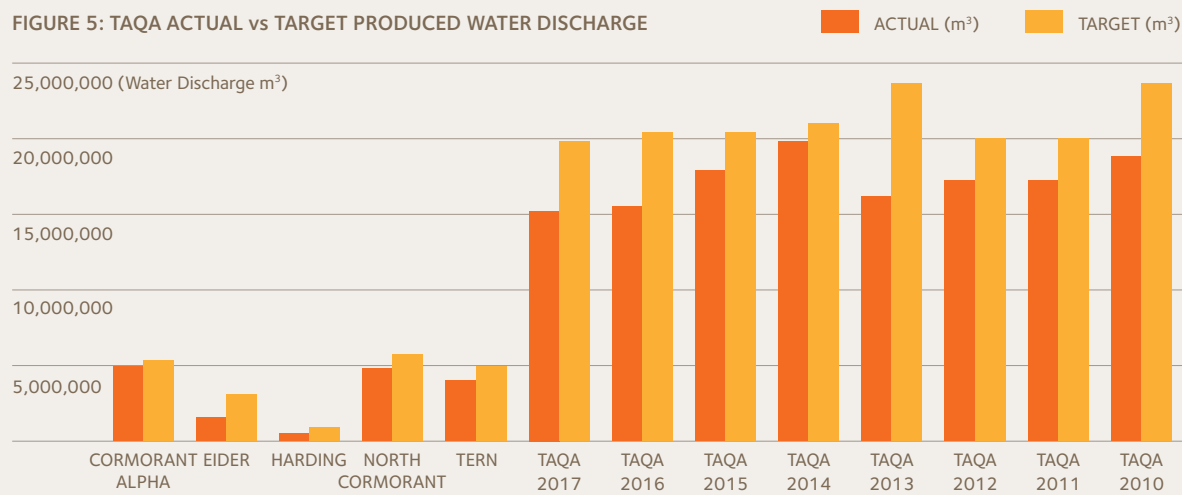


FIGURE 6: TAQA ACTUAL vs TARGET OIL IN PRODUCED WATER

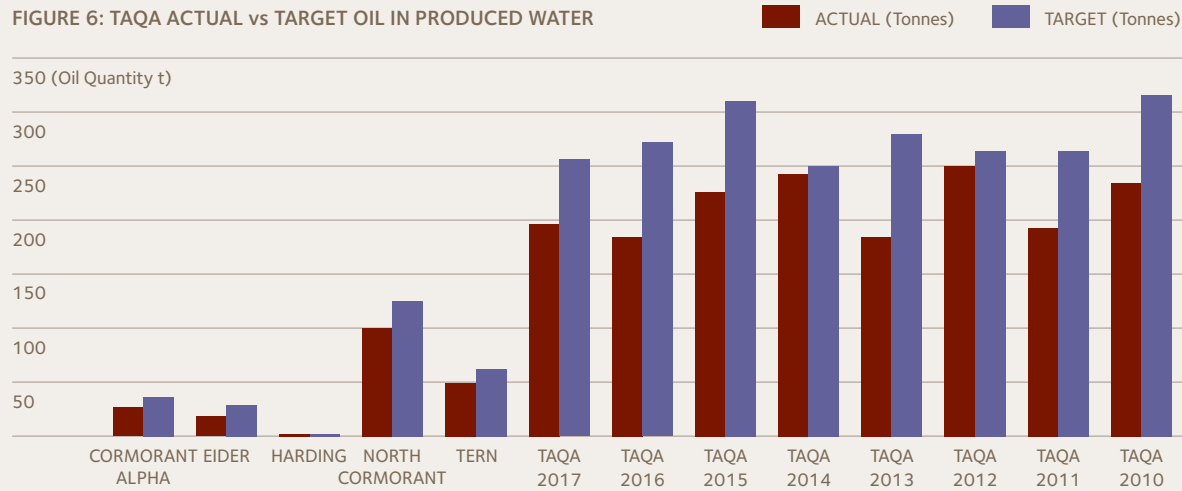


Figure 5 shows that the actual volume of produced water discharged to sea during 2017 met the internal targets for each installation.

Figure 6 shows the actual quantity of oil discharged to sea via produced water for all TAQA platforms during 2017 compared to internal targets. A total of 196.2 tonnes of dispersed oil was discharged to sea which is 22% below the internal target. This is a 14.4 tonne increase from the amount that was discharged in 2016 mainly due to some process instability events and overall decreased separation performance.

In addition to the produced water discharge streams on the installations there were also three additional project based term OPPC permits in place during 2017. The first permit covered the replacement of subsea hoses for the Eider Otter bypass project, where approximately 0.3 Kg of oil was discharge to sea. The two other permits related to well abandonment and coiled tubing operations at Pelican and although an OPPC permit was in place no oily discharges to sea were made.

Waste

A variety of solid and liquid hazardous and non-hazardous wastes are produced from TAQA's offshore operations, including: drill cuttings, waste chemicals, tank washings, waste oil, paper, scrap metal, glass and wood. To ensure legal compliance all TAQA platforms actively segregate their waste which reduces contamination of disposal routes.

The Merchant Shipping (Prevention of Pollution by Garbage) Regulations 1998 prohibits overboard discharge of offshore waste. All waste is therefore segregated offshore and disposed of onshore via a variety of routes including re-use, recycling, Waste-to-Energy (WtE), landfill and incineration.

Figure 7 details the tonnage of TAQA waste going to each disposal route over the last five years. 2017 saw an increase in waste going to landfill due to decreased availability of WtE and waste being reused compared to 2016. It should be noted that the amount of waste sent to WtE is dictated by the capacity of plants handling the waste and this reduced through 2017. Overall the tonnage of waste produced and handled during 2017 was 3010 tonnes, which is approximately a 237% increase on 2016. Approximately 50% of the increase in waste

in 2017 was due to the well abandonments and wet bulk wastes, there was also an increase in project related waste.

Figure 8 gives an overview of the percentages of different waste disposal routes generated by the TAQA offshore across all assets saw a small decrease in 2017 compared to 2016 due to the decreased availability of the WtE site. It is also noted that the MODU was on hire from Q1-Q2 2017 producing operational waste and drilling waste that required landfilled (treated wet and solid bulks).

Annual waste reduction targets for general waste were set for all platforms during 2017. The platform target for 2017 was for a 93% (average) correct segregation of general waste. This was measured by conducting quarterly general waste skip audits. The target was based on continual improvement in waste segregation to ensure that waste is sent to the correct disposal route. The waste reduction targets were met by all of the platforms with the exception of Cormorant Alpha. The waste targets will continue to be based on the effectiveness of waste segregation going forward.

FIGURE 7: TAQA 2017 WASTE DISPOSAL ROUTE COMPARISON (TONNES)

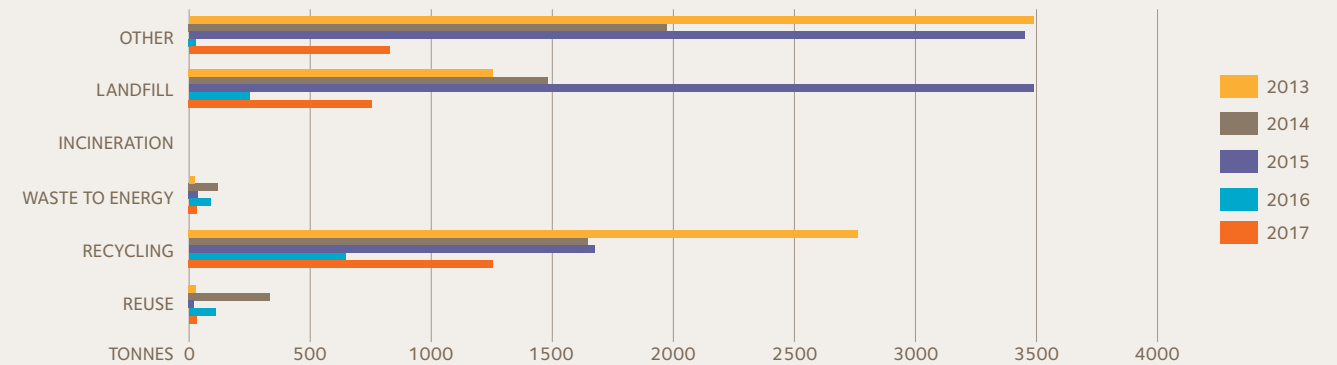
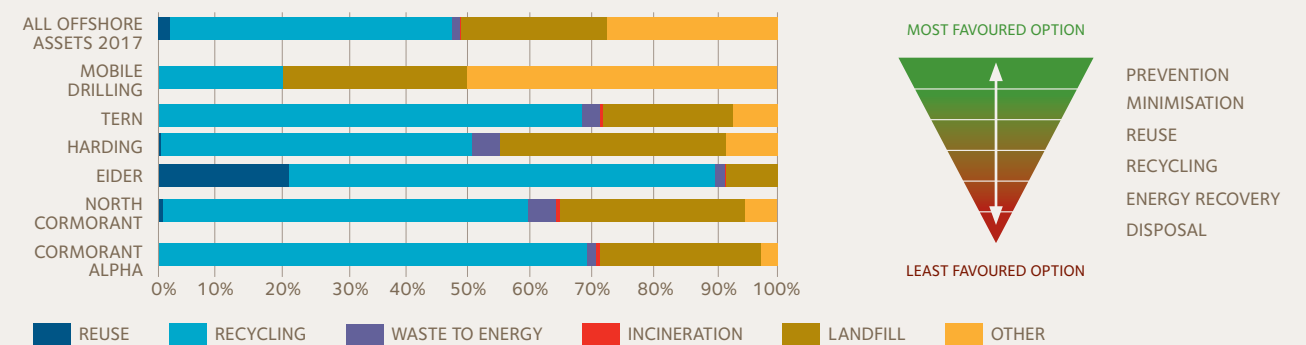
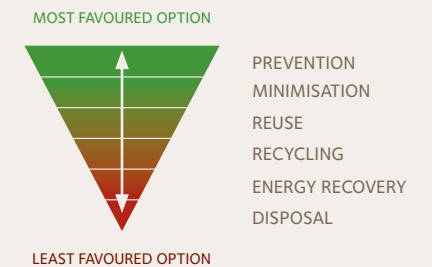


Figure 8: TAQA 2017 WASTE DISPOSAL ROUTE BY LOCATION



TAQA WASTE HIERARCHY



Chemicals

Chemical use and discharge is regulated under the Offshore Chemicals Regulations 2002 (as amended) (OCR). A permit must be obtained from OPRED prior to the use and discharge of chemicals associated with production, drilling, well interventions and pipeline operations offshore.

These permits describe the selection, deployment, discharge route and environmental impact assessment for chemicals that are either used continuously or on an ad-hoc basis.

A key objective of the OCR Regulations is “to identify chemicals that might be considered hazardous and to ensure wherever possible their substitution by less hazardous or non-hazardous chemicals”.

Classification of chemicals is undertaken via the Offshore Chemical Notification Scheme (OCNS). This scheme assigns a substance a risk/hazard category. This is either a colour or a letter (dependent on the method used to model the risk), based on the varying levels of hazard/risk to the receiving environment associated with its discharge (see Table 1).

Table 1 shows the relative quantities of chemicals used and discharged according to their classification under the OCNS. The quantities of chemicals used (5,258 tonnes) and discharged (2,439 tonnes) cover all those used during 2017 for TAQA's installation operations, Eider Otter bypass project, well intervention/abandonment activities and pipeline operations.

A substitution warning is assigned to an offshore chemical if it is considered by CEFAS to be harmful to the environment. i.e. the chemical or one of its components fails to meet set criteria with respect to biodegradation, bioaccumulation potential or toxicity.

It should be noted that of the total 2,439 tonnes of chemicals discharged to sea during 2017, 97% of this was a discharge of either the lowest risk CHARM (Chemical Hazard Assessment and Risk Management) category Gold, or the Non-CHARM lowest risk category E. Furthermore, of the total 2,439 tonnes of chemicals discharged to sea during 2017, only 1.1% was comprised of chemicals which carry a substitution warning.

TABLE 1: 2017 CHEMICAL USAGE AND DISCHARGE QUANTITIES ACCORDING TO OCNS CATEGORY

			TOTAL USAGE (KG)	TOTAL DISCHARGE (KG)
NON-CHARM MODEL CHEMICAL CATEGORISATION	A	HIGH HAZARD	0.00	0.00
	B	↑	0.00	0.00
	C	↓	5,492.56	0.00
	D	POSES LITTLE OR NO RISK	358,631.17	16,070.43
	E		2,785,129.02	918,105.96
CHARM MODEL CHEMICAL CATEGORISATION	PURPLE	HIGH	0.00	0.00
	ORANGE	↑	0.00	0.00
	BLUE	RISK	0.00	0.00
	WHITE		0.00	0.00
	SILVER	↓	80,291.47	41,310.48
	GOLD	LOW	2,028,645.35	1,463,965.54
			5,258,189.57	2,439,452.41

FIGURE 9: 2017 TAQA CHEMICAL USAGE AND DISCHARGE

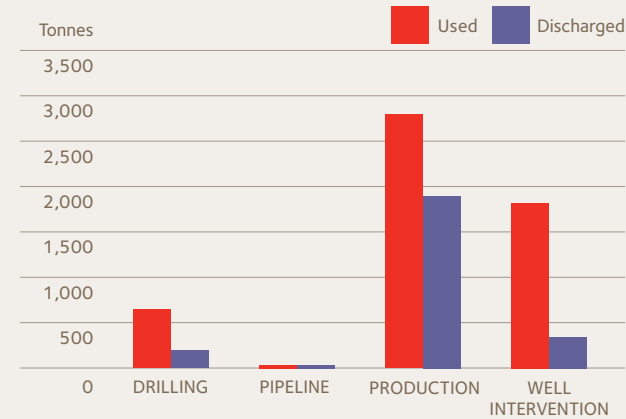
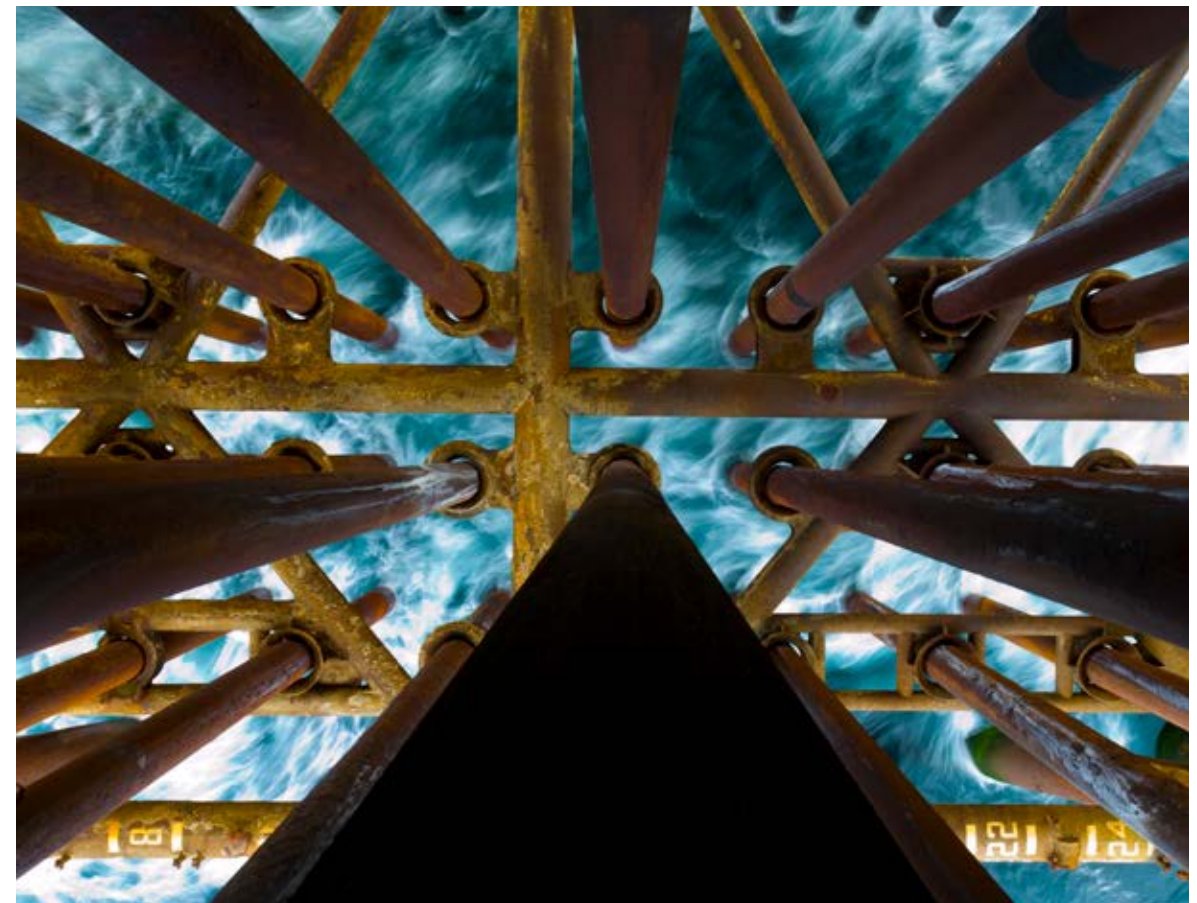
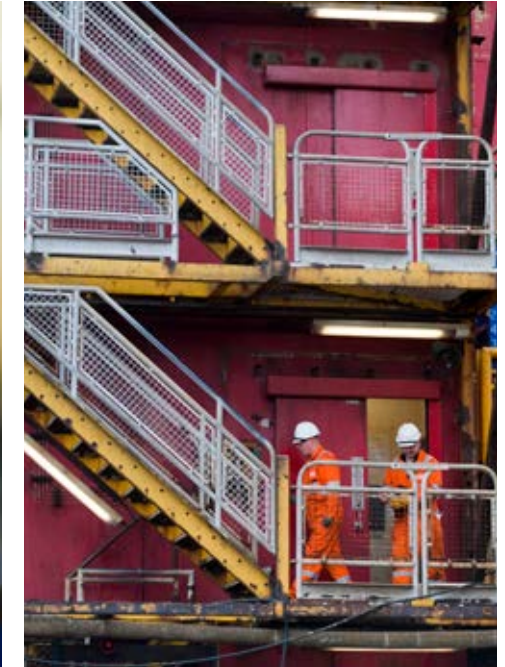


Figure 9 highlights that production operations used the largest amount of chemicals during 2017. Comparing historical production chemical usage it is noted that there has not been a significant increase in use, with levels steady. Well intervention operations used 1874.9Kg chemicals, significantly less than the portion discharged to sea (338.4Kg). This is due to the fact that the majority of well intervention chemicals are injected into the wells and chemicals flow into the platform process systems before discharge via approved points to sea.





Accidental Spills

All offshore operations must be covered by an approved Oil Pollution Emergency Plan. These plans describe the procedures and notifications that must be undertaken in the event of a release. They are regularly tested and exercised by offshore and onshore response teams to ensure they are robust and fit for purpose. All unplanned discharges to sea of oil and chemicals, regardless of volume, must be reported to relevant authorities (OPRED, Marine Scotland, MCA and JNCC) via a Petroleum Operations Notice 1 (PON1).

At TAQA, there are a variety of systems and procedures in place to mitigate against and reduce the potential of the unplanned releases to sea. If a loss of containment does occur whether it reaches the sea or is recovered at the location, it is captured in the company's incident reporting database. The release is then subject to investigation to identify the root cause.

Table 2 shows the number of PON1s submitted by TAQA during 2017, detailing if it was an oil or chemical release and the corresponding quantity. 28 releases took place during 2017 which is a decrease on the 33 reported in 2016, however there was an overall 12% increase in the volume of oil released to sea, up from 0.62 tonnes in 2016 to 0.69 tonnes in 2017. In addition, 2017 also saw an increase in the volume of chemicals released to sea (8.23 in 2017 compared to 1.89 in 2016). The increase in chemical losses to sea was attributed to an ongoing subsea leak of hydraulic fluid at the Devenick S1 subsea installation with 7.71 tonnes reported in 2017, which represents 86% of the total chemicals spilled to sea.

TABLE 2 ACCIDENTAL OIL AND CHEMICAL SPILLS TO SEA

PLATFORM	DESCRIPTION OF OIL OR CHEMICAL SPILL	MAX QUANTITY SPILLED IN TONNES (T)
Cormorant Alpha	Pin hole oil leak in the closed drains degasser reclaimed oil tank pipework	0.002
	Diesel leak from east side bulk bunkering hose	0.005
	Methanol leak from Pelican subsea field bullnose umbilical terminal assembly	0.13668
Eider	Diesel leak from east side bulk bunkering hose	0.0018
	Hydraulic oil leak due to failed crane boom fitting	0.0178
North Cormorant	Oil leak from Eider three inch blowdown line	0.4
	Diesel leak from east side bulk bunkering hose	0.00346
	Diesel leak to sea	0.0900465
Tern	Module M2 east hazardous drains overflowed into storm drains leaking oily water to sea	0.1584
	Scale inhibitor leak from the Hudson well chemical injection line	0.0033
Devenick	Oil leak (bubbles) observed at the Devenick S2 wellhead	0.0116
	Subsea hydraulic fluid leak from the Devenick S1 hydraulic system	7.7114
Harding*	Diesel pin hole leak from north side bulk bunkering hose	0.00022
	Conductor tensioner Erifon leak on slot 4 PNE 2 (cylinder 1)	0.01
	Conductor tensioner Erifon leak on slot 12 GI1 (cylinder 2)	0.0225
	Conductor tensioner Erifon leak on slot 12 GI1 (cylinder 1)	0.01
	Conductor tensioner Erifon leak on slot 14 AQ 1 (cylinder 1 & 4)	0.0375
	Conductor tensioner Erifon leak on slot 14 AQ 1 (cylinder 3)	0.0225
	Conductor tensioner Erifon leak on slot 2 PN 1 (cylinder 2)	0.03
	Conductor tensioner Erifon leak on slot 3 PC1 (cylinders 1 & 4)	0.035
	Conductor tensioner Erifon leak on slot 5 WC 1 (cylinder 4)	0.02
	Conductor tensioner Erifon leak on slot 4 PNE2 (cylinder 1)	0.0375
	Conductor tensioner Erifon leak on slot 17 WS1 (cylinder 3)	0.0225
	Conductor tensioner Erifon leak on slot 17 WS1 (cylinder 2)	0.0225
	Conductor tensioner Erifon leak on slot 23 PSE1 (cylinder 1) & slot 24 IC6 (cylinder 1)	0.045
	Conductor tensioner Erifon leak on slot 24 IC6 (cylinders 2, 3 and 4 hose leaks)	0.02
	Conductor tensioner Erifon leak on slot 15 AQ2 (all four cylinders)	0.04

■ OIL SPILL ■ CHEMICAL SPILL

* It is noted that all but one of the chemical PON1 reports submitted in 2017 by Harding were attributed to losses of hydraulic fluid from the conductor tensioner system due to historical design issues. A rolling program of improvements through 2017 (onwards) includes replacement of under performing units, an onshore test rig and installation of new types of cylinder.



Onshore Initiatives

As a responsible energy company, TAQA continually looks to support the communities in which it operates. We have an active corporate social responsibility programme which looks to achieve three overarching goals: protect the environment from the impact of our operations; support the local communities where we operate; and increase education, potential and creativity.

Macduff Marine Aquarium

Situated on Aberdeenshire's scenic coast in the traditional fishing town of Macduff, Macduff Marine Aquarium features marine life from the Moray Firth, Scotland's largest bay, in a variety of exciting and innovative exhibits. Following our support in 2016 of new energy saving LED lighting, in 2017 TAQA supported the re-launch of the aquarium following a major refurbishment, including the production of a new Climate Change interpretation board.

Society of Petroleum Engineers (SPE) Cares - Beach Cleaning at the River Don

During Offshore Europe 2017 TAQA supported the SPE's Inspire programme; a series of activities, workshops and lectures specifically focused on supporting and informing young people who are interested in joining the oil and gas industry or just beginning their careers. An element of this support included a beach clean-up at the North Side of the River Don, working with the Marine Conservation Society.

Recycling Redundant IT equipment

TAQA continues to work with local charity ReBOOT, which aims to preserve and protect the environment for the benefit of the community by re-using and recycling IT materials. IT equipment, which included backup tapes, hard drives and laptops, went through a thorough process of data destruction before being re-used. The equipment was either donated to charities and community organisations, or sold at a low cost to support the training of volunteers and unemployed individuals. To date TAQA has diverted approximately two tonnes of Waste Electrical & Electronic Equipment (WEEE) from the conventional disposal routes (recycling and landfill).

Earth Hour

The World Wide Fund for Nature (WWF) describes Earth Hour as a "global celebration of our planet, bringing hundreds of millions of people from across the world together in a symbolic and spectacular light outs display. It's a brilliant reminder that together we can make change happen, and it gives us a chance to think about the small things we can do every day to help create a brighter future." TAQA encouraged the workforce to play a part in Earth Hour both at work and at home. The onshore business also participated in March 2017, by switching off all lights at the main office building during Earth Hour (TAQA House).



Environmental Objectives

Each year a number of key objectives are set. The purpose of these objectives are to help achieve and demonstrate continual improvement in the environmental performance of TAQA in the UK. Each objective is made up of a number of individual targets.

Table 3 below provides an overview of the status of the 2017 objectives at year end.

TABLE 3 ENVIRONMENTAL OBJECTIVE OVERVIEW

	OBJECTIVE	STATUS
1	Environmental Studies/Assurance Activities	Completed/Achieved (>90%)
2	Offshore Operations Continuous Improvements	Completed/Achieved (>90%)
3	Environmental Engineering Control Improvements	Partially Complete (>75%)
4	Waste Management Continuous Improvements: Reduction of waste to landfill both onshore and offshore (see below):	Completed/Achieved (>90%)
	a) 93% (average) correct general waste segregation for offshore	Completed/Achieved (>90%)
	b) 75% (average) correct general waste segregation for onshore	Partially Complete (>75%)
5	Environmental Management System Continuous Improvements	Completed/Achieved (>90%)

■ COMPLETED/ACHIEVED (>90%)
 ■ PARTIALLY COMPLETE (>75%)
 ■ INCOMPLETE/NOT ACHIEVED (<75%)

Overall five of the seven objectives in 2017 were achieved and two were not fully completed. A number of the objective 3 targets were partially completed, however the objective was not met due to delays in the regulator issuing guidance and the Environmental Critical Element identification project scope changing to include Major Environmental Incident (MEI) and Major Pollution Incident (MPI) assessment. The platform MEI and MPI assessments were successfully completed in 2017. In addition objective 4 was partially met by three of the five offshore platforms, with the Eider and Cormorant Alpha platforms only missing the 93% (average) correct general waste segregation target by 1% and 3%, respectively.

Onshore waste management improved in 2017, although the average general waste skip compliance was 76%, 4% under the target. The other environmental objectives were successfully achieved in 2017.

In 2018, TAQA is continuing its efforts on focussed objectives in five key areas:

1. Environmental Studies/Assurance Activities
2. Offshore Operations Continuous Improvement
3. Environmental Engineering Control Improvement
4. Waste Management Continuous Improvement
5. Environmental Management System Continuous Improvement

Glossary

CEFAS Centre for Environment, Fisheries and Agricultural Science	MODU Mobile Offshore Drilling Unit	environmental management and improvement
CH₄ Methane	MPI Major Pollution Incident	PON Petroleum Operations Notice
CHARM Chemical Hazard Assessment and Risk Management	NORM Naturally Occurring Radioactive Material	PPC Offshore Combustion Installations (Pollution Prevention and Control) Regulations (2013)
CO Carbon Monoxide	NO_x Oxides of Nitrogen	PWFD Produced Water Flash Drum
CO₂ Carbon Dioxide	NSBC North Sea Bird Club	SCM Subsea Control Module
EMS Environmental Management System	OBM Oil Based Mud	SO₂ Sulphur Dioxide
ETS Emissions Trading Scheme	OCR Offshore Chemicals Regulations (2002) (as amended)	SPE Society of Petroleum Engineers
FLAGS Far North Liquids and Associated Gas System	OCNS Offshore Chemical Notification Scheme	STL Submerged Turret Loading (oil export system removed from the Harding Field during 2016)
GBT Gravity Base Tank	OIPW Oil in Produced Water	SSIV Subsea Isolation Valve
HSSEQ Health, Safety, Security, Environment and Quality	OLS Offshore Loading System (oil export system installed at the Harding Field during 2016)	UKCS United Kingdom Continental Shelf
ISO 14001 International Standards Organisation 14001 – specifies the requirements for an environmental management system	OPEP Oil Pollution Emergency Plan	UMC Underwater Manifold Centre
JNCC Joint Nature Conservation Committee	OPPC Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations (2005) (as amended)	VOC Volatile Organic Compound
mboe/d Thousand Barrels Oil Equivalent per Day	OPRED Offshore Petroleum Regulator for Environment and Decommissioning	WEEE Waste Electrical & Electronic Equipment
MCA Maritime and Coastguard Agency	OWS Oily Water Separator	WtE Waste-to-Energy
MEI Major Environmental Incident	PDCA Plan-Do-Check-Act cycle for	WWF World Wide Fund for Nature

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