



**SPIRIT ENERGY**

**ENVIRONMENTAL PERFORMANCE  
REVIEW 2017**



## FOREWORD

I am delighted to present Spirit Energy's first Environmental Performance Review, following the company's creation in 2017 with the combination of Centrica's exploration & production business and Bayerngas Norge.

As a newly-incorporated oil and gas operator, Spirit Energy's vision is to add value as an independent and sustainable oil and gas business in Europe, and I look forward to seeing the teams across our operations deliver that vision in the years ahead.

With the combination of Centrica's exploration & production business and Bayerngas Norge completing in December 2017, the focus of this review is predominantly on the performance of the legacy Centrica assets. Despite significant changes to the business the focus on safe and compliant operations remained unchanged throughout the year.

As well as the creation of Spirit Energy, 2017 was also a landmark year as we continued to progress Oda, our first operated development in Norway, towards first oil, and drilled a third production well at the Chestnut field in the central North Sea, extending the life of the field even further and demonstrating our commitment to maximising reserves.

We are active throughout the life cycle of our assets, and last year we also progressed our decommissioning campaign by abandoning six North Sea wells.

As the industry continues to recover from the recent downturn we know we cannot be complacent and will continue the good work done to date to ensure safe, reliable and efficient operations. A good example is the case study showing the significant investment in NOx emission reductions across our portfolio. Working closely with the rest of the industry, including our fellow operators and supply chain partners, the safety of our people and our environmental responsibilities remains foremost in our minds.

**Neil McCulloch**

**Technical and HSE Director**



## ENVIRONMENT POLICY

At Spirit Energy we are committed to understanding, managing and reducing the environmental and ecological impacts of our activities through innovation, technology and cultural change.

We are committed to:

**Assessing**, understanding and managing our environmental risks and impacts, placing special emphasis on minimising major accident risks

**Enabling** and encouraging our employees to help us achieve our environmental goals

**Proactively** seeking ways to reduce our carbon emissions

**Reducing** waste and using resources efficiently

**Developing** renewable and low-carbon energy sources, products and services

**Encouraging** our customers to move towards a low carbon future by helping them make informed decisions about the use of our products and services

**Working** with our suppliers and business partners to pursue responsible environmental practices

**Publishing** regular performance reports and openly discussing our environmental performance with internal and external stakeholders

**Continually** improving and setting measurable objectives and targets to prevent pollution and reduce our environmental impacts

**Complying** with environmental legislation, regulations and other applicable requirements

We will implement comprehensive environmental management systems that are routinely audited and attain certification to ISO14001 in our exploration and production operations. Our performance is reviewed regularly by the Spirit Energy Board.

**Chris Cox**

**Chief Executive**

## OUR OPERATIONS

In 2017, our exploration & production business has organised across three asset groups – the North Sea (including facilities in both the UK and the Netherlands), Morecambe Bay and Norway – following the divestment of Centrica's interests in Canada and Trinidad & Tobago during the year.

This review covers the 2017 performance of the European operated assets which are within the OSPAR region.



### North Sea Assets

Our operated assets in the North Sea include the Chestnut oil field, located in the central part of the UK North Sea, which has been in production since 2008 and is produced via the Hummingbird Spirit floating production, storage and offloading (FPSO) vessel. In the Southern North Sea, operated assets include facilities in the Netherlands and UK sectors, such as manned fixed platforms at J6-A and at F3-FA, seven not permanently attended installations (NPAI) and one subsea asset.

In addition to routine operations at these facilities, in 2017 we drilled a third production well at the Chestnut field, plugged and abandoned six wells and started decommissioning the ST-1 and Audrey NPAs in the southern North Sea plus their associated infrastructure.



### Morecambe Assets

The combined fields of Morecambe Bay continue to provide a significant portion of the UK's gas supply, having produced more than 6.5trillion cubic feet of gas for UK homes and businesses since coming on stream in 1985. The asset also includes the Barrow Gas Terminal, which processes all the gas from Morecambe Bay.

The Morecambe Bay fields are produced via three bridge-linked installations, forming the Central South Morecambe platform, as well as seven NPAs and two subsea tiebacks.



### Norway Assets

Operated assets in Norway include the producing Vale field, which flows back to the Statoil Heimdal platform, while we are also progressing the Oda field with the subsea development drilling and tie-back operations. Our non-operated interests include stakes in major Norwegian fields such as Staffjord, Kvitebjørn, Heimdal and Valemon.

## OUR ENVIRONMENTAL MANAGEMENT SYSTEM

The Spirit Energy Environmental Policy outlines our responsibilities in relation to environmental stewardship and our commitment to continually improve our environmental performance. The environmental management of our operations are integrated within health and safety as well as the business management activities. This integrated system ensures the embedding of environmental requirements into business practices for maximum benefit.

The following key impacts and risks are managed within routine operations:

- Carbon dioxide emissions from power generation and flaring
- Oil discharged in produced water
- Chemical use and discharge to sea
- Waste generation and disposal
- Unplanned events – emissions, discharges and permit non-compliances

Performance is reported to the regulators and within Spirit Energy to operations and senior management and a number of other forums such as to the Carbon Disclosure Project. Performance data is also available on one of our shareholders website ([www.Centrica.com](http://www.Centrica.com)).

Improvements in performance are planned and managed within the annual improvement planning cycle. These improvements are approved by senior leadership and aligned with business operational plans. Maximum benefit from strategic initiatives and improvements can be achieved across the exploration and production business through this planning process.

The activities in our operated assets from exploration to decommissioning are certified to the Environmental Management System ISO14001<sup>1</sup>. In 2017 we transferred one of our certificates to the new ISO14001 standard a year ahead of the deadline without any issues. The remaining two certificates will transition in 2018.

This report summarises the performance and initiatives of Spirit Energy's exploration and production operations in 2017 and the planned improvements in 2018 as required by OSPAR<sup>2</sup>.

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<sup>1</sup> ISO 14001 is an internationally recognised standard for environmental management systems

<sup>2</sup> OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry

## OUR PERFORMANCE

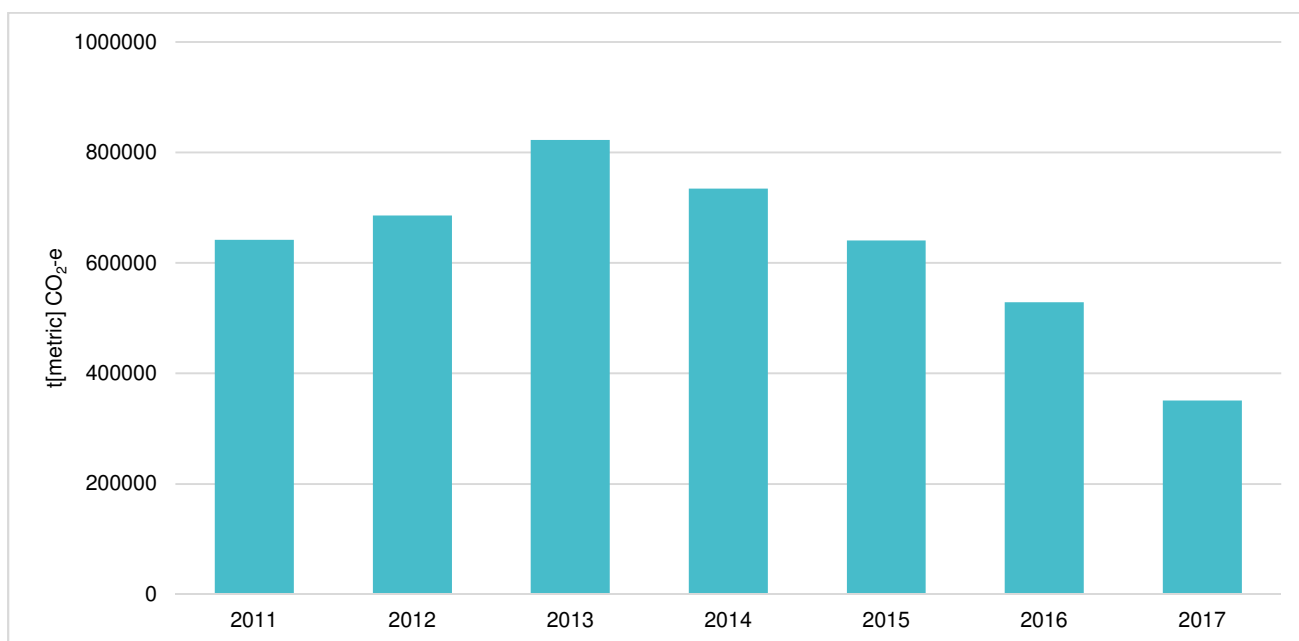
The environmental performance of our activities in 2017 is summarised below and presented in detail in the Appendix.

### Carbon dioxide emissions

The emissions from our offshore and onshore installations are shown from 2011 to 2017 in Figure 1 and in Figure 2 for our higher emitting facilities. Emissions data for all of our operated assets are in the Appendix.

The majority of emissions to atmosphere from our installations are from gas-fired turbines used for power generation and gas compression. The lack of process and compression equipment on the smaller NPAs results in considerably lower emissions from these installations.

**Figure 1 – Historical carbon dioxide emitted (EU ETS)**

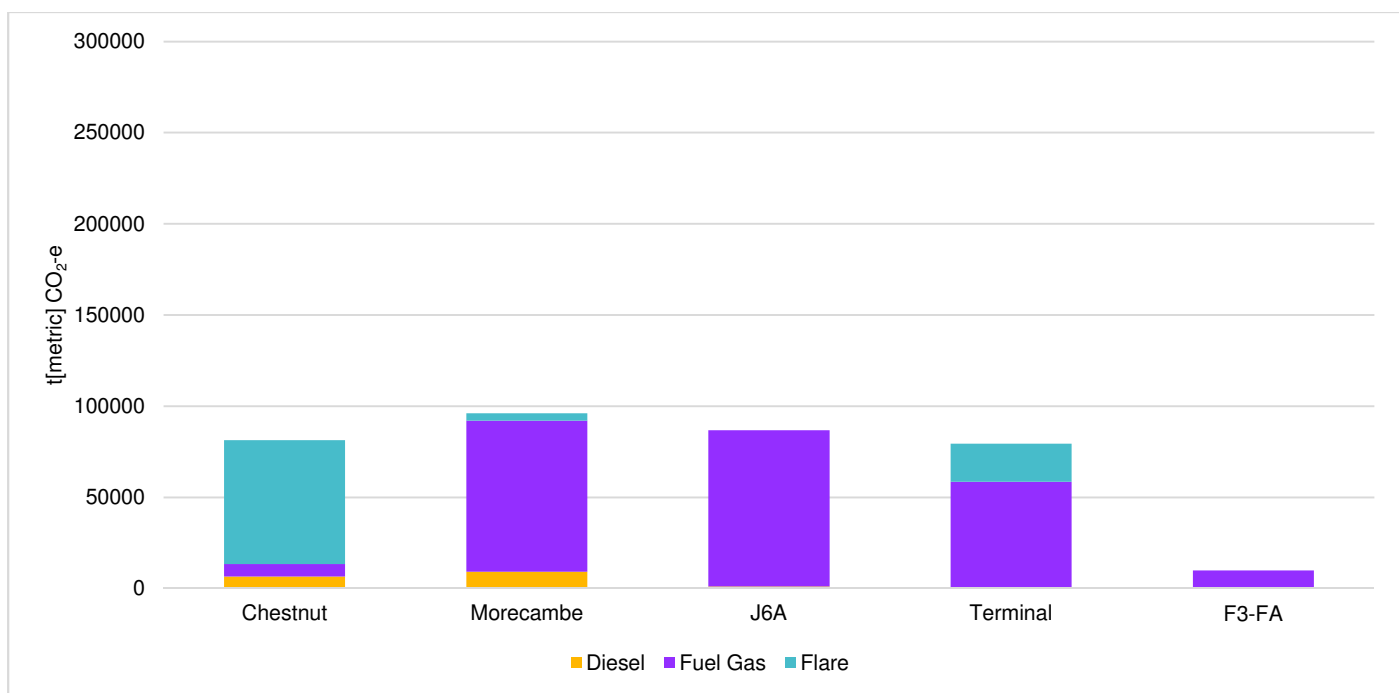


In 2017, the asset emissions were impacted by the following:

- The extended shutdown at Morecambe in 2017 is reflected in reduced total emissions and an increase in diesel usage.
- Chestnut shutdowns for maintenance and start up of the additional well drilled in 2017 at this field.
- Increased length of the shutdown at J6-A installation and reduced production due to reservoir depletion at F3-FA.

Carbon dioxide from the combustion emissions at the Hummingbird Spirit FPSO, Morecambe Bay, J6-A in the Greater Markham Area (GMA) and the Barrow Gas Terminals are part of the EU Emissions Trading System (EU ETS). In 2017 Chestnut, Morecambe and the Barrow Gas Terminals met the ETS free allowances limits.

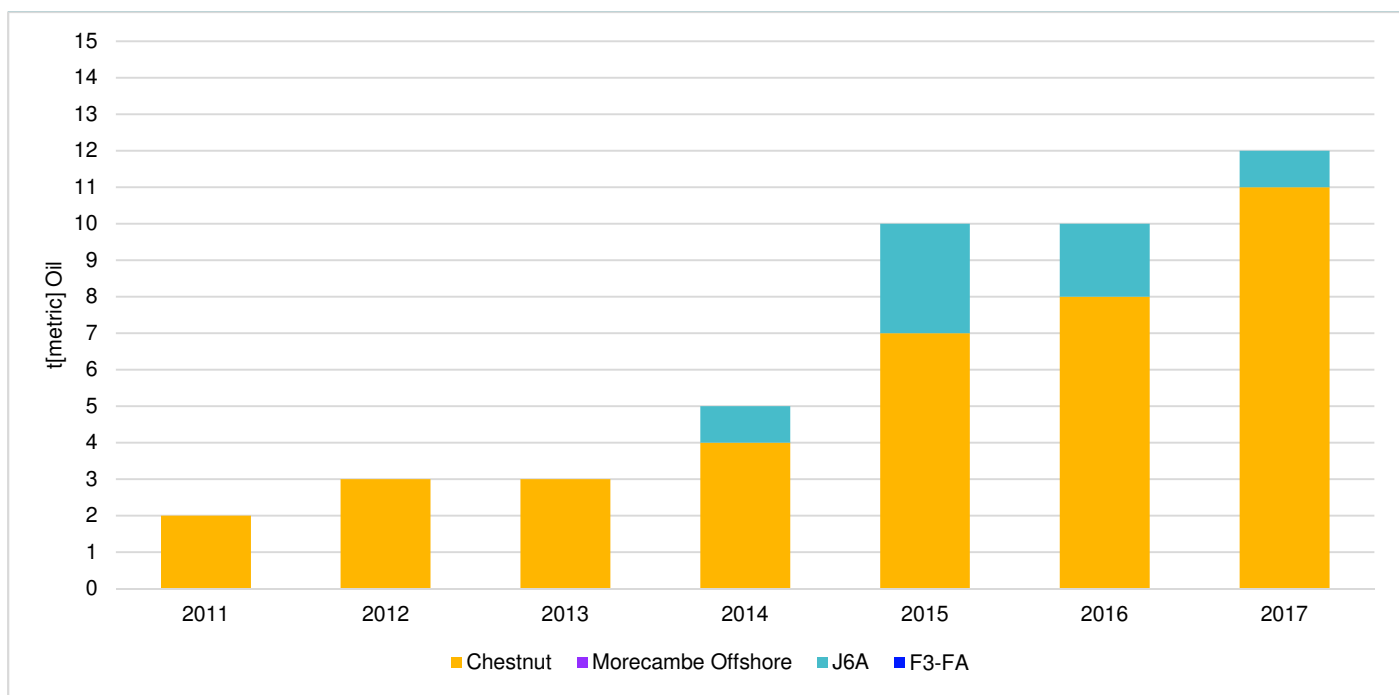
**Figure 2 – Carbon dioxide emitted in 2017**



**Oil discharged in produced water**

Oil is discharged to sea in produced water following treatment at the Hummingbird Spirit FPSO, South Morecambe, J6-A and F3-FA facilities. The total oil in produced water discharged from these facilities over the past six years is shown in Figure 3. All oil to sea discharges in produced water were within the permitted limit (where applicable) in 2017.

**Figure 3 – Oil discharged to sea 2011-2017**



The oil discharged in produced water from our assets has continued the increasing trend in 2017 largely due to increased water production from the wells at the Chestnut field. We continue to review opportunities to reduce the oil to sea e.g. the loss of the re-injection well on J6-A has triggered a review of the design of the produced water treatment equipment.

### Chemical use and discharge to sea

The amount and type of chemicals used for our offshore operations differ depending on the activities and reservoir types, for example the rock type to be drilled, well design and production functions. We were well within our permitted limits of use and discharge of chemicals in 2017.

The majority of the substitution chemicals are permitted for contingency use in the well activities, however only a small amount (0.1 %) of three of these chemicals were discharged. Work continues to identify replacement products across our activities such as the replacement of the subsea hydraulic fluid at Vale and is summarised for the UK in the review of the technical justifications for chemicals flagged for substitution carried out within Spirit Energy.

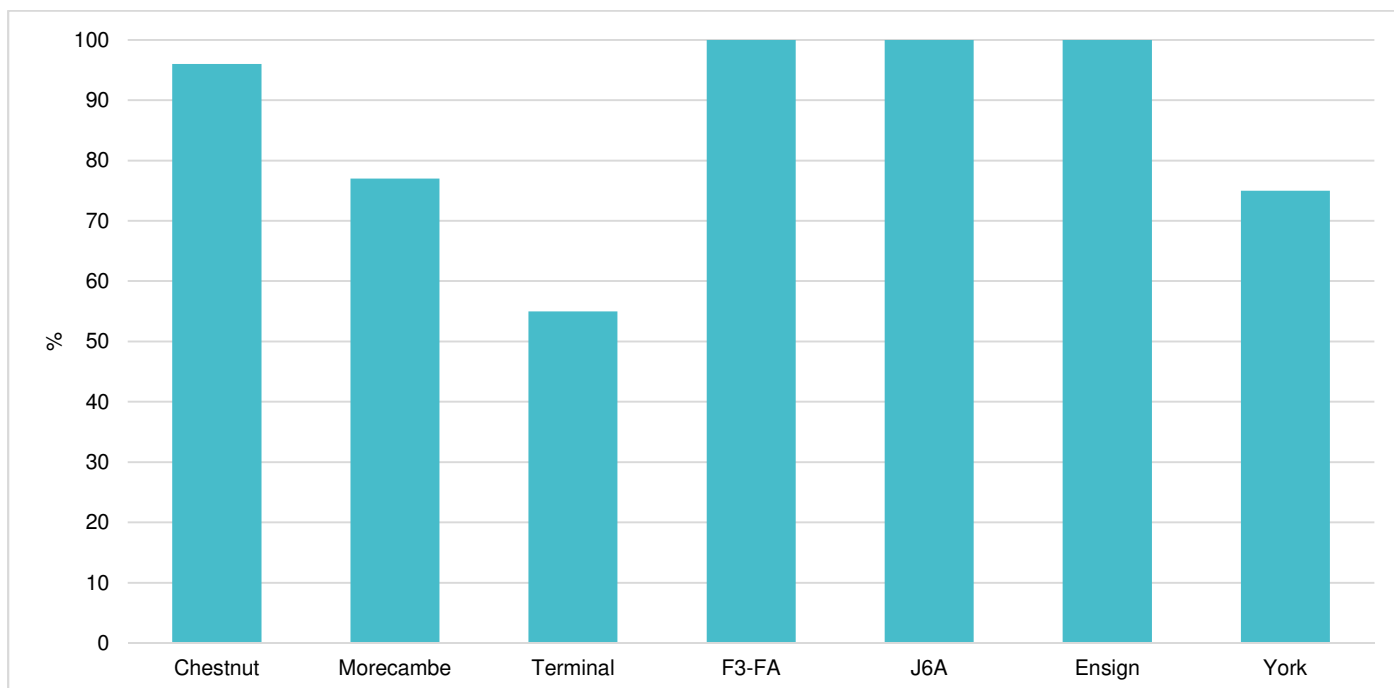
### Waste generation and disposal

Waste is a key area for environmental impact, from the potential for contamination from hazardous wastes to long term impacts of waste such as plastics in our environment. As decommissioning activities including well plug and abandonment are increasing in our operations schedule we are working with the operations to minimise the production of waste e.g. through disposal of cleaning fluids downhole and reduction of packaging materials taken offshore.

In 2017 we have extended our Key Performance Indicator to include waste from capital projects and wells across Spirit Energy. This has demonstrated that a large amount of waste we are producing is recyclable e.g. metal from the simplification of one of our NPAs in Morecambe. This has encouraged awareness and focus on waste production and management in the assets.

The average recycling<sup>3</sup> percentage was 74% in 2017 (Figure 4) which included all the production, wells and capital project waste. As part of this focus area we have identified opportunities within each asset and will be managing some of those opportunities in 2018.

**Figure 4 – 2017 waste recycled from producing installations**



<sup>3</sup> Reuse, recycling and waste to energy



## Unplanned events

A total of 8 spills to sea and 18 non-compliances were submitted to the UK regulator with none submitted to the Netherlands and Norwegian regulators.

### Spills to sea

We reported eight spills to sea (a total of 671 l) from Spirit Energy assets in 2017, six spills of oil (379 l) and two of chemical (341.1 l). This is dominated by one oil release of 303 l hydraulic oil from the DP1 NPAI firewater pump in Morecambe. In addition there were three hydraulic fluid releases (one from topsides and two from ROV lines), one condensate release related to well testing and the remaining one was from an unknown source. Similarly with the chemical releases, one subsea hydraulic fluid (341 l) released during a subsea leak detection investigation was the main spill. The remaining chemical spill was a small volume from jumper disconnection. Investigations were carried out into all the releases and lessons learnt captured where appropriate e.g. amendments to the well operations standard or update of environmental inspection checklists.

### Other regulatory non-compliances

Of the 18 non-compliances submitted in 2017, nine were against the chemical regulations. Two involved the incorrect chemical on the permit and one chemical was used and not permitted. These events were addressed through training and initiating additional assurance. The other six chemical non-compliances were reported for late returns, which have been addressed with increased deadline alerts and permitting assurance activities.

We also reported seven oil-to-sea permit non-compliances in 2017 non-of which resulted in an increase in environmental impact. Two non-compliances were in relation to incorrect description of operations in the applications, three related to the lack of produced water during the shutdown and two were for late reporting of returns. These were addressed by amendment of two applications, updating the maintenance management system for sampling requirements, and training was given to operations. In addition increased assurance will be carried out on the permit requirements as part of the environmental inspections in 2018.

The two remaining non-compliances were 241 kg of F-gas leaked from an HVAC refrigeration system on the South Morecambe platform which has since been removed from operation and omission of an update to the PPC permit at South Morecambe resulted in a non-compliance with the SO<sub>x</sub> limit.

All events have been investigated and addressed at both asset and cross asset basis to ensure learnings are captured for Spirit Energy.

## Onshore Performance

### Barrow Gas Terminals

The Barrow Gas Terminal operates under an Environment Permit which is regulated by the Environment Agency (EA) and an annual performance report is submitted to the EA for the site. Emissions to air from the process and discharges to water are monitored and managed with the limits specified in the permit. Any deviation from these limits is investigated to prevent a reoccurrence.

In 2017 the terminals were only operational for 14 weeks in 2017 and did not operate between 24th February and 26th October 2017 due an extended shutdown. As a result of this extended shutdown, emissions from the terminal in 2017 were significantly lower than in previous years.

The South Morecambe Terminal ceased operating in July 2016 and work is now well underway to complete the decommissioning and demolition of the terminal. The safe removal of hydrocarbon, chemical and freon inventories from the site removes a significant risk to the environment at Morecambe.

The first phase of the North Morecambe Terminal Field Gas Compressor Catalytic Converter Project was also completed with the installation of the catalytic converter during the shutdown. This £11.2m project will be commissioned in October 2018 and will reduce the emissions of NOx and CO from the Field Gas Compressor by over 80%.

In 2017 there were three notifications to the EA following environment events on site.

The first was in October, when a notification was submitted following a breach of the emission limits from a hot oil heater. Repairs to a defect are underway to ensure compliance with the emission limits when it is restarted. In December following the identification of a condensate leak from pipework, a repair was made to the condensate line and the contaminated ground removed from site and other improvements are being completed. At the end of December the failure of an “o” ring in a pipework joint resulted in approximately 1400 litres of hydraulic oil spillage on site. Preventative maintenance strategies were put in place to ensure similar “o” rings are replaced on a regular basis.

## Case Study: NOx Emission Reductions

We have two assets whose NOx emission limits were in exceedance of those required by the EU combustion plant directives at Barrow Terminal in UK and J6-A in the Dutch sector of the North Sea. Both installations are required to reduce emissions to below the required limits by 2019. Major projects have been in development since 2016 to meet the 2019 deadline due to the length of time required for design and planning.

All options were considered and assessments were carried out for the Best Available Technology for both assets. Both assets opted for the selective catalytic reduction (SCR) technology which reduces exhaust NOx emissions through the principal of injecting a NOx reducing chemical (ammonia or urea) into the exhaust stream in the presence of a catalyst. NOx and ammonia (NH<sub>3</sub>) react on the surface of the catalyst to form nitrogen and water. Although this is an established technique there are uncertainties until the systems are in place, tested and commissioned. The volume and distribution of ammonia injected is critical; under-injection will result in higher NOx emissions whilst over-injection will result release of unreacted ammonia.



### Case Study: J6-A

The LM1600 turbines which drive the J6A Low Pressure compression trains currently emit NOx in excess of the 225 mg/Nm<sup>3</sup> regulatory compliance limit. During the platform shut down in 2017 the exhaust of the machines were partially removed and replaced by the SCR-housings. The urea tanks and injection system will be installed and commissioned in 2018 ahead of the January 1st 2019 deadline.



### Case Study: Barrow Terminal

At Barrow the £11.2m North Morecambe Terminal Field Gas Compressor Catalytic Converter Project will be commissioned in October 2018 and will reduce the emissions of NOx and CO from the Field Gas Compressor by over 80% and ensure compliance with the EU Large Combustion Plant BAT Conclusions.

## 2017-2018 ENVIRONMENTAL IMPROVEMENT PLANS AND PERFORMANCE

	Initiative	Progress
Risk management – environmental integrity	Continued cross-regional focus on the management of process safety to reduce the potential for Major Accident Hazards and regulatory non-compliances.	<p>The Process Safety and Maintenance Excellence projects continued in 2017. A review was carried out into the identification of environmentally important equipment to ensure consistency across the assets.</p> <p>In 2017 we developed a series of checklists to enhance the assurance of the inspection and maintenance of our equipment. The inspections are planned for all of the UK and NL assets in 2018.</p>
Reporting and Performance	Common reporting system across the E&P business and review all performance metrics.	<p>Development of a standalone online observations reporting tool accessible by all assets including offshore. This will enhance the reporting and increase visibility of all unsafe acts and conditions including environmental throughout the business.</p> <p>Efficiencies were made within our internal environmental reporting in 2017 through adoption of the automated facilities within our online system myHSES. In 2018 we plan to further streamline our internal reporting for efficiency.</p>
Awareness and training	Improvements in environmental awareness training across North Sea and Morecambe assets	<p>In 2017 we developed and rolled out environmental specific messages to the Morecambe asset. In 2018 we will develop this approach further with more activity specific environmental messages which will be distributed to operations as applicable.</p> <p>Also in 2017 we linked the Energy institute modules into our company training online system. These modules will be embedded in the competency systems across the assets including wells and projects in 2018.</p>
Carbon/energy management	Development of carbon savings and energy efficiency opportunities	We continued reporting the carbon intensity of our major emitting installations in 2017 and sought carbon savings/energy efficiency opportunities in our business. In our Norwegian asset we have enhanced the transparency of our non-operated assets by inclusion of carbon reporting in our routine business reports.
Waste management	Development of waste key performance indicator and opportunities for improvement.	A cross asset waste KPI was developed and reported to the assets throughout 2017. Opportunities for improvements were also identified and will be implemented in 2018 as applicable.
ISO14001 Compliance	Transfer to the 2015 ISO14001	We transferred one certificate to the new standard in 2017. The remaining two will transition in 2018.

# APPENDIX

## Performance Data

Key indicator	Morecambe		North Sea					Norway
	South Morecambe	Total of 7 NPAs and subsea infrastructure	Chestnut	J6-A	F3-A	Total of 5 NPAs and subsea infrastructure	Wells and Projects <sup>‡</sup> Operations	Vale
Annual average oil in produced water mg/l	6	N/A	14.2	13.2	6.3	N/A	N/A	N/A
Tonnage of oil in produced water to sea	0.001	N/A	11.2	0.17	0.05	N/A	N/A	N/A
CO <sub>2</sub> from combustion for power generation and compression (t)	93,097 <sup>†</sup>	N/A	14,503 <sup>†</sup>	86,742 <sup>†</sup>	9,783	750	N/A	N/A
CO <sub>2</sub> from flaring (t)	3,153 <sup>†</sup>	N/A	68,576 <sup>†</sup>	N/A	N/A	N/A	N/A	N/A
Number of substitution chemicals permitted	0	1	4	2	0	0	6	1
Amount of permitted chemicals discharged (t)	1.23	1.28	223	210	1.5	0.3	1763	0,52
Percentage of permitted chemicals discharged with a SUB warning (%)	0	0	46.2	2.8	0	0	0.13	76
Waste amount (t)	821.3		120	186.7	20.1	9.1	630	N/A
% of total waste reused/recycled/waste to energy	77		97	95%	94%	93	71	N/A

† = ETS Verified Data

‡ = Project data included

The NPAs have no discharge of produced water to sea and the power generation on the facilities is diesel driven below 20MW which produces limited emission. Subsea infrastructure emissions/discharges and waste are managed via the host installations unless there is an intervention activity at the subsea location.

**Unplanned event data**

Key indicator	Morecambe		North Sea					Norway
	South Morecambe	Total of 7 NPAs and Subsea Infrastructure	Chestnut	J6-A	F3-A	Total of 5 NPAs and Subsea Infrastructure	Wells and Projects	Vale
Number and total litres of oil released to sea	1 (303l)	1 (18 l)	1 (0.1 l)	0	0	0	3 (6.6 l)	0
Number and total litres of chemicals released to sea	0	0	0	0	0	1 (341 l)	1 (<0.1 l)	0
Number of environmental permit non-conformances	7	1	2	0	0	7	1	0

Morecambe Other = Five DP, Calder and Millom West NPAs, subsea infrastructure for Rhyl and Dalton

North Sea NPAs = Ensign, York Chiswick, Grove and ST-1

North Sea Subsea Infrastructure = Trees, A-Fields, Eris/Ceris, Seven Seas, Kew

Our fields are produced back to the following facilities:

- A-fields back to Conoco-Phillips LOGGs platform
- Trees fields to the Marathon Brae Alpha platform
- Vale field to the Statoil Heimdal platform.

