

Exploration & Production

Environmental Performance
Review 2015

centrica

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Foreword

Similar to many in the sector, 2015 was a challenging year for Centrica's exploration and production business. However, the headwinds the industry faced led to all of us collaborating more than ever to ensure production continues as safely and efficiently as possible

In the face of lower commodity prices, the industry has needed to work smarter, whilst maintaining its focus on safe and environmentally-responsible operations.

Centrica has been at the forefront of efforts to bring operators and supply chain partners closer together, and I am delighted that the hard work of our teams across the UK, Netherlands, Norway and Canada is reflected in production of 78.6 million barrels of oil equivalent in 2015.

Against a tough backdrop, we continue to invest in our existing assets and the future of the North Sea. The Cygnus project, which has generated more than £1.3billion for the UK economy since sanction less than five years ago, will come on stream in 2016. Meanwhile, the £85million Barrow Terminals Project, now complete, will extend the life of our Morecambe Bay assets and cut thousands of tonnes of CO₂ from our carbon footprint every year. In Norway, new and innovative drilling methods allowed us to continue our excellent progress on developing the Butch discovery.

Despite the work we have done in the past 12 months to ensure safe and reliable operations, we cannot be complacent as the impacts of lower prices continue to be seen across the industry. The safety of our people and our environmental responsibilities are hugely important to us, and will remain as core values as we continue to maximise the potential of our assets in the North Sea and Morecambe Bay in the coming years.

Ken Robertson

Senior Vice-President, HSE and Technical



Group Environment Policy

At Centrica 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 in all our businesses and attain certification to ISO14001 or equivalent in our exploration and production, power generation and servicing and installation operations. Our performance is reviewed regularly by the Centrica Executive Committee.

Iain Conn

Chief Executive

Our Operations

Centrica's Exploration & Production business operates in three business regions – Canada, Norway and the UK and the Netherlands (UKNL).

The UKNL region is divided into three hubs; the North Sea, Morecambe Bay and the Netherlands.

This review covers our performance in the OSPAR regions of UKNL and Norway.

UKNL Region

North Sea Hub

North Central North Sea

Centrica's Central North Sea assets are mainly oil-producing fields. Our operated Chestnut field has been in production since 2008 via the cylindrical Hummingbird Spirit FPSO, the first of its kind to be used in the North Sea. In our non-operated portfolio, we have interests in the Armada, Alba, Brae and Beryl assets.

Southern North Sea

The Southern North Sea is home to the Cygnus gas field, the largest discovery in the region in 25 years where Centrica has a 48.75% interest. The development is expected to come on stream in 2016, joining Centrica's operated gas-producing assets in the area like York and Ensign.



Morecambe Hub

The combined fields of Morecambe Bay remain a cornerstone asset for Centrica, offering unique flexibility. The area continues to provide a significant portion of the UK's gas supply. Centrica's East Irish Sea fields have been producing gas since 1985, supplying more than 6.5trillion cubic feet of gas for UK homes and businesses.

The hub also includes the Barrow Gas Terminals, which together process all the gas from Centrica's assets in Morecambe Bay as well as some third-party fields.

Netherlands Hub

Centrica operates two key hubs in the Dutch North Sea, the Greater Markham Area (GMA) and F3-FA, from its Hoofddorp office in the Netherlands. The F3-FA field first started producing gas in 2011 via the largest self-installing platform in the North Sea, making the stranded gas field economic. GMA consists of the manned platform J6-A and the unmanned platforms Grove, Chiswick and ST-1, as well as the Kew field which was developed in 2014 via a subsea tieback.

The ST-1 platform has been shut in, and decommissioning operations will begin in 2016.

Norway Region

Since entering Norway in 2006, Centrica has built a solid portfolio of assets on the Norwegian Continental Shelf. We will continue to explore, develop new projects and maximise the output of producing assets. We currently have more than 60 licences on the Norwegian Continental Shelf and our operated projects include the producing Vale field and the Butch and Fogelberg discoveries. Our non-operated interests include stakes in major Norwegian fields such as Valemon, Heimdal, Statfjord and Kviteseid.

We are currently working on field development plans for both Butch and Fogelberg, and drilled a shallow pilot hole at Butch in 2015. The innovative technique was Norway's first ever open water coiled tubing drilling operation, successfully using a light well intervention vessel to reduce the risk of shallow gas at the field.



Our EMS

In Centrica we strive to continually improve our environmental performance in addition to ensuring legal compliance. The system to facilitate improvements and manage the environmental impacts and risks presented by our activities is integrated with the health and safety systems into the Business Management System. The management system is certified to ISO14001, a commitment which is made in the environmental policy, which helps us to ensure maximum understanding, management and reduction of environmental impact.

Our Environmental policy requires the identification of interactions with the environment and the controls necessary to reduce the risk to as low as reasonable practicable (ALARP). The following interactions with the environment are well regulated in the areas in which we operate and require routine management for our offshore activities:

- 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

The performance is not only reported to the regulators and within Centrica to operations and senior management it is reported to a number of other forums such as to the Carbon Disclosure Project. Our performance is also available on the external Centrica website (www.Centrica.com).

Improvements in performance are planned and managed within the annual improvement planning cycle with objectives, targets and milestones tracked through the year. The improvements are aligned with business operational plans and requirements and are approved by senior management.

This report summarises the performance and initiatives of Centrica's exploration and production operations in 2015 and the planned improvements in 2016 as required by OSPAR¹.

¹ OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry

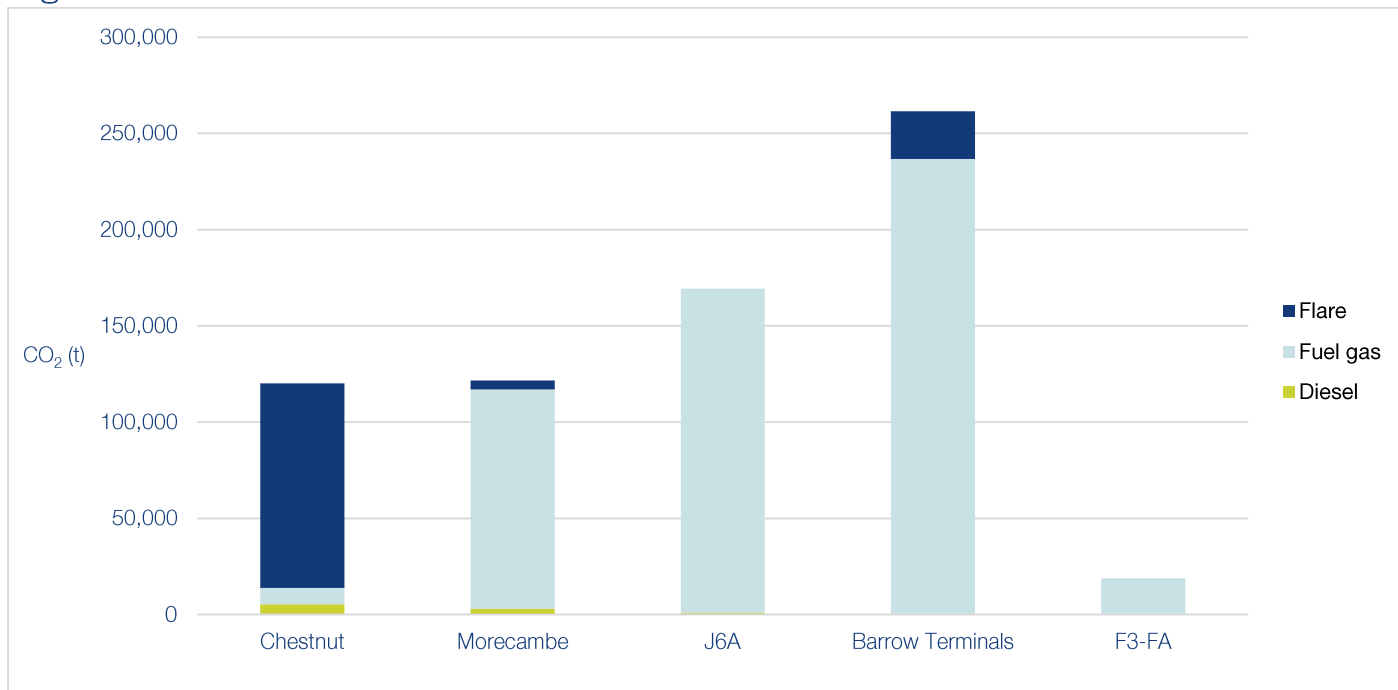
Our Performance

The environmental performance of our activities in 2015 is summarised below and presented in detail in the appendix in relation to regulatory compliance.

Carbon dioxide emissions

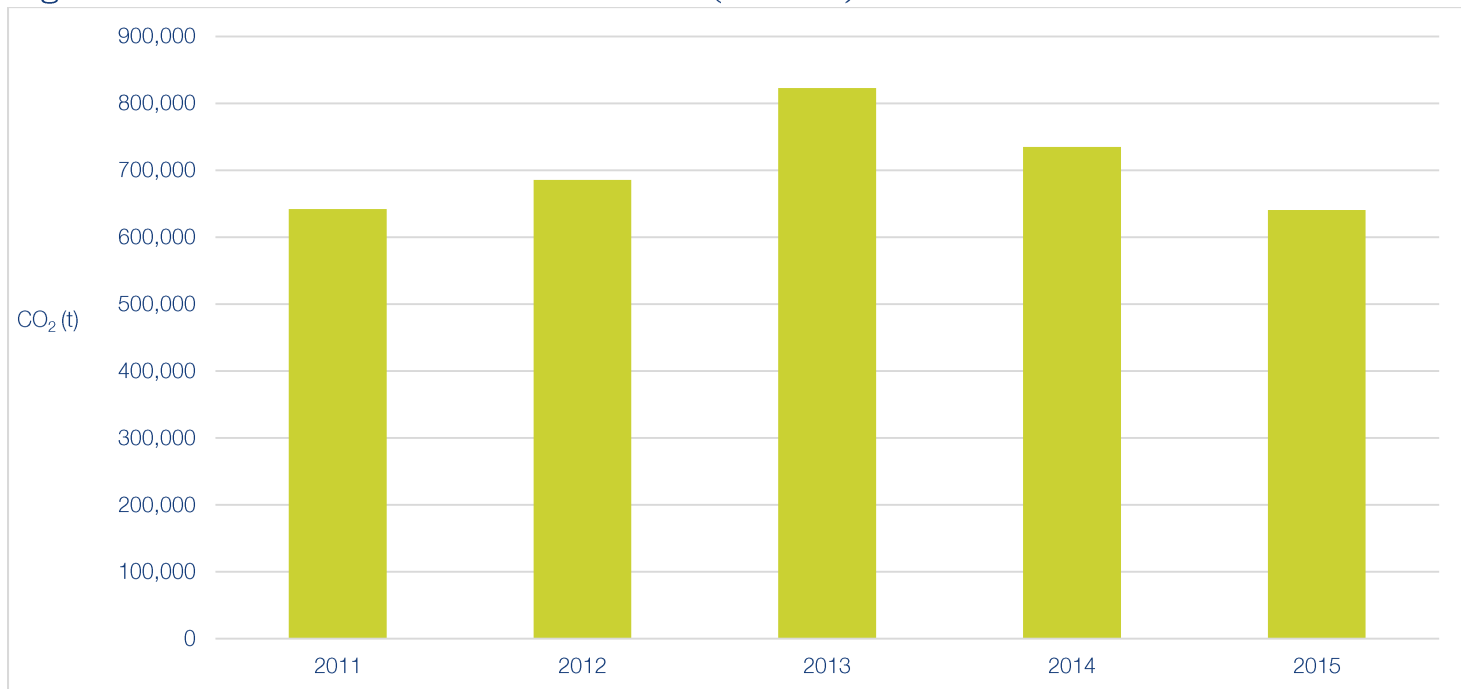
The emissions from our offshore and onshore installations are shown in figure 1 for our higher emitting facilities and in the appendix for all our emitting facilities. The difference in scale of emissions demonstrates that the greatest emissions are from the gas-fired turbines on the production installations and the gas processing at Barrow Terminal. The emissions from the Not Permanently Attended Installations are approximately 1,000 times lower than the higher emitters in our portfolio.

Figure 1 – Carbon dioxide emitted in 2015



Carbon dioxide from the combustion emissions from Chestnut FPSO, Morecambe offshore, J6-A in GMA and Morecambe onshore from the terminals are part of the EU Emissions Trading System (EU ETS). In 2015 Chestnut, Morecambe and the Barrow Gas Terminals met the ETS free allowances limits.

Figure 2 – Historical carbon dioxide emitted (EU ETS)

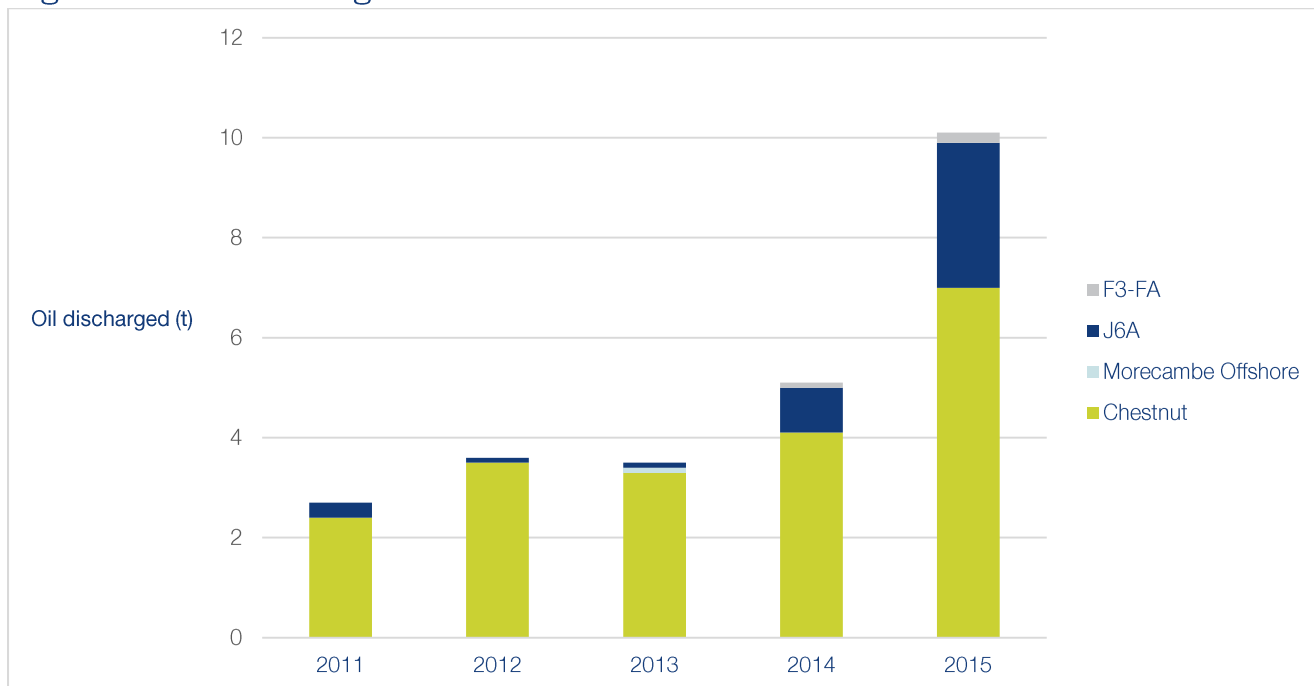


Carbon dioxide emissions have decreased from 2014 due to a reduction in overall production and an extended shutdown in 2015 at the Barrow Gas Terminals. In 2015, three of our facilities were assessed as part of the Energy Savings Opportunities Scheme and we will be assessing the opportunities identified in 2016 as part of our performance improvement activities.

Oil discharged in produced water

Oil is discharged to sea in produced water following treatment in the Chestnut FPSO, Morecambe, J6-A and F3-FA facilities. The total oil in the produced water discharged from these facilities over the past five years is shown in figure 3. All oil to sea discharges in produced water were within the oil tonnage permitted limit (where applicable) in 2015 and there was only one short term exceedance of the 30 mg/l legal oil concentration limit at Morecambe.

Figure 3 – Oil discharged to sea 2011-2015



The increase of oil discharged in produced water from our assets in 2015 was due to increased production at both Chestnut and J6-A and aquifer breakthrough at F3-FA. The reinjection system on J6-A was offline in 2014 and 2015; however there are plans to re-instate this system in 2016.

Chemical use and discharge to sea

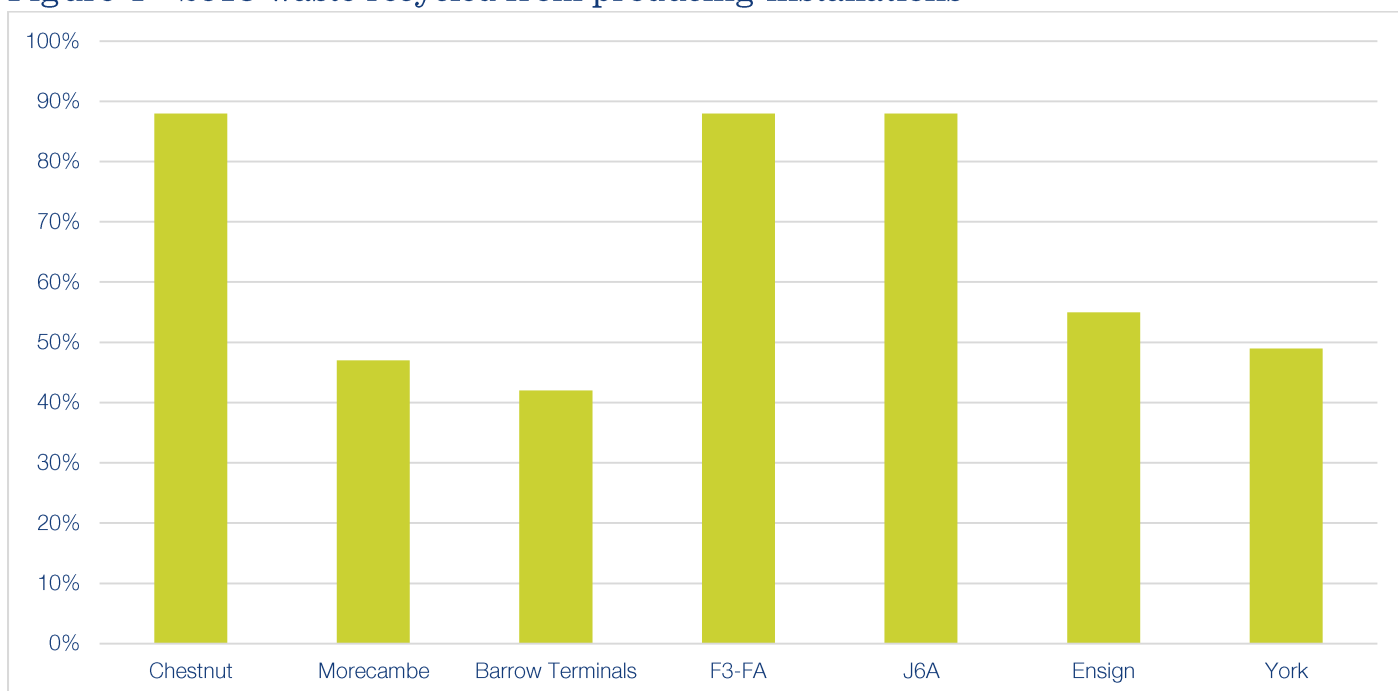
The amount and type of chemicals used for our offshore operations differ depending on the activities and reservoir types e.g. rock type to be drilled, well design and production functions such as corrosion inhibition. The highest chemical use and discharge in our operations occurs during well operations. In 2015 we saw lower drilling activity than previous years, accounting for the decrease in chemical volumes discharged for drilling. This was partially offset by increased production from the Chestnut reservoir and the start-up of wells in GMA which required high methanol use.

A routine review of the technical justifications for chemicals flagged for substitution is carried out within Centrica to ensure opportunities for minimisation of use and/or discharge are realised.

Waste generation and disposal

The generation of waste from our operations and the management of the disposal are key environmental issues facing the oil and gas industry. In 2015 our UKNL and Norwegian well and production operations collected 1,612 tonnes of waste material and transported it to shore for treatment and disposal. Of this total waste 40.6% (including drill cuttings) and 87% (excluding drill cuttings) was recycled. The recycling percentages at our operational installations in 2015 (figure 4) reflects the activities, including maintenance and project activities, undertaken at our assets this year. Although reuse and recycling is maximised through waste segregation both on and offshore, there remain opportunities to reduce the production of waste and therefore avoid management and disposal. Centrica has focused attention on this opportunity in a 2015 project in the Netherlands Hub (see case study on the following page).

Figure 4 – 2015 waste recycled from producing installations



In the future we expect a greater focus on the management of waste generated through our decommissioning activities.

Unplanned events

Spills to sea

There were 11 spills to sea in 2015, of which seven were oil and four were chemical. The seven oil spills to sea released a combined total of less than 5 kg of oil. Maintenance of equipment or changes to processes and procedures have been carried out to prevent a recurrence of these events. The four chemical releases totalled less than 0.5 kg – of these, three were due to topsides lack of containment and one was from a hydraulic fluid leak from a remotely operated vehicle.

Other regulatory non-compliances

We submitted 11 permit non-compliances in 2015 to the UK regulator. Two were late Offshore Chemical Regulation returns, five were non-compliances with the Consent to Locate permits, one was related to a Marine License deposit limit exceedance and one was an exceedance of oil in produced water permit limit.

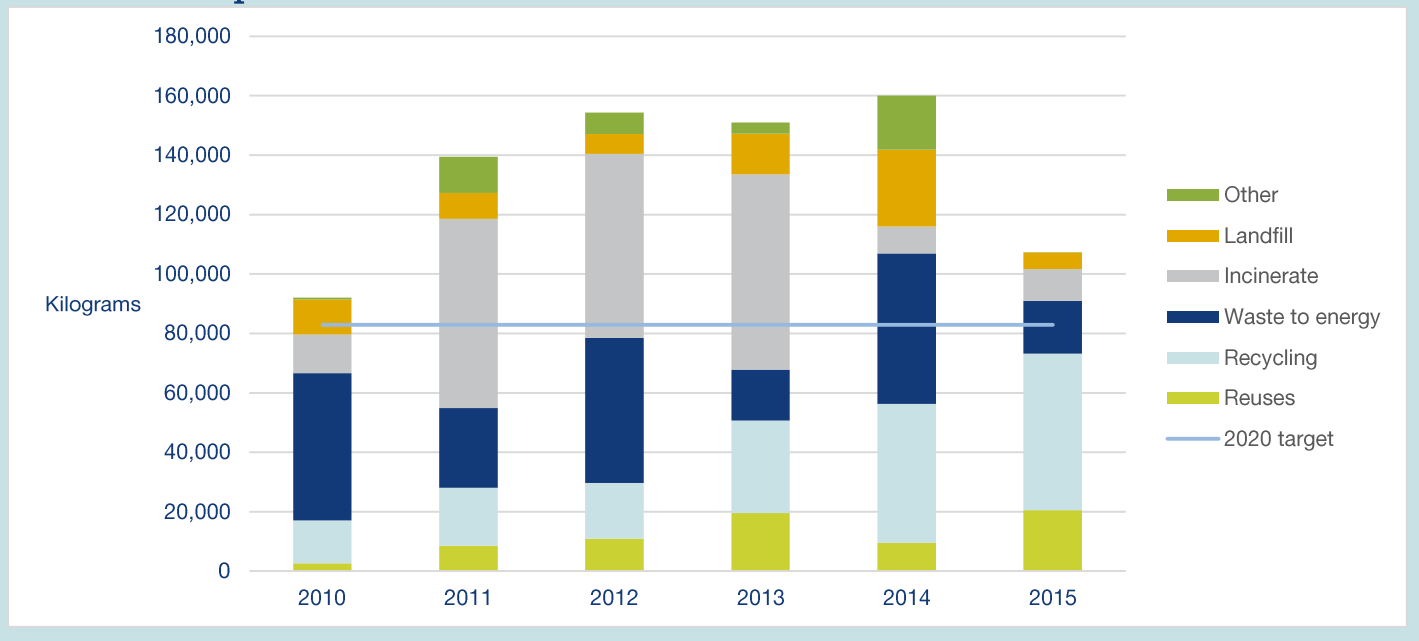
All events were recorded and investigated to provide lessons learnt for future activities.

Case Study: Waste Reduction at Sourcein Netherlands Hub

In 2014 and 2015 the Netherlands Hub reviewed waste generation and disposal throughout the supply chain and started an improvement project. The goal of this project was to ensure efficient and effective waste management in order to reduce risk to people and environment and explore potential cost saving opportunities. This project is a combined effort from Operations, HSE and the Procurement department with the sponsorship from the Netherlands Commercial Manager.

The amount and type of waste varies significantly at our oil and gas production sites depending on the status of operation, and we strive to control and limit the amount of waste generated at all times. As part of this initiative we have committed to a 10% waste reduction target by 2020 at our offshore gas and oil platforms in the Netherlands. This is a significant commitment given the increasing maintenance requirements in ageing assets. There are a number of activities underway to ensure the target is met, such as raising awareness of waste reduction and segregation, as well as decreasing packaging taken offshore. As can be seen from the graph below, this initiative has been successful in reduction of the waste to landfill in 2015.

Annual waste performance



Barrow Gas Terminals

Onshore processing

Hydrocarbons from the Morecambe Bay assets were processed at the South, North and Rivers Gas Terminals in 2015. The terminals operate under an Environmental Permit which is regulated by the Environment Agency (EA) and a performance report is submitted annually for this site.

Emissions to air from process and combustion sources and discharges to water are monitored and managed within the limits specified in the permit. Any deviation from these limits is investigated to prevent a reoccurrence.

In 2015 there were four notifications to the EA regarding breaches of the permit limits.

Three of these notifications were regarding breaches of the NO_x emission limit from the Rivers Acid Plant during the start-up of the plant. The emission limit breaches were of a short duration and regarded as a minor breach by the EA. The final notification followed a spill of chemical on site, some of which entered the site drains and was washed from the site during clean-up to surface water. Investigation of this event led to improvements to the drains, processes and site procedures to prevent recurrence.

Work on the £84m Barrow Terminals Project has now been completed. The construction of the new pipeline between the South and North Morecambe Terminals allows all of the gas from the South Morecambe field to be processed through the North Morecambe Terminal. This improves the efficiency of the gas processing with the environmental benefit of significant reductions of CO₂, NO_x and carbon monoxide emissions from combustion activities on site. It is estimated that the project will reduce CO₂ emissions from the terminals by up to 65,000 tonnes per year.

The project has also eliminated the need for the use of hydrochlorofluorocarbons (HCFCs) on South Morecambe Terminal, which are ozone depleting substances and subject to phase out under the Montreal Protocol.



The Big Clean

In line with the OSPAR initiative on marine litter, our long-term commitment to beach cleaning in and around our Morecambe Bay operations has been extended to our UKNL headquarters in Aberdeen.

The programme in Aberdeen started in 2015 in support of the September National Beach Clean weekend, with collaboration between Centrica and one of our contract partners Wood Group. The team cleaned up beaches in an area highlighted by local residents as needing particular attention and the effort

was supported by both the Marine Conservation Society and Aberdeen City Council. In total, the team removed 111kg of rubbish including a bag full of hypodermic needles.

In 2015 the Morecambe initiative focused on the North Walney National Nature Reserve near Barrow-in-Furness, Cumbria. In partnership with the Furness Waste Consortium and Wildlife Trust, we have removed over 5,000 kg of rubbish in over 100 events. In 2015 we won the environmental volunteer of the year category in the annual Love Barrow awards and were finalists in the National Clean Britain awards.

We were able to restore the natural beauty of areas around our oil and gas sites in Barrow and Morecambe Bay, as well as supporting the local community in Aberdeen. It is planned to carry on this initiative at both locations in 2016.

2015-2016 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 (including compliance with the EU Offshore Safety Directive requirements in the UKNL region). Development of the management process for environmentally important elements across UKNL producing facilities.	Establishment of the process safety and maintenance excellence projects in 2016 as part of enhancing the process safety framework. Management framework developed for controls across UKNL in relation to the EU Offshore Safety Directive safety and environmental critical elements and controls to prevent lower severity events In 2016 we will review sources and equipment controls for releases of hydrocarbons and chemicals from all installations in the UKNL Region
Carbon/energy management	Development of carbon and energy management plans for the offshore producing installations.	Energy savings opportunities were investigated for the UK assets as required by Energy Savings Opportunities Scheme (ESOS) as the first step in development of the plan In 2016 we will review and assess the energy saving opportunities highlighted by the ESOS and develop a UKNL carbon/energy management plan
Performance	Common reporting system across the E&P business and review all performance metrics.	The new management tool (myHSES) for Health, Safety, Environment and Security includes environmental event and performance reporting has been rolled out and we are embedding this within the business. In 2016 we will continue embedding and optimising myHSES for management of environmental performance. In 2015 we established a carbon intensity of production metric within Centrica for the UKNL region and in 2016 we will continue to monitor our performance in this metric.
Awareness and training	Improvements in environmental awareness training across UKNL	In 2015 we reviewed our existing systems against internal standards and ISO14001 standard requirements and started development of requirements for the UKNL region environmental competencies. In 2016 we will finalise the requirements and initiate their fulfilment.

Appendix

Performance Data

UKNL Region									Norway Region	
KEY INDICATOR	Morecambe		UK North Sea		NL North Sea				Vale	1 Well Operation
	South Morecambe	Morecambe NPAIs	Chestnut	UKCS NPAIs ²	J6-A	F3-A	GMA NPAIs ³	9 Well Operations		
Annual average oil in produced water mg/l	22	N/A	12.6	N/A	8.3	5.3	N/A	N/A	N/A	N/A
Tonnage of oil in produced water to sea	0.01	N/A	7.02	N/A	2.72	0.19	N/A	N/A	N/A	N/A
CO ₂ from combustion for power generation (t)	117,061 ¹	N/A	15,836 ¹	286	107384 ¹	18750	234	N/A	N/A	N/A
CO ₂ from flaring (t)	4,575.9 ¹	N/A	106,398 ¹	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of substitution chemicals remaining in use	1	0	3	0	1	1	N/A	15	1	0
Amount of permitted chemicals discharged (t)	13.9	N/A	130.5	N/A	1694	0.18	N/A	2003	0.2	46.0
Percentage of permitted chemicals discharged with a SUB warning (%)	0	N/A	30.7	N/A	45	0	N/A	0.3	76	0
Waste volume (t)	500	N/A	133.7	25.6	78.9	27.7	7.8	835	N/A	2
% of total waste recycled	47	N/A	88	50	88	88	85	30 ⁴	N/A	0

¹ = ETS Verified Data / ² = Total Ensign and York / ³ = Total ST-1, Chiswick and Grove / ⁴ = includes drill cuttings waste

The NPAIs have no discharge of produced water to sea and the power generation on the facilities is diesel driven below 20MW and produces limited emission. Subsea infrastructure emissions/discharges and waste are managed via the host installations

Morecambe NPAIs = Five DP, Calder and Millom West NPAIs, subsea infrastructure for Rhyl and Dalton. Waste included in S Morecambe

UKNS NPAIs = Ensign and York NPAIs, subsea infrastructure for Trees, A-Fields, Eris/Ceris, Seven Seas

GMA NPAIs- Greater Markham Area Other = Chiswick, Grove and ST-1 NPAIs, subsea structure for Stamford and 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 Heimdahl platform.

Unplanned event data

KEY INDICATOR	UKNL Region				Norway Region					
	Morecambe		UK North Sea		NL North Sea			Wells and Projects	Vale	Wells
	South Morecambe	Morecambe Other	Chestnut	UKCS Other	J6-A	F3-A	GMA Other			
Number and total tonnage of oil spilled	2 (<0.001)	4 (<0.003)	0	0	0	0	0	1 (0.0005)	0	0
Number and total tonnage of chemicals spilled	0	1 (0.0001)	1 (0.0003)	0	0	0	0	2 (0.0002)	0	0
Number of environmental permit non-conformances	1	0	2	6	0	0	1	1	0	0

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

UKNS Other = Ensign and York NPAs, subsea infrastructure for Trees, A-Fields, Eris/Ceris, Seven Seas

GMA – Greater Markham Area Other = Chiswick, Grove and ST-1 NPAs, subsea structure for Stamford and 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 Heimdahl platform

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