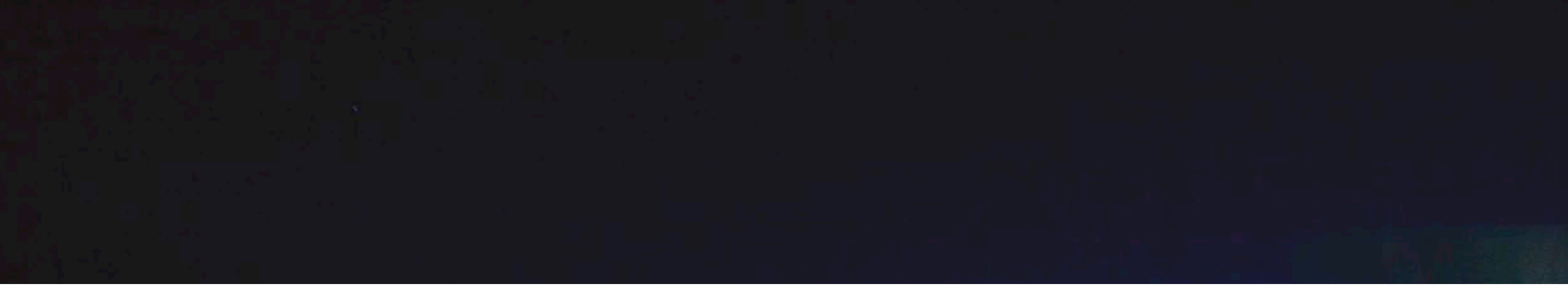

2015 ENVIRONMENTAL REPORT

ENVIRONMENTAL WORK BY THE OIL AND GAS INDUSTRY

FACTS AND DEVELOPMENT TRENDS

The Norwegian Oil and Gas Association (formerly the Norwegian Oil Industry Association) is an interest organisation and employer's association for oil and supplier companies related to exploration for and production of oil and gas on the Norwegian continental shelf (NCS). Norwegian Oil and Gas represents just over 100 member companies, and is a national association in the Confederation of Norwegian Enterprise (NHO).

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1 FOREWORD

THE NORWEGIAN OIL AND GAS ASSOCIATION PUBLISHES AN ANNUAL ENVIRONMENTAL REPORT CONTAINING A DETAILED OVERVIEW OF ALL EMISSIONS/DISCHARGES FROM THE PETROLEUM INDUSTRY IN THE PREVIOUS YEAR. ITS PURPOSE INCLUDES IMPARTING EMISSION/DISCHARGE DATA AS WELL AS THE INDUSTRY'S WORK AND RESULTS IN THE ENVIRONMENTAL AREA.

Pursuant to the Norwegian Environment Act, all operators on the Norwegian continental shelf (NCS) must submit annual emission/discharge reports. All emissions/discharges and all waste generated from operations on the NCS must be reported in detail.

This report derives its information from Environment Hub (EEH), a joint database for Norwegian Oil and Gas, the Norwegian Environment Agency (NEA) and the Norwegian Petroleum Directorate (NPD). Pursuant to the Environment Act, all operators on the NCS must submit annual emission/discharge reports in accordance with the requirements specified in the activities regulations and set out in detail in the NEA guidelines for reporting from offshore petroleum activities (M-107 2014). Where the operator companies are concerned, these requirements mean that all emissions/discharges and all waste generated from operations on the Norwegian continental shelf (NCS) must be reported in detail on an annual basis. In addition to sending the emission/discharge report for each field to the NEA, all the data must be posted to the EEH. That applies both to planned and officially approved operational emissions/discharges and to those which occur accidentally. Common parameters ensure consistent emission/discharge reporting from all production licences.

This environmental report contains a synthesis of all emissions/discharges, as well as a summary of results from research projects related to the marine environment and environmental monitoring.

The definition of the petroleum industry accords with the one provided in the Norwegian Petroleum Tax Act. Emissions/discharges from the construction and installation phase, maritime support services and helicopter traffic are therefore excluded.

This English version is a translation of the Norwegian report. Electronic versions in both English and Norwegian are published on the Norwegian Oil and Gas website at www.norskoljeoggass.no. Field-specific emission/discharge reports submitted to the NEA can also be downloaded from the site.

2 SUMMARY

ACTIVITY ON THE NCS WAS AT A RECORD LEVEL IN 2014, EVEN THOUGH OIL PRICES ALMOST HALVED. RECOVERY FACTORS FROM RESERVOIRS ON THE NCS REMAIN HIGH, WHILE EMISSIONS PER UNIT PRODUCED ARE ONLY ABOUT 50 PER CENT OF THE INTERNATIONAL AVERAGE. THIS DEMONSTRATES THAT THE NORWEGIAN OIL INDUSTRY IS A TECHNOLOGICAL FRONT-RUNNER FOR BOTH PRODUCTION AND ENVIRONMENTAL MEASURES.

Acute discharges of oil are continuing to decline, and the effect of the preventive measures implemented by the industry has led to a steady decline in such incidents over almost a decade. Discharges from drilling activities are also falling, and environmental monitoring shows that no significant effects can be detected beyond about 250 metres from the discharge site. Although production is more demanding on the aging fields, the oil content in produced water is 60-70 per cent below the official threshold and further reductions are being sought – particularly on the new large fields due to be brought on stream. Greenhouse gas emissions have risen from 12 to 13 million tonnes because of increased production and more energy-intensive operation.

After several years of high oil prices, activity on the NCS reached a record level in 2014. A high level of exploration activity and new discoveries also mean that prospects for a long period of declining production have been replaced by a flat trend for output. In addition, operating parameters for the petroleum industry are changing. Oil prices have more than halved since June 2014, and the profitability of new development projects is under pressure. Reducing costs on the NCS accordingly represents a priority for the whole industry, where Norwegian government policies will also be important.

The oil and gas sector currently accounts for about a quarter of Norway's overall value creation measured by gross domestic product (GDP), and provided roughly the same share of national greenhouse gas emissions in 2014. That means the petroleum industry's contribution to emission cuts will also be an important part of the climate solution. The Norwegian government deploys a number of instruments to regulate emissions from oil and gas activities. These have unleashed a number of measures by the industry, resulting in emission cuts documented in broad-based studies conducted over recent years both by the sector itself and by the government.

CO_2 emission figures for 2014 show some increase from the year before, but remain lower than in 2008. They have varied between 12-13 million tonnes annually since 2007. No rise has been recorded despite very high recovery factors for the reservoirs, ever more energy-intensive production on mature fields, and the fact that a growing proportion of output consists of gas which requires more energy to export than oil.

Total emissions of NO_x from petroleum operations rose by just over 2 000 tonnes in 2014. At around 50 000 tonnes per annum, the overall figure has changed very little in recent years. The oil and gas industry is a substantial contributor to the environmental agreement on NO_x, which regulates the commitments made to the government by Norway's industry associations on reducing their overall emissions of these gases through a fund model. Commitments have so far been met, and the fund can report important contributions to developing both new and environmentally effective solutions and new markets and market players. A positive additional effect is that the NO_x projects implemented will also cut emissions of CO_2 equivalent by about 400 000 tonnes per annum, calculated from 2014. This represents a significant contribution to Norwegian emission reductions.

Emissions of non-methane volatile organic compounds (nmVOC) have risen since 2013. Uncertainty has prevailed over how large a reduction effect one of the technological solutions actually provides when recovering vapour during offshore loading. As a result, the NEA and the VOC Industry Collaboration have jointly sought ways to improve documentation of these emissions. The increase in the emission figure reflects improved emission factors based on measurements. Emissions from loading were therefore probably underestimated in earlier years when these vessels have had this technology installed. Nevertheless, overall nmVOC emissions have been cut by about 80 per cent since 2001, primarily as a result of measures on shuttle tankers.

The petroleum industry has worked intensively to reduce discharges to the sea, which derive primarily from drilling and produced water. Discharges of the latter rose somewhat in 2014, but remained substantially lower than in 2007. Produced water represents the most important source of oil discharges on the NCS. It is worth noting that the oil content in produced water on the NCS is no less than 60-70 per cent below the threshold set by the environment authorities, both nationally and internationally. Monitoring has not identified any significant environmental effects from produced water discharges.

Discharges of water-based drilling fluids and drill cuttings were further reduced in 2014 and are now almost 50 per cent lower than in 2010 – despite a high level of drilling activity in recent years.

Discharges of chemical additives from the Norwegian petroleum sector declined somewhat in 2014. No less than 91.3 per cent of these were in the "green" category. The reported release of "black" and to some extent "red" chemicals has risen markedly over the past two years. This reflects both changes to the regulations, with mandatory reporting also extended to safety chemicals such as fire extinguishing foam (not previously reportable), and the final shut-down of wells – which releases cement and other chemicals not tested in accordance with today's regulations and therefore reportable as black. Replacing all fire extinguishing foam on the NCS with new and less environmentally hazardous alternatives will take several years, but discharges of both red and black chemicals are still substantially lower than they were only 10-15 years ago.

No acute oil or chemical spills of any particular size occurred in 2014. The number of oil spills, particularly those with a volume exceeding 50 litres, continues to fall and has shown a declining trend over the past 15 years. This reflects the extensive preventive measures implemented by the industry. The largest single discharge of chemicals in 2014 involved oil-based drilling fluid related to an exploration well. Less than 0.01 per cent of the fluid comprised red chemicals, with the remainder being yellow and green.

The marine environment has been carefully monitored by independent scientists since the 1970s. Their findings provide an extensive body of openly available data which present possible effects of discharges to the sea from the oil and gas industry. A summary of environmental monitoring results was published in 2013, and concluded in part that the probability of the petroleum sector's operations causing significant effects is low.

Every country will need to adapt if the necessary climate goals are to be reached. All sectors must reduce their emissions, while utilisation of acreage and energy has to become more efficient. Production by the Norwegian oil and gas sector is the cleanest in the world, given that it has a high recovery factor and makes environmentally efficient use of both chemicals and energy. The industry is working purposefully to implement further energy-efficiency measures in order to reach its stated ambitions for cutting CO_2 emissions up to 2020 and to contribute to the development of new technology for reducing emissions even further.


NOHA
NOHA

3 LEVEL OF ACTIVITY ON THE NCS

THE OIL AND GAS INDUSTRY HAS COMPLETED ANOTHER YEAR WITH A HIGH LEVEL OF ACTIVITY ON THE NCS.

After several years of high oil prices, activity on the NCS reached a record level in 2014. A high level of exploration activity and new discoveries also mean that prospects for a long period of declining output have been replaced by a flat trend for production. In addition, operating parameters for the petroleum industry are changing. Oil prices have more than halved since June 2014, and the profitability of new development projects is under pressure. Reducing costs on the NCS accordingly represents a priority for the whole industry, where Norwegian government policies will also be important.

The oil and gas sector has completed another year characterised by a high and rising level of activity. During the autumn of 2014, however, it became clear that the industry was once again entering a period of upheaval. After staying largely more or less stable at over USD 100 per barrel for roughly three years, the price of Brent Blend crude has more than halved since June 2014. Complex factors underlie this development. Growth in global demand for oil was weak last year, while shale oil production in the USA continued to expand. Oil prices fell further after 27 November 2014, when Opec decided to fight for global market share and no longer wished to continue its role as a price stabiliser in the oil market. A quick reversal of the steady rise in costs in order to reach a sustainable level has thereby become very important for players on the NCS. The industry is accordingly entering a period when investment will be lower than in recent years but when the level of activity stays high in a historical perspective. Oil and gas operations on the NCS will remain the most important engine for the Norwegian economy and the development of national prosperity over coming years.

PETROLEUM OUTPUT STABLE FOR NEXT FEW YEARS

Production from the NCS in 2014 totalled 218.9 million standard cubic metres of oil equivalent (scm oe), up by 3.5 million scm oe (1.6 per cent) from the year before. This increase must be viewed in relation to the high level of exploration activity in recent years. Output in 2014 was nevertheless down 17.2 per cent from the 2004 peak. The NPD expects overall production from the NCS to lie around the present level for the next few years. Oil output could decline somewhat towards the end of this decade, while gas production will continue to rise. Only minor changes are expected for condensate and NGL during this period. Several large discoveries made in recent years will help to sustain production into the next decade. At the same time, price trends for crude oil represent a source of uncertainty for the development of investment and thereby of future production.

OIL FLATTENING OUT

Production of crude oil totalled 88.2 million scm in 2014, corresponding to 1.52 million barrels per day. That represented an increase of 3.3 million scm (3.9 per cent) from the year before. Output in 2014 derived from 73 fields as well as one discovery with test production. Oil output had been expected to go into reverse during 2014, but completion of several large projects on producing fields and the drilling of many wells helped to ensure an increase instead. In addition comes the start-up of new fields. Since peaking in 2000, oil production from the NCS has declined by 51.3 per cent. The NPD's forecast for the next five years shows relatively stable oil output for the immediate future before another downturn begins towards 2019. Production already approved will account for 94 per cent of the volume over these five years.

STEADY RISE FOR GAS

Gas sales in 2014 totalled 108.8 billion scm, on a par with the year before and in line with the NPD's forecast in 2013. When converted to oil equivalent, gas output from the NCS has exceeded oil production since 2010. Gas production is expected to be stable over the next couple of years before again showing some increase. Output in 2019 is predicted to be up by about four per cent from 2014.

GRADUAL DECLINE LIKELY FOR LIQUIDS

NGL production totalled 18.9 million scm oe in 2014, up by 1.2 million scm oe from the year before. The NPD estimates that output of NGL will remain stable towards 2019. A total of 2.9 million scm oe of condensate was produced in 2014, down by 1.1 scm oe from the year before. According to the NPD, this decline will continue over the next couple of years before output recovers to the 2014 level by 2019. Overall liquids production from the NCS is expected to fall from 110 million scm oe last year to 102 million scm oe in 2019.

UNCERTAINTY PREVAILS

The NPD's production forecasts for the next few years are based on the assumptions which prevailed in the autumn of 2014. Oil prices have fallen substantially over a few months and this trend, should it persist over time, will have consequences for the level of activity on and thereby also production from the NCS. These effects could take the form of postponed development projects, reduced measures to improve recovery and the drilling of fewer production wells.

45 PER CENT OF TOTAL RESOURCES SOLD AND DELIVERED

The NPD's resource accounts estimated that recoverable petroleum resources at 31 December 2014 totalled 14.1 billion scm oe, a slight decline from 2013. Of this figure, 6.4 billion scm oe or 45 per cent have been sold and delivered. Total recoverable petroleum resources declined by 21 million scm oe (0.2 per cent) from 2013, following a reassessment of 12 discoveries in the previous accounts which are now considered to have a low development probability. Reserves are estimated to have grown by 13 million scm oe in 2014, compared with 102 million scm oe the year before. Including last year's growth, reserves fell by 206 million scm oe.

50TH ANNIVERSARY ON NCS

Fifty years have passed since oil activities began in Norway, its continental shelf boundaries were defined, and its first – and biggest – offshore licensing round was staged. Regulations for petroleum operations on the NCS were established by royal decree on 9 April 1965. The first licensing round, covering 278 blocks in the North Sea below the 62nd parallel, was announced just four days later. That occurred two months after Norway and the UK had signed a treaty on dividing the continental shelf between them in accordance with the median line principle. A similar treaty was concluded with Denmark on 8 December that year.

INVESTMENT PEAKED IN 2014

The Statistics Norway investment survey for the third quarter of 2015 confirmed that the level of activity on the NCS passed its peak in 2014 and will decline somewhat in the time to come (see figure). Nevertheless, the companies expect activity in the petroleum sector to remain at high in a historical perspective during 2015 and 2016.

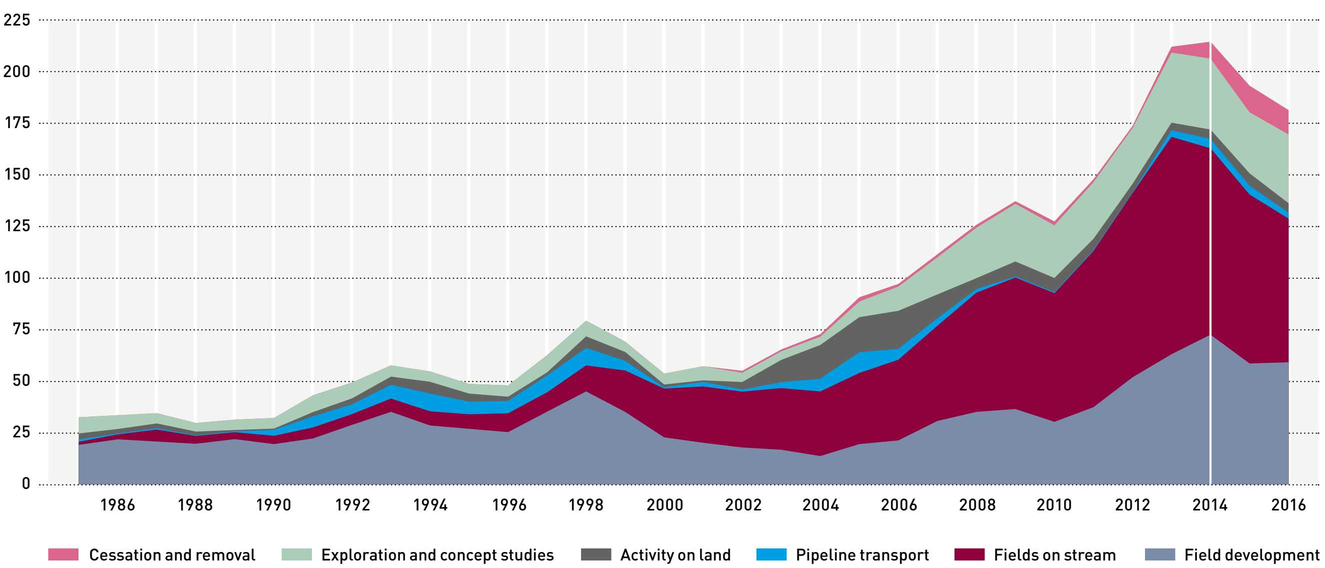
According to the survey, investment in the oil and gas sector, including pipeline transport, totalled NOK 214.3 billion in 2014, up by NOK 2.4 billion from the year before. Compared with 2013, capital spending increased for exploration, land-based operations and pipeline transport but showed an overall decline of NOK 5.5 billion for fields. The third-quarter survey estimated total investment in 2015 and 2016 at NOK 190.3 billion and NOK 181.2 billion respectively.

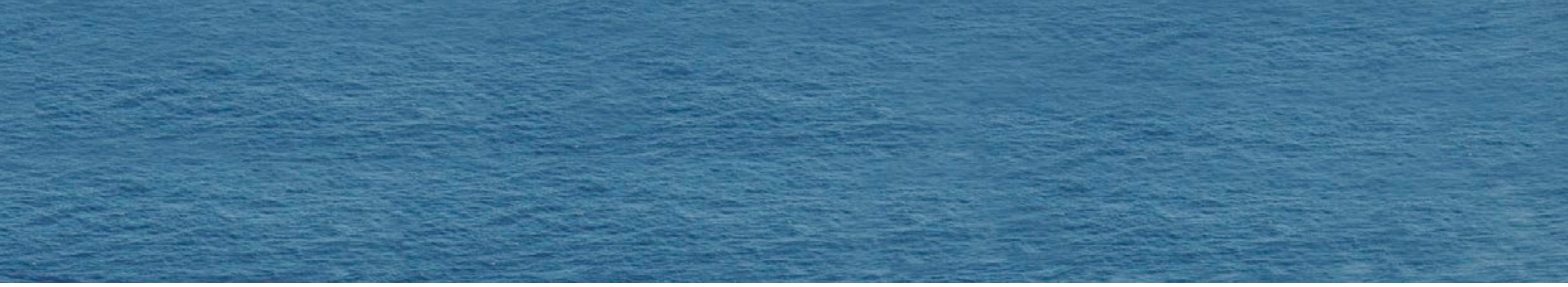
23RD ROUND OPENS NEW AREA OF NCS

The Ministry of Petroleum and Energy announced the 23rd licensing round in January, covering 57 whole or part blocks. These break down into 34 in Barents Sea South-East (the former area of overlapping claims with Russia), 20 in the rest of the Barents Sea and three in the Norwegian Sea. This represents the first time since 1994 that the opportunity has been offered to explore a new area of the NCS, which is important given today's demanding conditions for the industry. The government aims to award new production licences in the first half of 2016.

FIGURE 01 ACCRUED INVESTMENT BY TYPE IN THE OIL SECTOR
NOK BN

Source: Statistics Norway





4 DISCHARGES TO THE SEA

DISCHARGES TO THE SEA DERIVE PRIMARILY FROM DRILLING AND PRODUCED WATER. DESPITE A HIGH LEVEL OF DRILLING FOR BOTH EXPLORATION AND PRODUCTION WELLS, DISCHARGES FROM THIS ACTIVITY DECLINED IN 2014. PRODUCED WATER DISCHARGES ROSE SOMEWHAT FROM 2013. AS FIELDS AGE, THE PRODUCED WATER CUT IN WELLSTREAMS IS RISING.

4.1 DISCHARGES FROM DRILLING

The level of drilling activity was high in 2014, and on a par with 2013 as well as the peak year of 2001.

The fluid used when drilling wells has many functions. These include bringing up drill cuttings, lubricating and cooling the drill bit, preventing the borehole from collapsing and, not least, keeping pressure in the well under control to prevent an uncontrolled blowout of oil and gas.

The industry primarily utilises two types of drilling fluids today: oil- and water-based. Ether-, ester- or olefin-based "synthetic" fluids were also utilised earlier, but have been little used in recent years.

Discharging oil-based or synthetic drilling fluids, or cuttings contaminated with these, is prohibited if the oil concentration exceeds one per cent by weight – in other words, 10 grams of oil per kilogram of cuttings. Used oil-based drilling fluids and contaminated cuttings are either shipped ashore as hazardous waste for acceptable treatment or injected in dedicated wells beneath the seabed.

Consumption of oil-based drilling fluids declined in 2014 by about 15 per cent from the year before. None was discharged to the sea. The proportion of fluids injected fell somewhat during 2014, while the share sent ashore rose correspondingly.

Injection of drill cuttings contaminated with oil-based fluids also declined from 49 per cent in 2013 to 29 per cent last year. This primarily reflected increased drilling activity on fields without established injection wells.

However, the quantity of cuttings recorded as being delivered to land in the form of hazardous waste considerably exceeds the figures given above. This is because the cuttings are slurrified on the platforms

FIGURE 02 WELLS DRILLED ON THE NCS

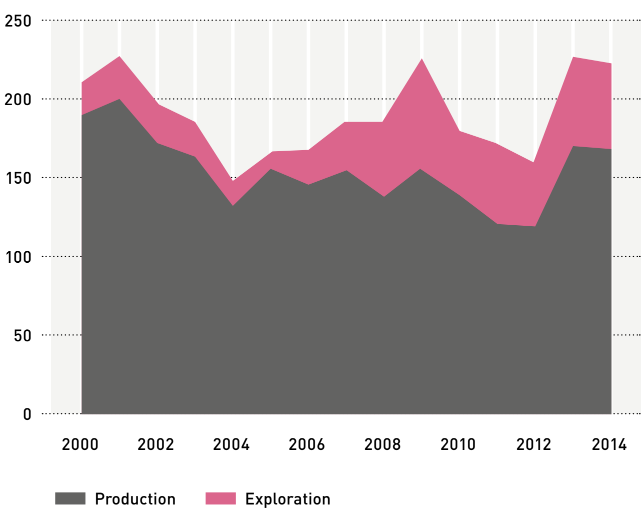
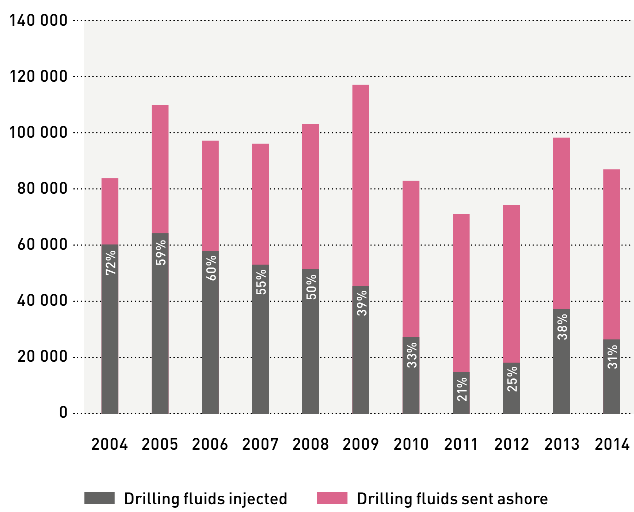


FIGURE 03 DISPOSAL OF OIL-BASED DRILLING FLUIDS (TONNES)



offshore so that they can be handled more easily to and from the vessels shipping them to land. Oil-contaminated cuttings delivered as waste totalled just under 50 000 tonnes in 2013, which rose to 76 550 tonnes last year.

Discharges of water-based drilling fluids were reduced by almost seven per cent in 2014, and totalled 113 505 tonnes. These substances contain natural components such as clay or salts, and will be classed as green chemicals in the NEA's classification system. In line with Ospar, they pose little or no risk to the marine environment when discharged. The possible impact of these discharges is tracked by environmental monitoring. See chapter 5.

FIGURE 04 DISPOSAL OF DRILL CUTTINGS CONTAMINATED WITH OIL-BASED DRILLING FLUIDS (TONNES)

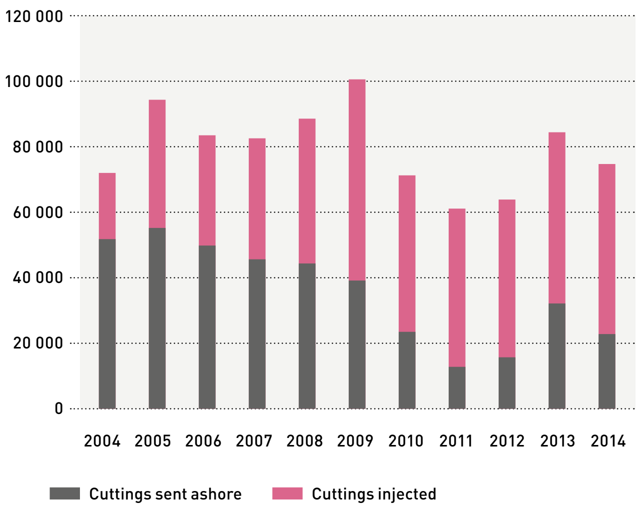
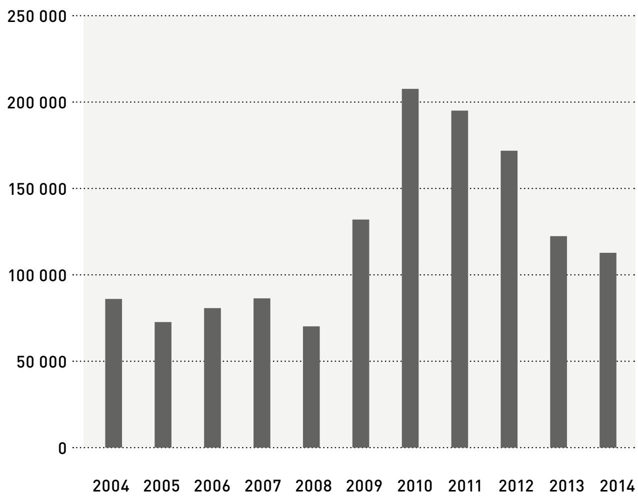


FIGURE 05 DISCHARGE OF DRILL CUTTINGS FROM WELLS DRILLED WITH WATER-BASED FLUIDS (TONNES)



4.2 DISCHARGES OF PRODUCED WATER

Volumes discharged have lain in recent years between 130-140 million cubic metres, with 141 million as the figure for 2014. The oil concentration in these discharges is about 60-70 per cent of the permitted level.

Produced water: This accompanies the oil up from the reservoir, and comprises water found naturally in the formations as well as volumes injected to boost formation pressure. Once separated out on the platform, it is treated before being discharged to the sea. The water contains various inorganic salts, heavy metals and organic compounds as well as naturally occurring radioactive substances. Various treatment technologies help to reduce its oil content below the official ceiling, which is basically 30 milligrams per litre (mg/l). Treatment facilities must be operated in an optimum manner to achieve the lowest possible oil content.

Displacement water: Seawater is used as ballast in the storage cells on some platforms. When oil is to be stored in the cells, this water must be treated before discharge. The seawater has a small contact area with the crude, so the quantity of dispersed oil is usually small. The volume discharged depends on the level of oil production.

Drain water: Water falling as rain or used to wash down decks may contain chemical residues and oil. Drain water forms only a small proportion of the total quantity discharged.

Jetting may form an additional category. Particles and oily sand which accumulate in the separators must be flushed out by water jetting from time to time. Some oil contamination remains on the particles after the water has been treated in accordance with the regulations. The quantity of oily water discharged is marginal.

Oily water can also derive from cleaning process equipment, in connection with accidents, or from the deposition of oil droplets released by flaring in connection with well testing and workovers.

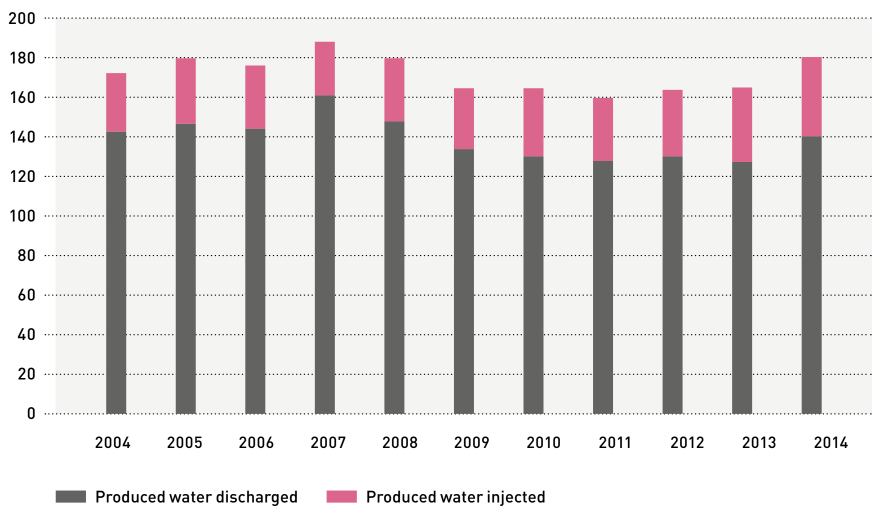
PRODUCED WATER

Forecasts for produced water discharges on the NCS rose for many years, with the volume expected to exceed 200 million scm in 2012-14. However, it peaked at 160 million cubic metres in 2007 and declined substantially in subsequent years. Discharges have lain during recent years at around 130-140 million cubic metres, and amounted to 141 million in 2014.

On certain fields where conditions permit, all or part of the produced water is injected back into the sub-surface. Such injection rose substantially from 2002, and has been about 20 per cent of the total quantity in recent years. Just over 22 per cent was injected in 2014.

Produced water on new fields pre-existed in the formations. Water – primarily treated seawater – is injected into reservoirs to maintain their pressure, in part to improve oil recovery. This is substantially higher than the world average on some NCS fields.

FIGURE 06 PRODUCED WATER DISCHARGED TO THE SEA OR INJECTED BELOW GROUND. (MILL CU.M)



However, such injection means that the quantity of produced water increases with the age of the field. The proportion (cut) of produced water on the NCS accordingly shows a rising tendency, and came to more than twice the amount of oil in 2014.

Monitoring results have not identified any environmental effects from releasing produced water. Nevertheless, the industry is working continuously to cut its discharges – partly in line with the precautionary principle and partly to achieve the continuous improvement required by Norway's HSE regulations and offered by the best available technology (BAT).

DISCHARGES OF OTHER WATER TYPES

Discharges of displacement water declined steadily up to 2009 and have since been relatively stable. Sources other than produced water accounted for just over 30 million cubic metres in 2014.

DISCHARGES OF OILY WATER

Water is treated before discharge with the aid of different technologies on the various fields. The average oil content of produced water for the whole NCS was 12.5 mg/l in 2014, compared with the official requirement of 30 mg/l. By optimising operation of their treatment facilities, operators seek to keep the quantity of oil in discharge water as low as possible. New treatment plants and improved operation have reduced the oil concentration on a number of fields. Nevertheless, the average concentration of oil in discharges on the NCS is rising. That reflects increased volumes released from certain older fields which make a relatively large contribution.

The quantity of oil in produced water discharged to the sea increased from 1 542 tonnes in 2013 to 1 761 in 2014. A total of 1 858 tonnes of oil were released in water on the whole NCS in 2014. These amounts have been relatively stable over the past 10 years. Despite extensive environmental monitoring, no significant negative effects have been identified from these discharges.

DISCHARGE OF OTHER SUBSTANCES WITH THE WATER

Produced water has been in contact with the sub-surface for a long time, and accordingly contains a number of naturally occurring substances. In addition to oil, these typically include monocyclic and polycyclic aromatic hydrocarbons (PAH), alkylphenols, heavy metals, natural radioactive materials, organic substances, organic acids, inorganic salts, mineral particles, sulphur and sulphides. Their composition will vary from field to field, depending on sub-surface properties. The content of environmentally hazardous substances is generally low, close to the natural background level in seawater.

No significant effects of these discharges have been identified, despite extensive environmental monitoring of both the water column and the seabed. See chapter 5.

FIGURE 07 RATIO BETWEEN QUANTITIES OF PRODUCED WATER AND OIL (CU.M)

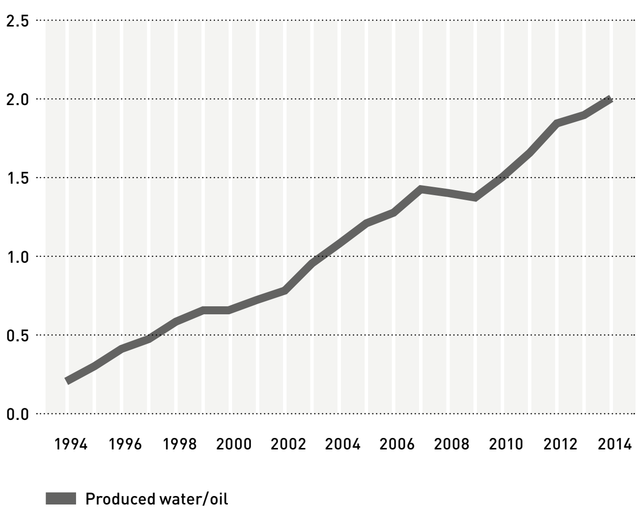


FIGURE 08 DISCHARGES TO THE SEA OF OTHER OILY WATER TYPES (MILL CU.M)

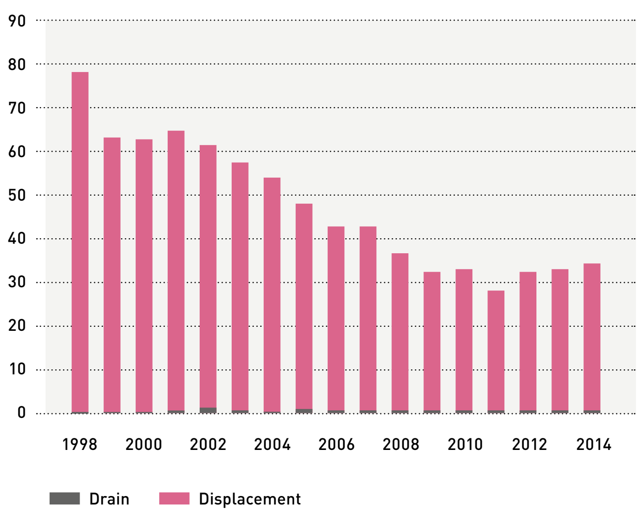


FIGURE 09 **AVERAGE OIL CONCENTRATION IN PRODUCED WATER** (MG/L)

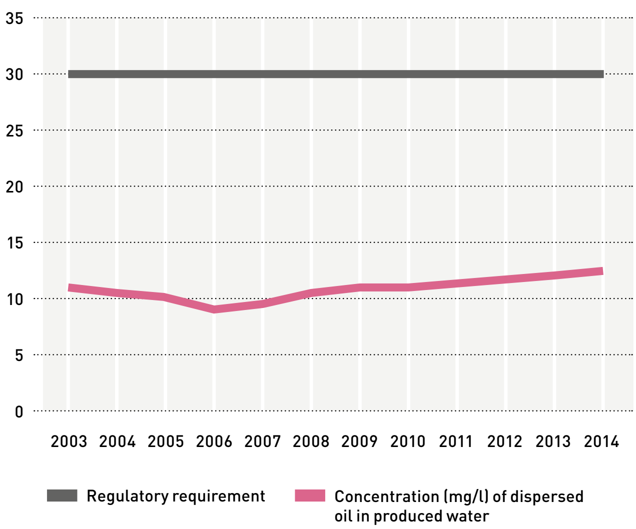
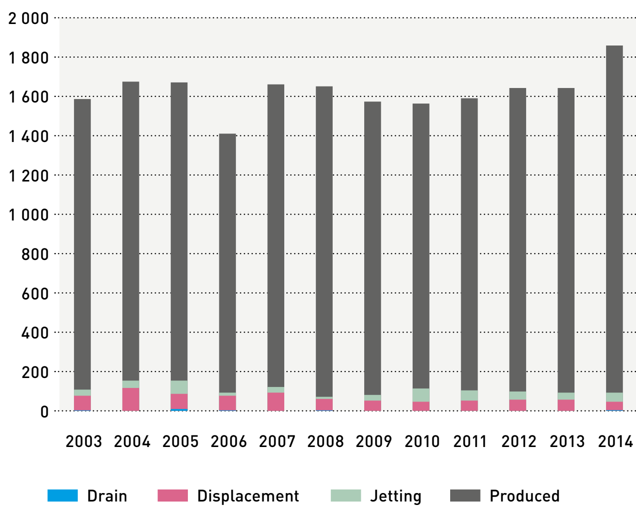


FIGURE 10 **OIL CONTENT IN WATER DISCHARGED ON THE NCS** (TONNES)



4.3 CHEMICAL DISCHARGES

Chemicals are assessed on the basis of their environmental properties, including persistence, bioaccumulative ability and toxicity (PBT). The Norwegian government has also specified criteria in the activities regulations and the guidelines for reporting from offshore petroleum operations.

A dedicated flow diagram has been developed for environmentally hazardous substances to determine which category they should be reported in. As a general rule of thumb, chemical additives are divided by the NEA into four categories in accordance with the classification in the activities regulations.

1) GREEN Chemicals considered to have no or very limited environmental impact. Can be discharged without special conditions.

2) YELLOW Chemicals in use, but not covered by any of the other categories. Can normally be discharged without specified conditions.

3) RED Chemicals which are environmentally hazardous and should therefore be replaced. Can be discharged with the permission of the government, but must be given priority for substitution.

4) BLACK Chemicals which are basically prohibited for discharge. Permits are issued only in special circumstance – where it is crucial for safety, for instance.

Discharges of chemical additives from Norwegian petroleum operations were just over 166 000 tonnes in 2014, a slight decline from the year before. Green chemicals accounted for no less than 91.3 per cent of this figure, while the red and black categories contributed 16.3 and 13.9 tonnes respectively. They thereby accounted jointly for some 0.018 per cent of discharges. Yellow chemicals represented 8.7 per cent, compared with 8.3 per cent in 2013.

Replacing chemicals with less environmentally harmful alternatives – known as the substitution duty – represents an important part of efforts to reduce the possible impact of offshore discharges. Extensive substitution of chemicals has reduced discharges of the most environmentally harmful substances to a fraction of their volume only 10 years ago. Operators must regularly assess the chemicals they use to see if they can be substituted.

However, a marked increase in reported discharges of black and to some extent also red chemicals has occurred over the past three years. The 13.9 tonnes of black chemicals discharged in 2014 was many times greater than in previous years, although still far lower than a decade ago. At 16.3 tonnes, discharges of red chemical more than doubled compared with the past three years.

Reasons for this growth are complex, and partly include actual increased releases of chemicals in these two categories. However, changed reporting requirements have also made a significant contribution. A general demand is that all chemicals to be discharged must be tested in accordance with an Ospar standard. If such test results are not available, the discharge must be reported as a black chemical.

Fire extinguishing foam was not reported earlier because it was a safety chemical and no alternative products offered satisfactory extinguishing properties. It was accordingly exempted from the substitution and reporting duties. Alternatives to certain foams which fall into the red category are now available, but it will be several years before all fields on the NCS have replaced the old types with new versions. Mandatory drills and tests will accordingly causes discharges for several years to come.

Another important contribution to the growth in reported discharges of black and red chemicals is the permanent shutdown of oil wells. This can cause the discharge of chemicals (cement and other substances) used many years ago when establishing the well or during temporary shutdowns. Since these have not been tested in accordance with today's regulations, their discharge must be reported as black chemicals.

FIGURE 11 **CHEMICAL DISCHARGES BROKEN DOWN BY THE NEA'S COLOUR CODING** (2014)

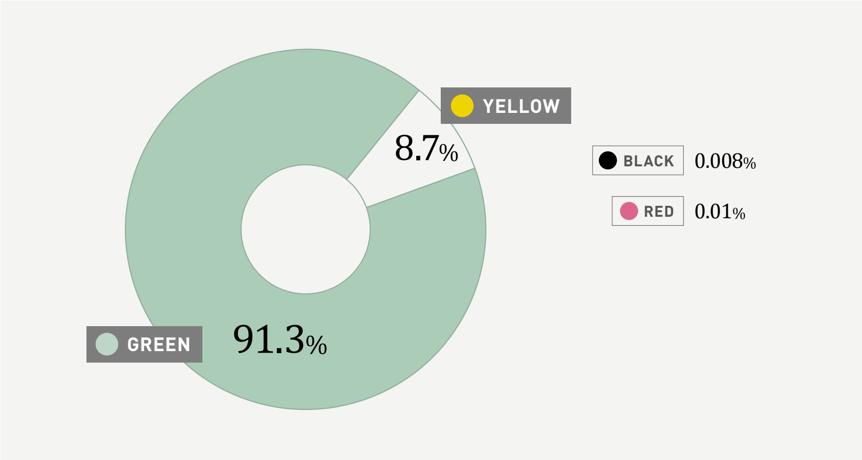


TABLE 01 **THE NEA's TABLE**

Discharge	Category[1]	NEA colour category
Water		
Substances on Ospar's Plonor list	201	Green
Substances covered by Reach annex IV [2]	204	Green
Certain substances covered by Reach annex V [3]	205	Green
Substances with no test data	0	Black
Substances thought to be, or which are, hazardous to genes or reproduction [4]	1.1	Black
List of prioritised substances in result objective 1 (priority list)	2	Black
Biodegradability $< 20\%$ and log Pow ≥ 5 [5, 4]	3	Black
Biodegradability $< 20\%$ and toxicity EC_{50} or $LC_{50} \leq 10$ mg/l [4]	4	Black
Two out of three categories: biodegradability $< 60\%$, log Pow ≥ 3, EC_{50} or $LC_{50} \leq 10$ mg/l	6	Red
Inorganic and EC_{50} or $LC_{50} \leq 1$ mg/l	7	Red
Biodegradability $< 20\%$ [4]	8	Red

Discharge	Category[1]	NEA colour category
Substances in yellow category:		
Substances with biodegradability $> 60\%$	100	Yellow
Substances with biodegradability 20-60%		
Sub-category 1: expected to biodegrade fully	101	Yellow
Sub-category 2: expected to biodegrade to environmentally non-hazardous substances	102	Yellow
Sub-category 3: expected to biodegrade to substances which could be environmentally hazardous	103	Yellow

[1] A description of the category is provided in the flow diagram. Category in table 5-1 has been related to category in table 6-1 to ensure correspondence with reported figures in the two tables.

[2] Removed from the black category in the activities regulations.

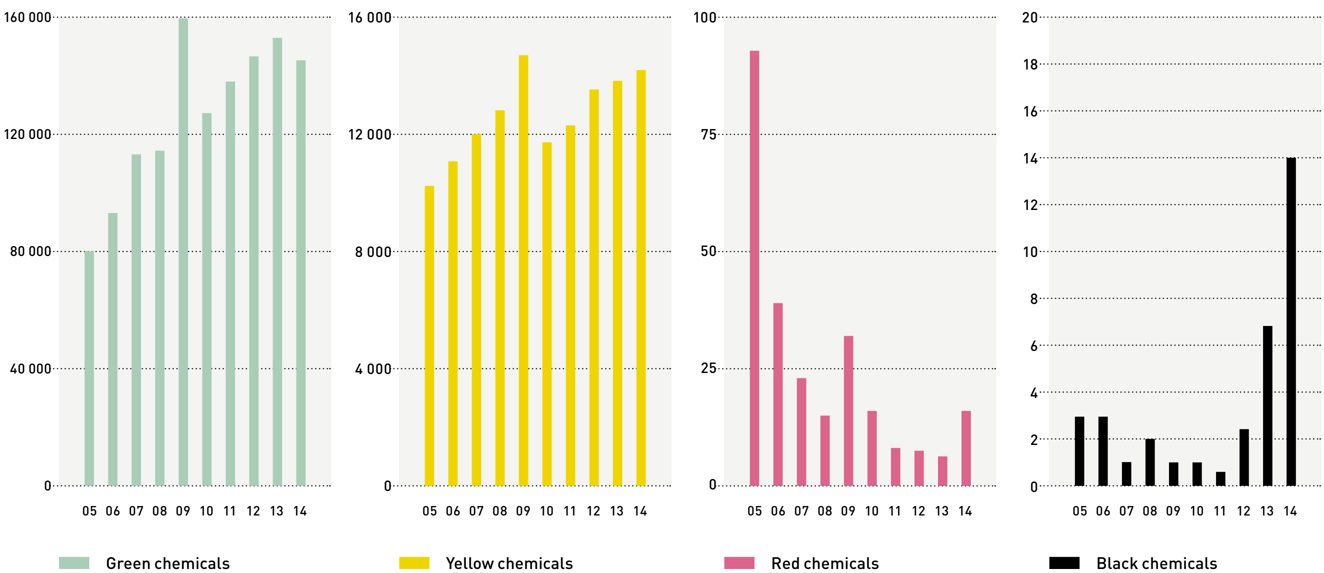
[3] Substances hazardous to genes or reproduction are understood to mean mutagen categories (Mut) 1 and 2 and reproduction categories (Rep) 1 and 2, see appendix 1 to the regulations on labelling, etc, of hazardous chemicals or self-classification.

[4] Data for degradability and bio-accumulation must accord with approved tests for offshore chemicals.

[5] Removed from the red category in the activities regulations.

[6] Commission regulation 987/2008. The NEA must assess whether the substance is covered by annex V.

FIGURE 12 **CHEMICAL DISCHARGES BY THE NEA'S COLOUR CATEGORIES, HISTORICAL TREND** (TONNES)



4.4 ACUTE SPILLS

Acute spills are defined as unplanned emissions/discharges which occur suddenly and are not covered by a permit. Possible environmental consequences of such releases will depend on the environmental properties and quantity of the substance emitted/spilt, and when and where the incident occurred.

Acute spills are classified in three principal categories:

- oil: diesel, heating, crude, waste and others.
- chemicals and drilling fluids.
- acute emissions to the air.

Norway's oil and gas industry pays great attention to adopting measures to prevent incidents which result in acute spills. All spills down to less than a litre are reported to the NEA in the annual emission/discharge report.

Acute oil spills have generally declined in number throughout the reporting period, but show a clear downward trend over the past seven-eight years. Only 59 such incidents occurred in 2014, compared with 117 the year before. This marked fall primarily reflects a reduction in the number of spills below 50 litres. That follows primarily from a clarification provided by the NEA in 2014 concerning which spills were to be classed as oil and chemicals respectively. Many companies, for instance, previously reported hydraulic oil discharges as oil spills. The decline for the latter is accordingly matched by a corresponding rise in chemical discharges.

Spills larger than 50 litres have declined steadily since 1997. There were 23 in 2014, of which 15 were in the range from 50 litres to one cubic metre and eight were more than one cubic metre.

The total volume of oil in acute spills varies substantially from year to year, with the statistics affected by large single incidents. In 2007, the NCS experienced its second largest acute oil spill, which totalled more than 4 000 cubic metres. The combined volume last year was 156 cubic metres, with a crude spill of about 50 cubic metres in the North Sea as the largest single incident.

No similar declining trend can be seen with acute chemical discharges. They have lain around 150-160 annually over the past five years, but rose substantially in 2014 to 237. Most of the increase occurred in the size category below 50 litres, where the number doubled as a result of the clarification of the regulations mentioned above.

Acute chemical spills had an overall volume of 737 cubic metres in 2014. Historically, discharge volumes are dominated by individual years (2007, 2009 and 2010 – see figure 16) when leaks were discovered from injection wells. The biggest spill in 2014 was 230 cubic metres of oil-based drilling fluid from an exploration well, followed by 152 cubic metres of chemicals on a North Sea field. Less than 0.01 per cent of the drilling fluid comprised red chemicals, with the rest in the yellow and green categories. Green substances accounted for 99 per cent of chemical spills in the North Sea.

FIGURE 13 **TOTAL ACUTE OIL SPILLS ON THE NCS**

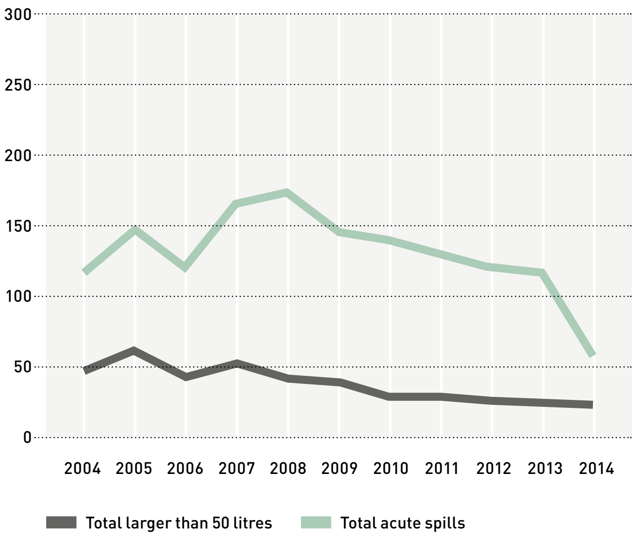


FIGURE 15 **ACUTE CHEMICAL SPILLS ON THE NCS**

FIGURE 14 **VOLUME OF ACUTE OIL SPILLS ON THE NCS (CU.M)**

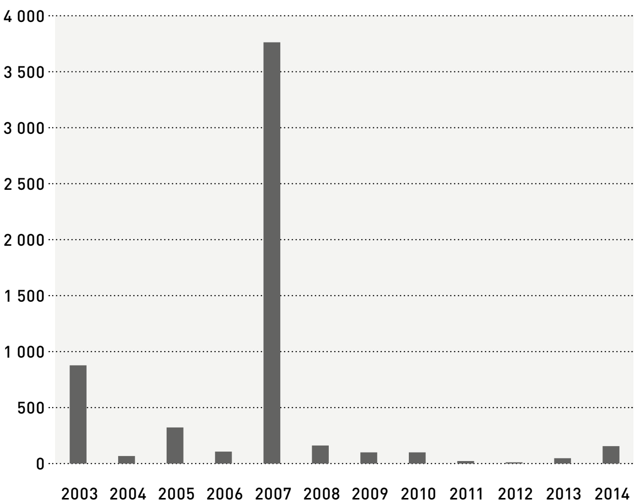
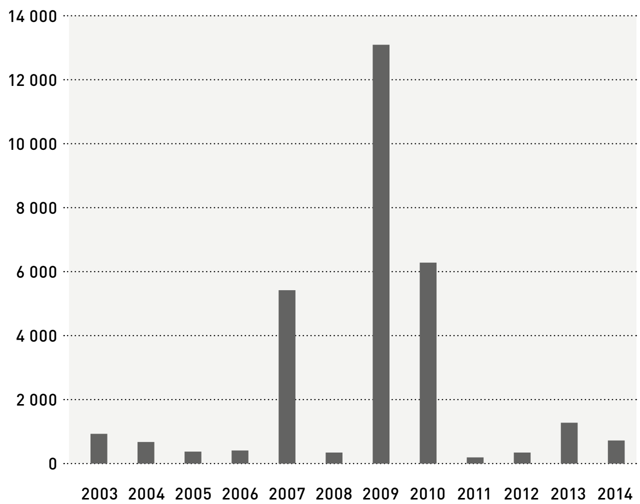


FIGURE 16 **VOLUME OF ACUTE CHEMICAL SPILLS (CU.M)**



5 OFFSHORE OPERATIONS AND THE MARINE ENVIRONMENT

ENVIRONMENTAL MONITORING INVOLVES THE SYSTEMATIC COLLECTION OF DATA USING VERIFIABLE METHODS. THE GOAL IS TO DOCUMENT THE CONDITION OF THE ENVIRONMENT AND ITS DEVELOPMENT.

The oil and gas industry conducts extensive environmental monitoring on the NCS. This aims to document the condition of the environment and its development as a result of both anthropogenic impacts and natural changes. Substantial research work related to the development of monitoring methods and to understanding the impact of petroleum industry discharges on the marine environment is also being pursued under the auspices of individual companies and the oil and gas sector as a whole.

Monitoring is conducted in accordance with standards described in the NEA's guidelines. These are a result of collaboration between the NEA, its panel of experts, the petroleum industry and the consultants doing the work. They specify in detail which parameters should be analysed, which methods should be used, necessary accreditation of laboratories and consultants, and templates for reporting. Monitoring is conducted by independent consultants, whose work is reviewed and quality-assured by a panel of experts on behalf of the NEA.

The monitoring covers investigations of the water column and benthic sediments and fauna, as well as visual inspection of the seabed in areas where species assumed to be particularly vulnerable to discharges (corals, sponges and so forth) are present.

WATER-COLUMN MONITORING – NORTH SEA

Produced water discharged to the sea contains chemical compounds which could be toxic for marine organisms. Fish and mussels positioned in cages at increasing distances from the installations are among the methods which have been used to describe the possible effects of discharges on the water column. With effect from 2015, a major water-column survey is required every third year.

Discharges of produced water totalled about 140 million cubic metres in 2014. According to earlier NPD forecasts, they should have been 220-250 million cubic metres.

The volume of the North Sea is no less than 94 000 cubic kilometres, or 94 billion cubic metres. This is a dynamic sea area characterised by a throughflow of water totalling no less than 1.5 million cubic metres per second on an annual basis. On that basis, the volume of produced water discharged annually compares with about 90 seconds of seawater flowing in from adjacent sea areas. Retention time for this water is relatively short, with its replacement taking about a year overall but as little as months or weeks depending on the area concerned. Produced water is rapidly diluted by ocean currents after discharge. This has been verified by water-column monitoring.

A panel of experts reviewed and summed up different monitoring techniques and effects identified by the surveillance. They concluded that theoretically possible toxic concentrations extend no more than 1 000-2 000 metres from the discharge point, but that biological effects are limited to less than 1 000 metres.

WATER-COLUMN MONITORING IN 2014

Such monitoring was conducted in 2014 on Njord, an oil and gas field which came on stream in 1997. The emphasis in 2013 had been on benthic fish species living close to the platform, and the same focus was applied in 2014. Since the platform was shut down when the study was undertaken, possible pollution in the fish reflected earlier influences from or contact with drill cuttings or subsurface leaks.

The work was conducted with passive samplers (semipermeable membrane devices – SPMDs) installed at six locations within the 500-metre safety zone around the platform. It found low levels of PAH in the water column one metre above the seabed.

Ling, tusk, ordinary redfish and saithe were the fish species collected. Reference fish from a station far from discharge sources were caught in a separate expedition. Findings included the following.

- No oil components were detected in fish fillets and stomachs
- Traces of black chemicals from fire extinguishing foam were found. Foam with such components has been utilised offshore, but is now largely replaced by other substances with better environmental properties. The highest value for such chemical compounds was found in ling from the reference station.
- The report concludes that the absence of any relationship between discharges and effects can be explained by the great sensitivity of the biomarkers.

SEDIMENT MONITORING – SEABED INVESTIGATIONS

An investigation must be conducted for all fields prior to coming on stream to establish the base condition before starting to discharge drill cuttings. Each region and field is then investigated every third year to establish the physical, chemical and biological status of the sediments. Benthic habitat monitoring comprises sampling the seabed, analysing sediments for heavy metals and oil compounds, and investigating biodiversity in the benthic fauna. The NCS is divided into 11 geographic regions for seabed monitoring, and the scale of this work must be related to offshore petroleum activities in each region.

Monitoring the environmental condition of seabed sediments around Norwegian offshore installations has been under way since the late 1970s. Field-based surveys were conducted annually until 1996. Thereafter, monitoring around individual fields was incorporated in regional programmes which have been pursued until the present day.

This work is done by independent accredited consultants, and detailed guidelines ensure that results from different surveys are comparable across time and space. Each field is investigated every third year. The results are assessed by the government's panel of experts and made available in the MOD database operated by Norwegian Oil and Gas, which is open to the general public and to researchers. The monitoring programme is among the most extensive conducted regularly on the North Atlantic seabed, and covers an estimated 1 000 stations on the NCS. Of these, about 700 are in the North Sea. Once the production phase has ceased, two further rounds of investigations are conducted at three-year intervals.

The government and its panel of experts conduct quality assurance of and comment on the reports submitted every year. Errors must be corrected before final approval is given in the autumn of 2015. Preliminary conclusions from the 2014 surveys are as follows.

REGION I – EKOFISK AREA

- The investigations covered no less than 17 fields or installations as well as 12 regional stations. Since sediments from the outermost stations on most of the fields have a total hydrocarbon content which exceeds the calculated likely contamination (laboratory control sample – LCS), the panel of experts recommended an expansion in the station network.
- The calculated limit for sediments to be classified as contaminated on the basis of their oil content is close to the background value and can thereby paint an artificial picture of the contamination.

REGION IV – STATFJORD

Region IV covers a number of the most important fields on the NCS, such as Statfjord, Gullfaks and Snorre. Samples were taken from a total of 258 stations, including 16 regional ones.

- Concentrations of metals were roughly the same as in the previous survey, and could almost be classified as non-contaminated.
- The total hydrocarbon content (THC) in the sediments had declined from 2011 at most of the stations.
- On eight of the fields, benthic fauna were found to be disturbed at one or two stations (Gullfaks, Snorre and Statfjord), but were regarded as undisturbed at the others.
- To give a picture of the scope of the monitoring, a total of almost 134 000 individuals from nearly 439 species groups were found at the 12 regional stations.
- Species diversity was high at all the stations, and varied from four to almost six. That indicates an undisturbed fauna.

BASE INVESTIGATIONS IN THE BARENTS SEA

Sediment samples were collected from 12 exploration drilling sites in the Barents Sea. They were characterised and subject to chemical analysis, and their micro-faunal content analysed.

Provisional findings include:

- the THC content increased with water depth; PAH and NPD content was low
- the content of Cd, Ce, Hg, Pb, Ti and Zn metals was low
- no pollution was found at the locations surveyed
- the benthic fauna at all the sites was regarded as healthy and undisturbed.

VISUAL INSPECTIONS

Visual inspections are carried out before planned exploration drilling can begin in areas which may contain organisms regarded, in terms of the precautionary principle, as particularly vulnerable to drilling discharges. The industry has developed guidelines for such surveys where deepwater corals are present. At the same time, substantial work is being devoted to developing methods and procedures for preliminary investigations to avoid physical damage to coral reefs, sponge communities and the like. Scientists have concluded that no harm has ever been demonstrated to coral reefs from petroleum activities. This work is now being extended to cover sponge communities and various sponge species. Comparative studies of the methods used by the industry and in the big Mareano project have also been conducted to ensure comparable results.

Visual inspection in 2014 covered fields in regions VII and IX, involving base investigations of sediments, and the Snøhvit G and F, Goliat Eye, Bone, Bigorna, Mercury, PL 611 Kvalross, Ursus Major, Aurelia, Neiden, Børselv, and Ørnen North and South well locations. Field work was conducted in accordance with the NS-EN 16260/2012 guidelines. It has been very well described, with a discussion of the strengths/weaknesses of the equipment used. The report demonstrates that the consultants have developed good routines for carrying out this type of monitoring.

6 EMISSIONS TO THE AIR

POWER GENERATION FUELLED BY NATURAL GAS OR DIESEL OIL IS THE MAIN SOURCE OF CO_2 AND NO_X EMISSIONS.

6.1 EMISSION SOURCES

Emissions to the air from the oil and gas industry consist primarily of exhaust gases containing CO_2, NO_x, SO_x, CH_4 and nmVOC from different types of combustion equipment. In most cases, emissions to the air are calculated from the amount of fuel gas and diesel oil used on the facility. The emission factors build on measurements from suppliers, standard figures produced by the industry itself, or field-specific measurements and calculations.

EMISSION SOURCES

The main sources of emissions to the air from oil and gas activities are:

- fuel gas exhaust from gas turbines, engines and boilers
- diesel exhaust from gas turbines, engines and boilers
- gas flaring
- combustion of oil and gas in connection with well testing and well maintenance.

Other sources of hydrocarbon gas (CH_4 and nmVOC) emissions are:

- gas venting, minor individual leaks and diffuse emissions
- vaporisation of hydrocarbon gases from offshore storage and loading of crude oil.

Power generation using natural gas and diesel oil as fuel is the main source of CO_2 and NO_x emissions. Their level depends mainly on energy consumption by the facilities and the energy efficiency of power generation. Gas flaring is the second largest source of this emission type. It only takes place to a limited extent, pursuant to the provisions of the Petroleum Act, but is permitted for safety reasons during operation and in connection with certain operational problems.

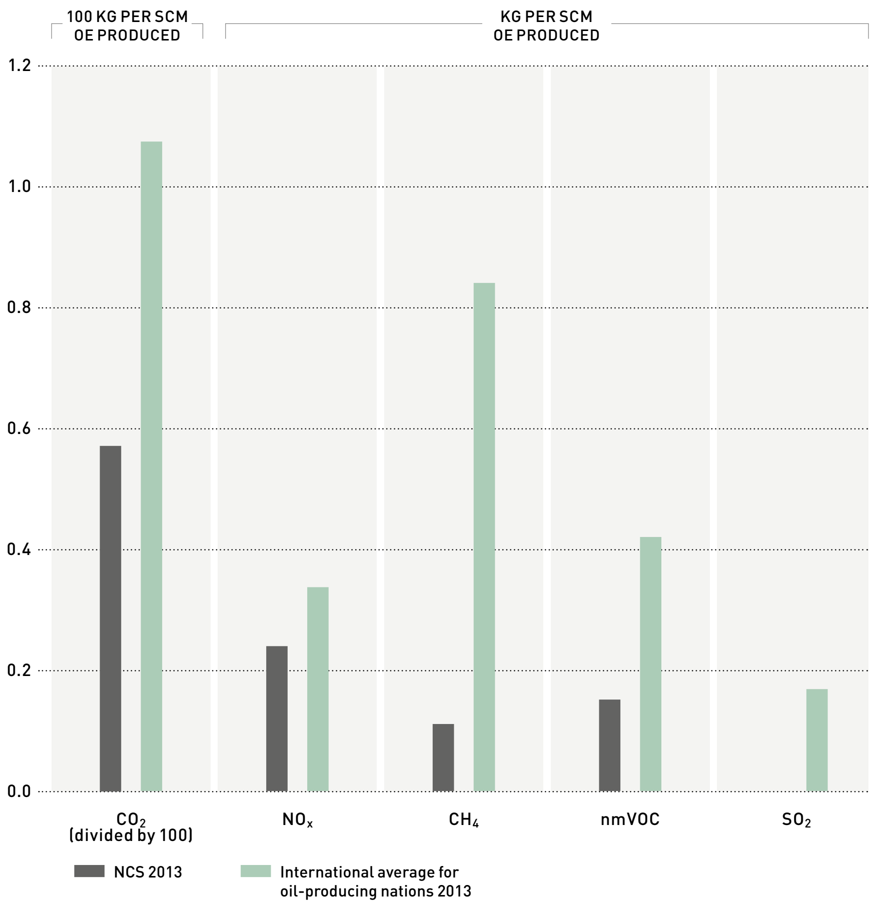
The most important sources of CH_4 and nmVOC emissions are offshore storage and loading of crude oil. During tank filling, volatile hydrocarbons vaporise into the tank atmosphere and mix with the inert gas added for safety reasons to eliminate the risk of explosion. Emissions occur as this mix is vented to the air when displaced by the entry of crude oil.

SO_x emissions derive primarily from the combustion of sulphur-containing hydrocarbons. Since Norwegian gas is generally low in sulphur, diesel oil is the principal source of such emissions on the NCS. Low-sulphur diesel oil is accordingly used.

Figure 17 presents emissions to the air on the NCS compared with international averages, specified per scm oe produced in 100 kilograms for CO_2 and in kilograms for the other substances. All figures are from 2013 because international figures for 2014 were not available in August 2015.

FIGURE 17 EMISSIONS TO THE AIR ON THE NCS COMPARED WITH THE INTERNATIONAL AVERAGE

Sources: IOGP and EEH



6.2 EMISSIONS OF GREENHOUSE GASES

A new agreement under the UN's climate convention is due to be negotiated in Paris during December 2015. The overall goal of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level where the most serious anthropogenic climate changes can be avoided. All countries were due to submit their indicative targets/commitments to the UN by the first quarter of 2015. The climate convention secretariat will then present a synthesis report no later than 1 November showing the overall effect of the submitted contributions, and assess whether these emission reductions are sufficient to limit global warming to less than 2°C.

Norway's indicative commitment under the climate convention has the following components:

- The country decided to accept a conditional commitment to reduce emissions by at least 40 per cent of the 1990 figure in 2030.
- Norway will conduct a dialogue with the EU covering an agreement on joint fulfilment of the climate commitment, with a target of reducing emissions by at least 40 per cent from the 1990 level. In the run-up to the climate summit in Paris, the government will work for a memorandum of understanding with the EU along these lines.

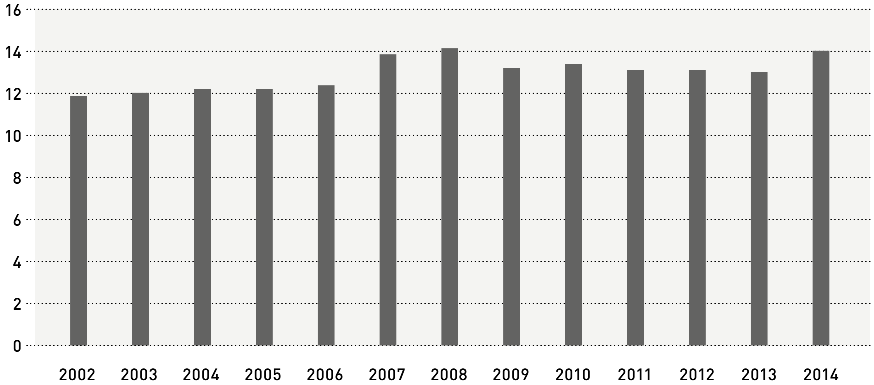
Should it prove impossible to agree a common solution with the EU, Norway will retain its commitment to an emission reduction of at least 40 per cent of the 1990 level by 2030, but on condition that flexible mechanisms are provided in the new climate agreement and that the country is credited for its participation in the EU emission trading system (ETS).

Norwegian Oil and Gas supports the recommendation from the Storting (parliament) on Norway's contribution to a new international agreement, including a deal on common fulfilment with the EU in the non-ETS sector. The Norwegian petroleum sector is part of the EU ETS, which aims to cut emissions by 43 per cent from the 2005 figure.

Every sector must contribute if that target is to be reached. Continuous efforts are made by the petroleum industry on the NCS to reduce its emissions, and a number of processes have been initiated to reinforce this work.

Norwegian Oil and Gas, for example, launched a joint industry project on energy management in April 2015. This will strengthen the attention paid to energy surveys, efficiency enhancement and knowledge-sharing between companies, and develop calculation methods for measures to reduce greenhouse gas emissions per unit produced.

FIGURE 18 EMISSIONS OF CO_2 EQUIVALENT ON THE NCS (MILL TONNES)



The industry is also working to strengthen and further develop its collaboration with Enova, both on energy management and on developing technology which cuts energy requirements and greenhouse gas emissions.

KonKraft is a collaboration arena for Norwegian Oil and Gas, the Federation of Norwegian Industries, the Norwegian Shipowners Association and the Norwegian Confederation of Trade Unions (LO). A work group chaired by Norwegian Oil and Gas was established in the autumn of 2014 to update the 2007 KonKraft report on the petroleum industry and climate issues. The group will look at technological and industrial opportunities for low-CO_2 technology in the petroleum sector, and assess how existing measures can be strengthened to encourage further technology development. The updated report is due in the first quarter of 2016.

Norwegian Oil and Gas is also collaborating closely with the NEA on establishing a better database for emissions of short-lived climate forcers, such as methane and nmVOC. See section 6.5 for more details.

Figure 18 shows that greenhouse gas emissions from the NCS totalled 14 million tonnes of CO_2 equivalent in 2014, compared with 13 million the year before. The main reasons for the rise were higher output than in 2013 from older fields which require more energy to produce, and a greater energy requirement for gas exports. According to preliminary figures from Statistics Norway, Norwegian emissions totalled 53.8 million tonnes of CO_2 equivalent in 2014 – a slight decline from the year before. The petroleum industry accounted for about a quarter of the 2014 figure.

6.3 GREENHOUSE GAS EMISSIONS

FROM NORWEGIAN AND INTERNATIONAL PETROLEUM OPERATIONS

A quarter of Norway's total value creation measured by GDP currently derives from the petroleum sector, which accounted for a similar proportion of national CO_2 emissions in 2014. The oil and gas industry's contribution to emission reductions will thereby also represent an important part of the climate solution.

A number of instruments are used by the Norwegian government to regulate emissions from the oil and gas business. The most important of these are the CO_2 tax, Norway's participation in the EU ETS, flaring provisions in the Petroleum Act, the requirement to assess power from shore when planning developments, emission permits, and the BAT requirement. These instruments have unleashed a number of measures by the petroleum sector, and both the industry itself and the government have documented in recent years that the Norwegian petroleum industry has acted to reduce its emissions by the equivalent of over five million tonnes of CO_2.

The result is an offshore industry in the international premier division for energy-efficient production and low CO_2 emissions per unit produced. At the same time, certain other oil provinces are increasingly able to point to clear environmental improvements from instituting production patterns similar to those on the NCS, such as reduced flaring. This is very positive. Less flaring both cuts CO_2 emissions and boosts energy supplies for more people, since the gas will be consumed rather than flared.

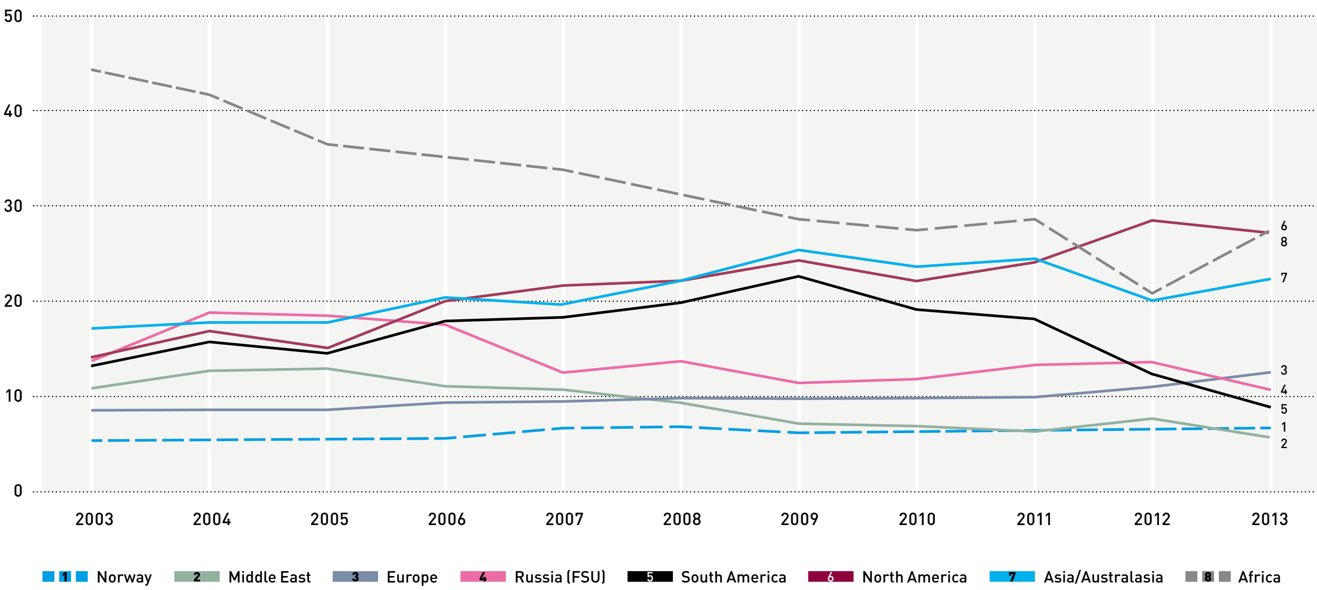
All companies in Norway report all their emissions pursuant to the applicable regulations. This is not the case in certain other petroleum provinces. In the Middle East, for example, emission figures are reported for only about 20 per cent of production.

The Norwegian offshore sector is a world leader for recovery factors. This means that a number of fields are mature, and recovering their remaining reserves is energy-intensive. Norway's petroleum sector nevertheless also ranks among the best in the world for low CO_2 emissions per unit produced.

The Norwegian petroleum industry pays for its emissions both through the CO_2 tax, which it has been subject to since 1991, and by buying allowances in the EU ETS since 2008. The CO_2 tax rate at 1 January 2015 was NOK 1.00 per scm of gas or litre of oil or condensate, corresponding to NOK 427 per tonne of CO_2. This tax has prompted, and continues to prompt, measures to cut emissions on the NCS.

FIGURE 19 **GREENHOUSE GAS EMISSIONS PER UNIT PRODUCED IN VARIOUS PETROLEUM PROVINCES 2003-13 (KG OF CO_2 EQUIVALENT PER BARREL OF OE PRODUCED)**

Sources: IOGP 2013 and Norwegian Oil and Gas 2013



6.4 EMISSIONS OF CO_2

CO_2 emissions from operations on the NCS totalled 13.1 million tonnes in 2014, compared with 12.3 million the year before. The petroleum industry is continuing to implement measures to reduce emissions in line with the KonKraft ambition for 2020.

The oil and gas industry released 13.1 million tonnes of CO_2 and accounted for just under a quarter of Norwegian emissions in 2014 – roughly the same proportion as the year before. The rise in CO_2 released partly reflected fewer production shutdowns in 2014, which increased output and thereby emissions. Higher gas production and exports from some fields also boosted the amount of CO_2 released.

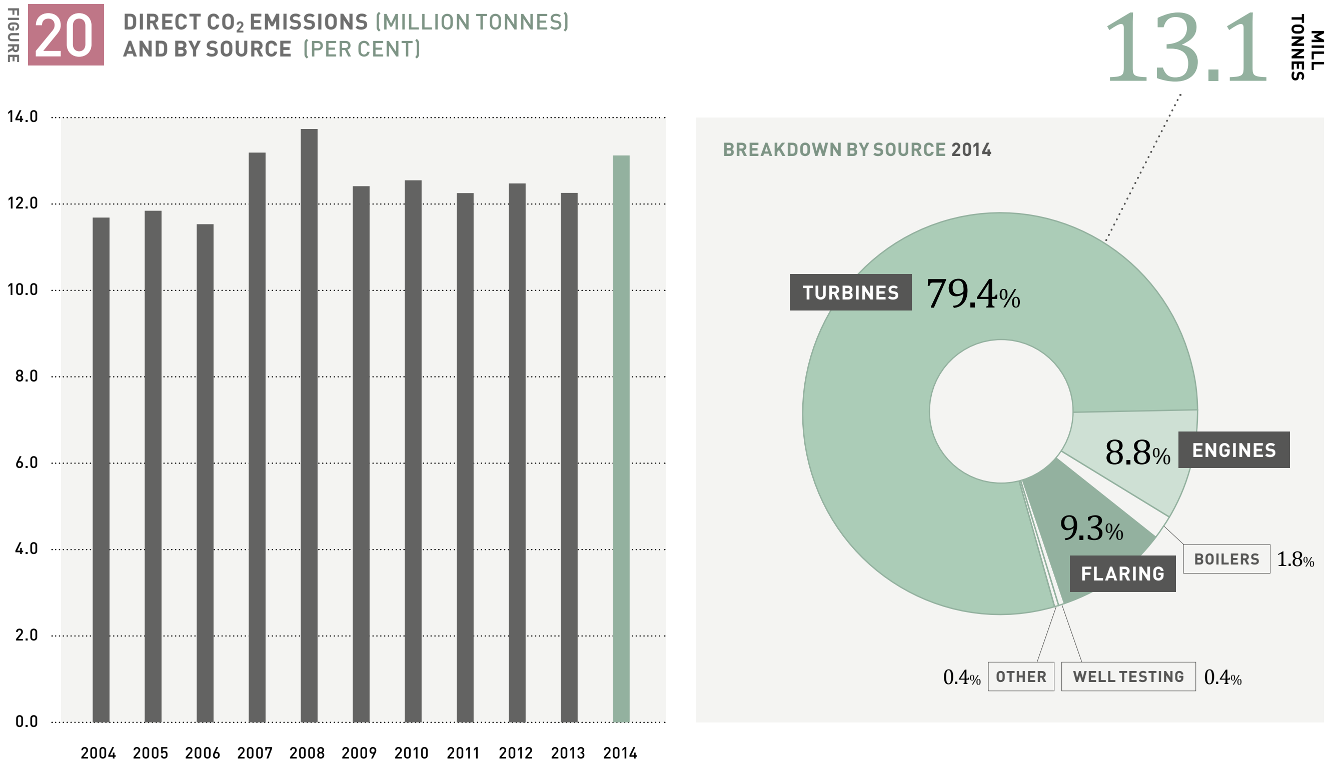
The breakdown by source was little changed from 2013. Figure 21 presents the historical trend for consumption of flare gas and associated CO_2 emissions.

The industry is working continuously to cut greenhouse gas emissions through greater energy efficiency, and through following up ambitions from the Konkraft reports (2007) to implement an overall CO_2 emission reduction of one million tonnes per annum by 2020 compared with the reference trajectory. Measures reported by 31 December 2013 corresponded to the avoidance of 630 000 tonnes of CO_2 emissions.

Requirements for energy management are set by the NEA through emission permits for activities on the NCS. The companies establish routines and procedures covering the various aspects of such management. That includes defining power-intensive operations and establishing energy targets based on assessment and weighting of the various energy aspects. This work results in identified potential measures which are assessed on the basis of energy savings and associated emission reductions, cost/benefit, regularity and other relevant parameters.

Numerous examples of types of measures are available, such as reduced flaring and cold venting, various kinds of production optimisation, optimised compressor design, and optimisation of various systems to

FIGURE 20 DIRECT CO_2 EMISSIONS (MILLION TONNES) AND BY SOURCE (PER CENT)



reduce diesel consumption. Green logistics, with the use of more efficient vessels, are another example of a measure which reduces emissions from the industry.

Many assessments and choices are made when planning new projects and the conversion of technical solutions and equipment which affect energy efficiency and emission levels. Technological advances and more optimised operation will also reduce greenhouse gas emissions.

Figure 22 presents the historical trend for direct and indirect CO_2 emissions per volume of hydrocarbons delivered in the 1990-2014 period. Specific CO_2 emissions in 2014 amounted to 52.9 kilograms per scm oe produced. This was calculated in earlier years on the basis of net production – in other words, the quantity of oil equivalent delivered from the field. The change is intended to make the figures directly comparable with international data from the IOGP.

Specific CO_2 emissions show a weakly rising trend. This reflects increased energy requirements on aging fields for recovering the remaining oil and, in part, the growing share of gas needing energy for compression before export to Europe.

FIGURE 21 FLARE GAS CONSUMPTION AND ASSOCIATED CALCULATED CO_2 EMISSIONS (TONNES)

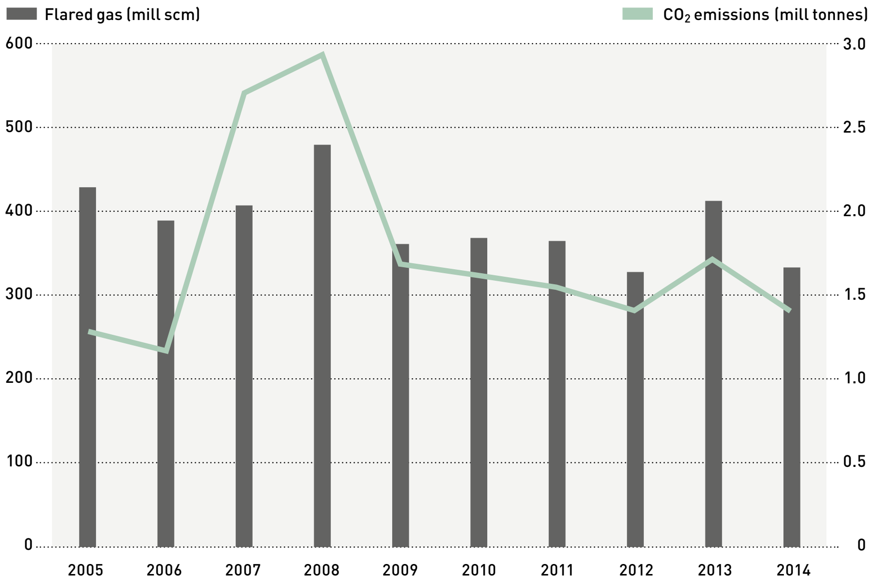
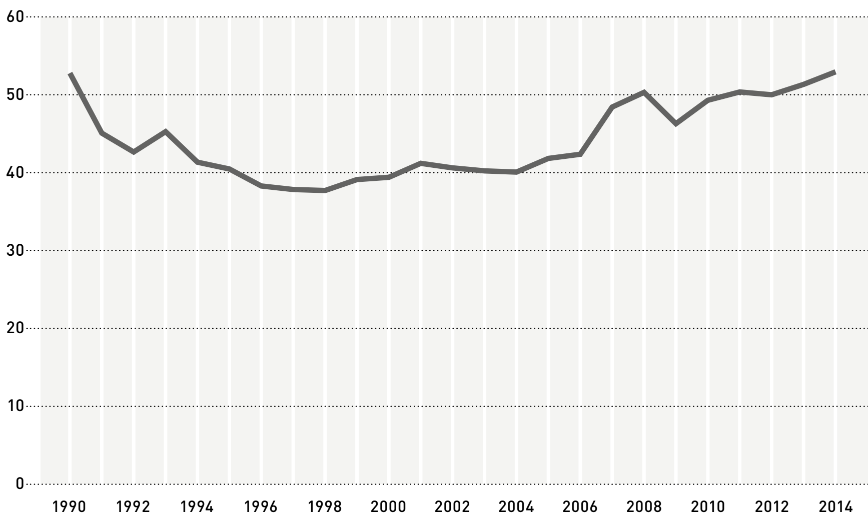


FIGURE 22 SPECIFIC CO_2 EMISSIONS (KG/SCM OE)



6.5 SHORT-LIVED CLIMATE FORCERS

Short-lived climate forcers (SLCFs) are on the political agenda in Norway and internationally. A number of initiatives are being pursued globally through the Climate and Clean Air Act Coalition (CCAC). Ambitions have also been expressed in the Svalbard Declaration of 2012 for the Nordic countries, the Arctic Council's Tromsø Declaration of 2009 covering eight Arctic nations, and the revised Gothenburg Protocol of 2012.

SLCFs comprise particles and gases characterised by a strong impact on climate and health, but a limited lifespan in the atmosphere. Reducing their emission could therefore have a rapid effect on both climate and health. Where they are emitted also has great significance. Growing attention is accordingly being paid to flaring and the consequences of this type of emission. CH_4 and nmVOC are SLCFs.

For safety reasons, great attention is already being paid to emissions of these components on the NCS. The CCAC has established a voluntary initiative known as the CCAC Oil and Gas Methane Partnership (OGMP) to reduce CH_4 emissions from the petroleum sector. This was officially launched by the UN secretary-general in September 2014. Statoil, BG Group, Total and Eni were among the companies behind the initiative.

A need has existed to update and further enhance knowledge about the various sources of diffuse CH_4 and nmVOC emissions. Norwegian Oil and Gas accordingly commissioned a review in 2013 of the quality of emission factors for these components. That has been followed up by the NEA through a major project to improve the quality of emission data. Conducted in close collaboration with the oil and gas companies, this project is due to be completed in late 2015. It will then have established improved emission factors and calculation methods for CH_4 and nmVOC released from these sources on the NCS.

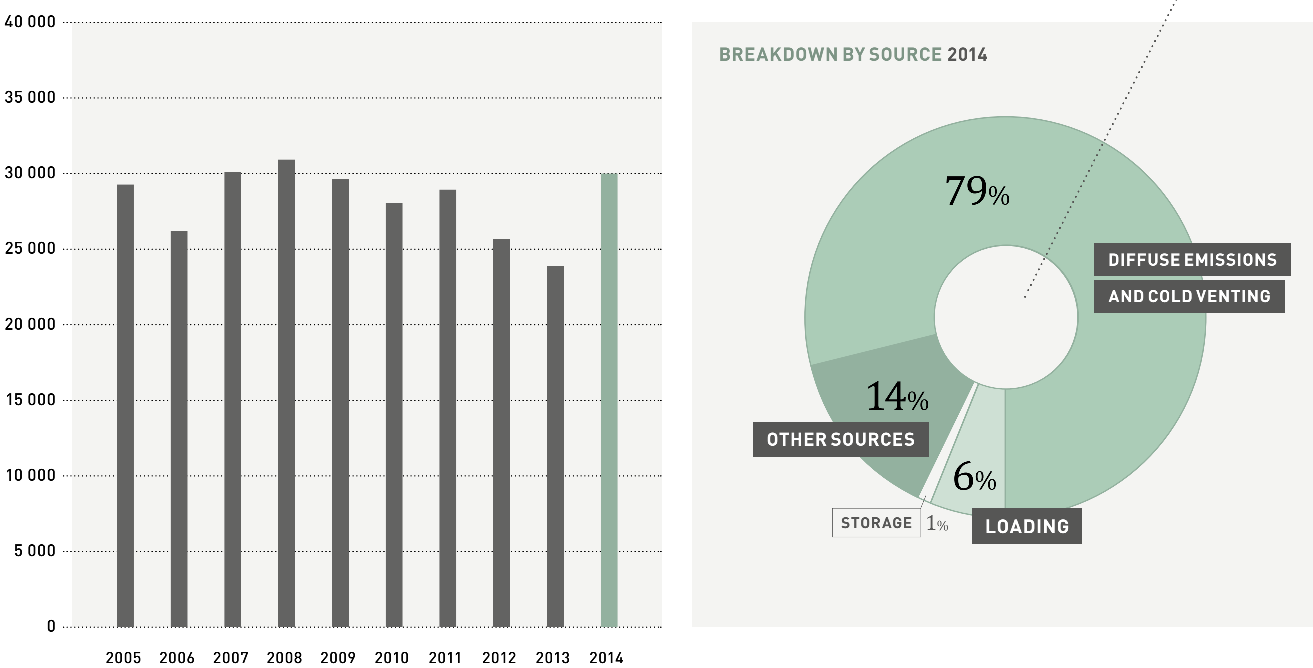
6.6 EMISSIONS OF CH_4

Figure 23 presents emissions of methane (CH_4) from operations on the NCS and the breakdown of these by source in 2014. A total of 30 048 tonnes of CH_4 was released, compared with 23 886 tonnes in 2013. The share of emissions from offshore loading of oil has declined drastically over the years and now accounts for less than six per cent of the total. Cold venting and diffuse emissions from flanges, valves and various types of process equipment represent the biggest sources of CH_4 from the oil and gas industry. The rise in emissions primarily reflects new fields coming on stream, increased production and higher volumes released from valves and cold venting.

According to Statistics Norway, Norwegian CH_4 emissions totalled 219 513 tonnes in 2014. The petroleum sector accounted for 13.7 per cent of this figure, more or less unchanged from recent years.

FIGURE 23 TOTAL EMISSIONS OF CH_4 (TONNES) AND BREAKDOWN BY SOURCE (PER CENT)

30 048 TONNES



6.7 EMISSIONS OF nmVOC

Overall nmVOC emissions have been cut significantly since 2001. These substantial reductions reflect investment in new facilities for removing and recovering oil vapour on storage ships and shuttle tankers.

Uncertainty has arisen over the actual size of the reduction effect achieved by one of the technological solutions. The NEA and the VOC Industry Collaboration[1] have accordingly cooperated on finding improved ways of documenting these emissions.

Equipment for metering nmVOC was installed on selected vessels in 2014, and verification measurements have been conducted at all major loading points. These show that the technology used on a number of the ships during loading has limited or no effect on the release of nmVOC to the air. Emission figures for nmVOC during loading in 2014 accordingly showed a rise from the year before. See figure 24. NmVOC emissions from loading on the NCS in 2014 were 33 313 tonnes, compared with a reported figure of 18 436 tonnes in 2013. This change reflects improved emission factors based on measurements. The amounts released from this source are therefore likely to have been underestimated in earlier years when these ships had the technology in question installed.

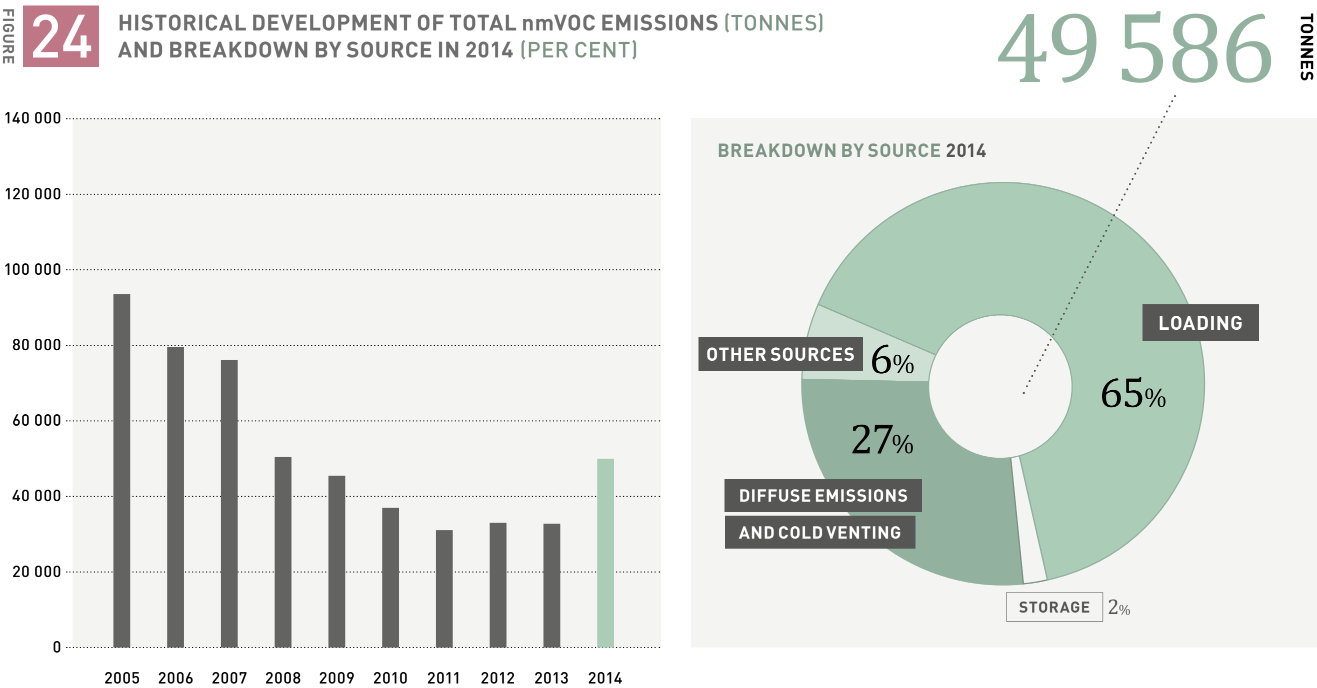
Figure 24 shows nmVOC emissions from operations on the NCS and the amount in 2014 by source. Total nmVOC emissions for the year came to 49 586 tonnes.

The remaining amounts are largely attributable to cold venting and diffuse emissions. These also increased, from 8 229 tonnes in 2013 to 13 437 tonnes. That largely reflects the start-up of and full production from such fields as Skarv and Gudrun.

Statistics Norway estimates total Norwegian nmVOC emissions in 2014 at 139 736 tonnes, with the oil and gas industry accounting for 35 per cent of this figure. Emission sources and factors for both CH_4 and nmVOC from diffuse sources are being reviewed in 2015 through a joint project with the NEA. See section 6.5.

[1] The VOC Industry Collaboration (VOCIC) was established in 2002 to reduce emissions of nmVOC from offshore loading, and is led by the field operators. This collaboration has made it possible to fulfil government requirements for cutting nmVOC emissions in a cost-effective manner.

FIGURE 24 HISTORICAL DEVELOPMENT OF TOTAL nmVOC EMISSIONS (TONNES) AND BREAKDOWN BY SOURCE IN 2014 (PER CENT)



6.8 THE NO_X AGREEMENT AND INTERNATIONAL OBLIGATIONS

The environmental agreement on NO_x regulates the commitments made to the government by Norway's industry associations on reducing their overall NO_x emissions. Some 858 enterprises were signed up to the agreement at 31 March 2015, including every operator company on the NCS.

All the companies signed up to the agreement report their emissions to the business fund for NO_x as the basis for their obligation to pay into the fund. Since its launch in 2008, the fund has considered more than 1 576 project applications. Of these, 659 have so far achieved verified reductions and thereby secured investment grants. This yielded an overall reduction of 28 199 tonnes of NO_x between 1 January 2008 and 31 March 2015. Commitments by the fund for 2013 and 2014 were fulfilled. The agreement makes a very important contribution to Norway's follow-up of the Gothenburg Protocol.

Emissions from mobile rigs have been reported to the NO_x fund with effect from 2014. The biggest reduction in NO_x emissions derives from various service ships in the oil and gas sector. Cuts from ferries/passenger ships, coastal shipping, industrial production and petroleum operations account for roughly the same proportion of the overall reduction. Rigs entered in the scheme are pursuing few measures in numerical terms, but each of these achieves big reductions.

Although it is a substantial contributor to the fund, the oil industry has few implemented projects in receipt of grants because the cost of measures on the NCS is generally high. The fund model used for this agreement ensures that emission reductions are implemented where they yield the biggest environmental return per krone spent.

The fund has also made an important contribution to the development of new environmentally efficient solutions, and of new markets and market players. Examples include the further development of solutions for gas-fuelled ships, environment-friendly conversion of marine engines, use of catalytic converters to treat emissions with urea, and the installation of fuel-efficient solutions. Viewed overall, the market has both secured new development and expanded the use of established NO_x-reducing solutions. New suppliers have also secured help in a vulnerable phase in order to establish themselves in the market with support from the fund.

Experience indicates that the emission reductions achieved are significantly higher with an environmental agreement than they were with the fiscal NO_x tax in 2007. Financing measures from the fund means increased cuts at a significantly lower financial burden for the companies, while the reductions in the agreement are achieved with a greater degree of certainty.

A positive side effect is that measures which reduce NO_x emissions by cutting fuel consumption also reduce the amount of CO_2 released. The overall effect of measure in the NO_x fund's portfolio will be a decline of about 500 000 tonnes per annum in CO_2 emissions when the agreement expires in 2017.

The environmental agreement was originally intended to run for 10 years, since that was the maximum duration permitted by the EU's guidelines on state support for environmental and energy measures. These guidelines were revised in 2014, and provide the opportunity for an extension. In 2014, the NO_x fund conducted analyses of the potential for further measures in the 2018-27 period.

These were presented to the government in January 2015, and the Confederation of Norwegian Enterprise (NHO) has asked the Ministry of Climate and the Environment to start work on continuing the environmental agreement. An extension would be desirable, and doing this quickly is important to ensure progress for those projects being pursued by the companies which will last beyond the end of the present agreement.

6.9 EMISSIONS OF NO_X

NO_x emissions from Norwegian petroleum operations totalled 52 582 tonnes in 2014, up from 50 887 tonnes the year before. Overall NO_x emissions have changed relatively little in recent years.

Figure 25 presents NO_x emissions from operations on the NCS and how these broke down by source in 2014. According to Statistics Norway, Norwegian NO_x emissions for the year totalled 147 811 tonnes, a decline of just over five per cent from 2013. The oil and gas industry accounted for roughly 36 per cent of this figure.

The biggest source of NO_x emissions from petroleum activities is combusted gas in turbines on offshore installations.

Specific NO_x emissions totalled 0.24 kg/scm oe delivered in 2014, a slight increase from the year before.

FIGURE 26 SPECIFIC NO_X EMISSIONS (KG/SCM OE)

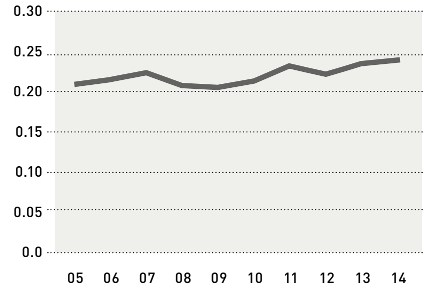
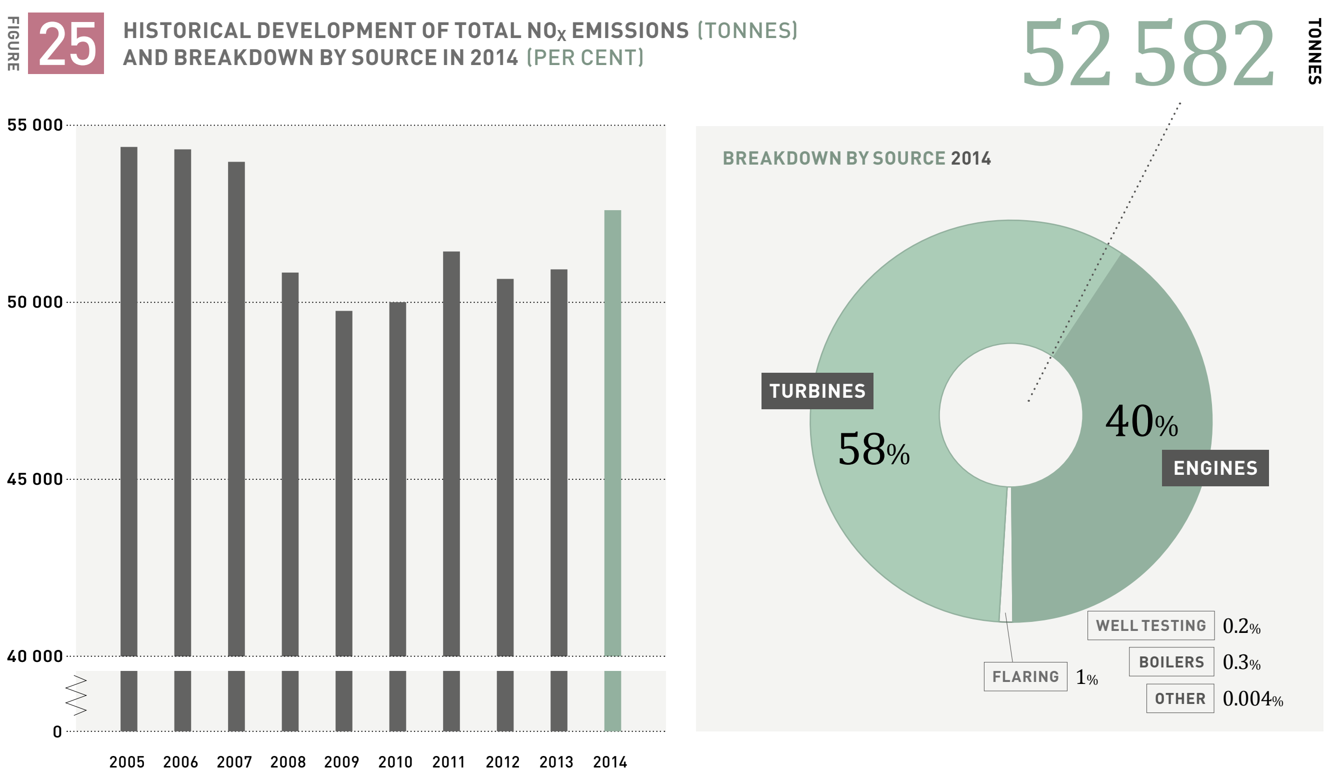


FIGURE 25 HISTORICAL DEVELOPMENT OF TOTAL NO_X EMISSIONS (TONNES) AND BREAKDOWN BY SOURCE IN 2014 (PER CENT)

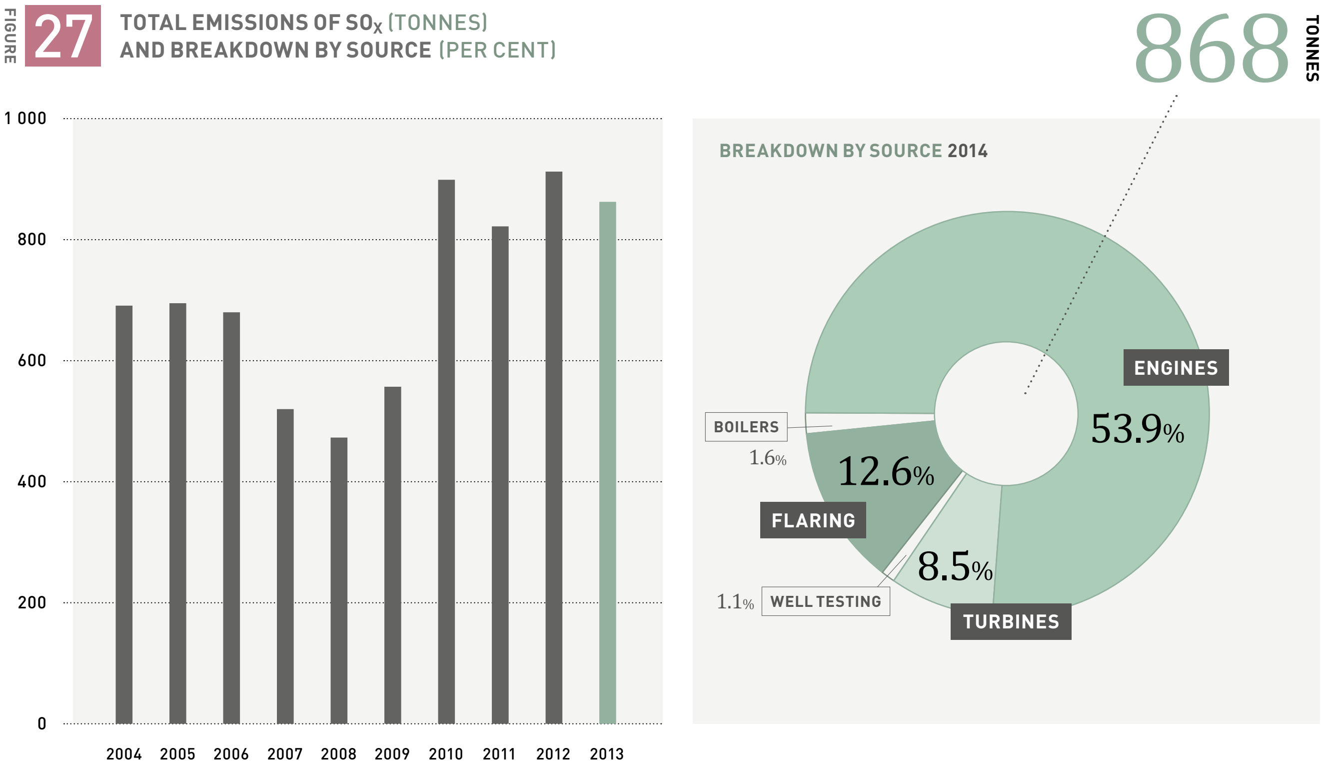


6.10 EMISSIONS OF SO_X

Figure 27 shows SO_x emissions from operations on the NCS and their breakdown by source in 2014. Total emissions in 2014 came to 868 tonnes, and have lain at this level for the past four years. The largest source in the oil and gas industry is combusting diesel oil in engines.

According to Statistics Norway, Norwegian SO_x emissions totalled 16 666 tonnes in 2014. The petroleum sector accounted for 5.2 per cent of this figure.

FIGURE 27 TOTAL EMISSIONS OF SO_X (TONNES) AND BREAKDOWN BY SOURCE (PER CENT)



7 WASTE

NORWEGIAN OIL AND GAS HAS DEVELOPED ITS OWN GUIDELINES FOR WASTE MANAGEMENT IN THE OFFSHORE SECTOR.

The petroleum sector is the largest generator of waste in Norway, and places great emphasis on its prudent management. Generally speaking, waste from the oil and gas industry is divided into hazardous and non-hazardous categories, and must be declared pursuant to national regulations and international guidelines. The principal goals of the operators are to generate a minimum of waste and to establish systems for recycling as much of it as possible. Norwegian Oil and Gas has developed its own guidelines for waste management in the offshore sector. These are used in declaring and further treatment of the waste. All waste is sent ashore in accordance with the industry's guidelines.

NON-HAZARDOUS WASTE

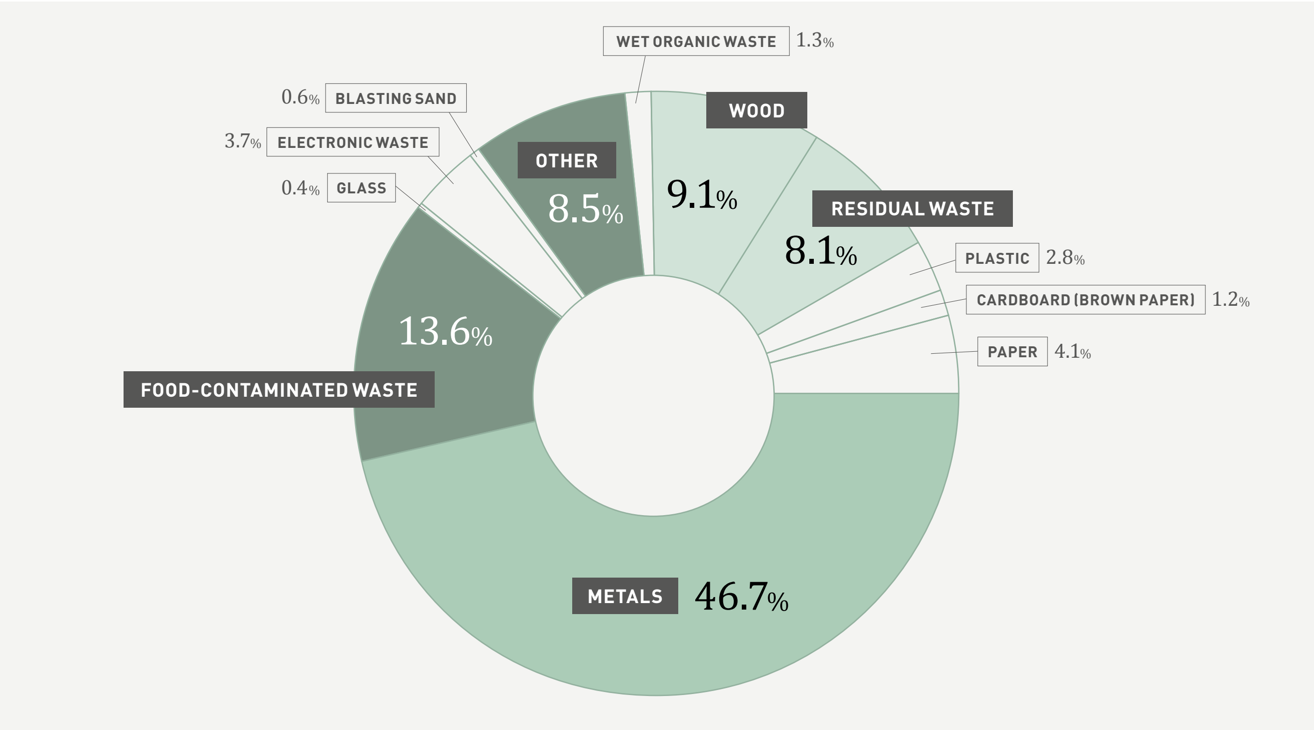
Non-hazardous waste totalled 27 058 tonnes in 2014, down just under seven per cent from the year before. This figure has varied between 20 000 and 30 000 tonnes since 2006.

HAZARDOUS WASTE

Some 426 000 tonnes of hazardous waste were delivered for treatment on land in 2014, a substantial increase from the year before. The largest proportion, about 375 000 tonnes, comprises various types of drilling and well waste – drilling fluids based on mineral oil (7 142 tonnes), oil-contaminated drill cuttings (7 143), downhole operations (7 031) and process water (7 165).

A substantial growth in oily waste has occurred in recent years. To a great extent, this reflects problems with leaks from injection wells on several fields, which prompted a halt to further injection in 2009-10. Oily waste previously injected had to be sent ashore for treatment. Methods for handling cuttings on these installations are based on slurrification with a view to injection. This process involves crushing the cuttings and adding water, and it is not unusual for the volume of cuttings to expand between four- and 10-fold as a result.

FIGURE 28 BREAKDOWN OF NON-HAZARDOUS WASTE FROM THE OFFSHORE INDUSTRY (2014)



That practice continued, and cuttings were sent ashore as slurry. This meant a marked increase in the quantity of drilling waste from certain fields. Injection provides substantial environmental benefits and can be cost-efficient compared with final treatment on land. Drilling of new injection wells on certain fields means that the quantity of injected liquids is again rising a little. See section 4.1. Work is under way on those installations and fields where injection will not be resumed to reduce slurrification and thereby cut the quantity of waste.

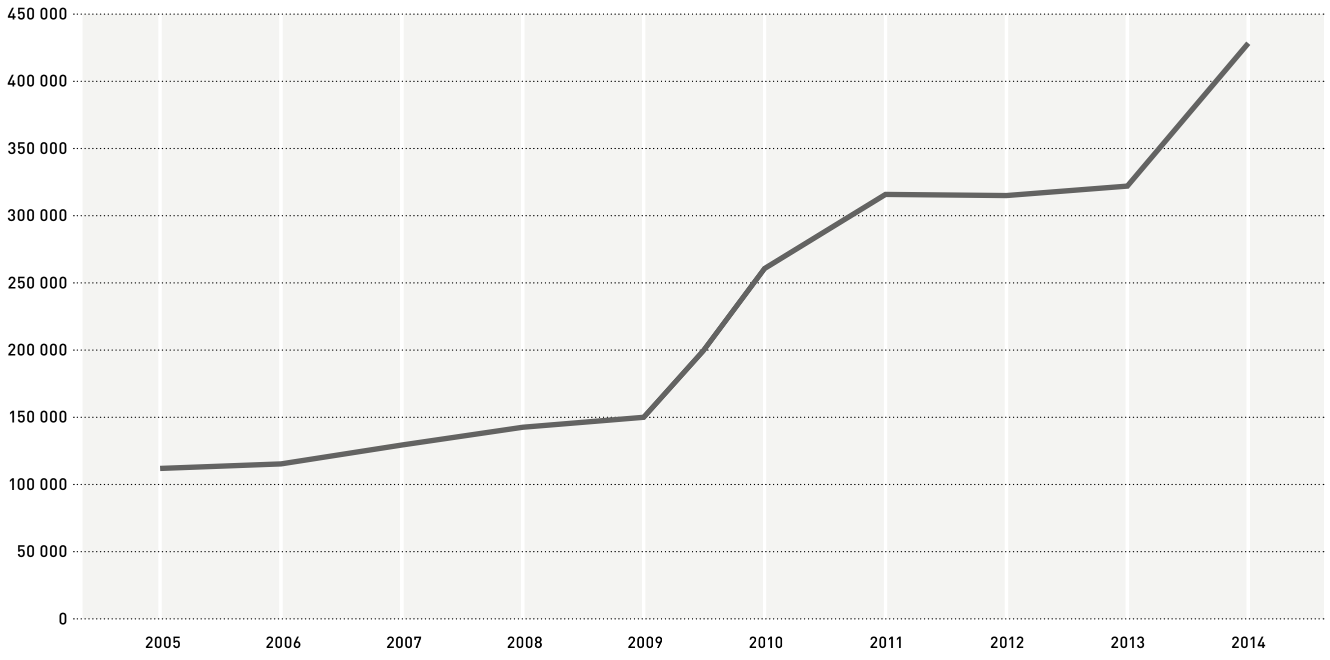
LOW-LEVEL RADIOACTIVE WASTE

Rocks beneath the seabed contain varying amounts of radium and other radioactive isotopes. These naturally occurring radioactive substances accompany oil, gas and – primarily – water to the surface during production. On some fields, sludge cleaned from oil-water separators can contain varying levels of measurable radioactivity. The concentration of these substances is measured through analyses of water and sludge by accredited laboratories.

Such waste is divided into and declared in three categories – no enhanced concentrations, radioactivity below 10 becquerels per gram and radioactivity above 10 Bq/g. The second and third of these are treated in accordance with regulations issued by the Norwegian Radiation Protection Authority. Waste with the highest activity is sent to a special landfill site in Gulen.

Just over 136 tonnes of radioactive waste were dealt with in 2014, including 60 tonnes to landfill and 76 tonnes for other treatment.

FIGURE 29 QUANTITY OF HAZARDOUS WASTE DELIVERED FOR FURTHER TREATMENT ON LAND FROM THE PETROLEUM INDUSTRY (TONNES)

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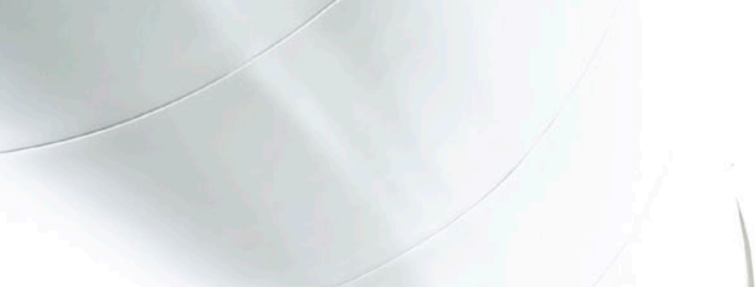

8 TABLES

TABLE 01

HISTORICAL PRODUCTION DATA FOR OIL, CONDENSATE, GAS AND WATER (MILL SCM, GAS BN SCM)

Reporting year	Oil	Condensate	NGL	Gas	Total oe
2001	180.9	5.7	10.9	54.1	251.6
2002	173.6	7.3	11.8	65.5	258.3
2003	165.5	10.3	12.9	72.9	261.6
2004	162.8	8.7	13.6	79.1	264.2
2005	148.1	8.0	15.7	85.7	257.5
2006	136.6	7.6	16.7	88.2	249.1
2007	128.3	3.1	17.3	89.5	238.2
2008	122.7	3.9	16.0	99.5	242.1
2009	114.9	4.4	16.9	103.7	239.9
2010	104.4	4.1	16.3	106.5	231.3
2011	97.5	4.6	16.3	100.3	218.6
2012	89.2	4.5	17.8	113.1	224.6
2013	84.9	4.0	17.7	107.1	213.7
2014	88.1	2.9	19.0	106.8	216.7

TABLE 02

INJECTION DATA (SCM)

Reporting year	Injected seawater	Injected gas	Gross fuel gas	Gross flared gas
2001	236 185 208	28 735 573 767	3 183 903 441	536 281 924
2002	239 216 244	33 249 106 525	3 633 399 130	412 882 829
2003	276 860 649	37 831 307 507	3 786 652 162	425 995 150
2004	277 454 051	42 080 845 665	3 944 034 988	415 445 530
2005	256 446 270	38 673 146 648	3 911 535 767	426 235 794
2006	229 580 409	35 912 244 455	3 812 244 031	388 296 590
2007	227 338 547	910 413 675	4 020 673 795	405 463 862
2008	211 622 233	878 468 398	3 747 606 181	478 756 232
2009	172 005 399	33 590 606	3 689 299 720	359 180 364
2010	160 642 436	73 993 770	3 681 557 183	366 768 997
2011	152 017 306	949 166 270	3 652 811 491	363 028 829
2012	141 172 398	29 331 500	3 579 740 030	325 791 139
2013	129 569 754	31 966 939 000	3 495 314 364	411 769 454
2014	146 077 916	37 350 404 000	3 798 925 621	332 081 167

TABLES

TABLE 03 DRILLING WITH OIL-BASED FLUIDS (TONNES)

Reporting year	Drilling fluids Consumption	Drilling fluids Discharged (volume)	Drilling fluids Injected	Drilling fluids Transported to land	Base fluids Left in hole or lost to formation
2005	217 852	0	64 486	44 699	52 020
2006	183 702	0	58 205	38 989	48 343
2007	182 381	0	53 301	42 877	50 636
2008	185 891	0	51 819	50 888	51 165
2009	219 217	0	45 728	71 157	53 745
2010	147 447	0	27 438	55 220	64 789
2011	112 863	0	14 954	55 895	47 456
2012	113 162	0	18 356	56 238	42 713
2013	146 235	0	37 555	60 795	47 884
2014	127 009	0	26 641	59 868	40 500

TABLE 04 DRILLING WITH SYNTHETIC FLUIDS (TONNES)

Reporting year	Drilling fluids Consumption	Drilling fluids Discharged (volume)	Drilling fluids Injected	Drilling fluids Transported to land	Base fluids Left in hole or lost to formation
2005	5 303	0	0	4 039	1 263
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	968	0	0	630	338
2009	0	0	0	0	0
2010	0	0	0	0	0
2011	2 888	0	0	1 126	1 762
2012	0	0	0	0	0
2013	1 444	0	0	601	843
2014	816	0	395	0	421

TABLE 05 DRILLING WITH WATER-BASED FLUIDS (TONNES)

Reporting year	Drilling fluids Consumption	Drilling fluids Discharged (volume)	Drilling fluids Injected	Drilling fluids Transported to land	Base fluids Left in hole or lost to formation
2005	219 126	153 352	21 879	17 082	20 804
2006	267 310	196 680	22 139	9 956	23 634
2007	265 754	199 281	27 243	9 439	16 982
2008	265 668	169 442	33 151	20 590	25 516
2009	419 440	285 662	20 320	24 717	31 417
2010	166 513	231 378	12 162	15 341	31 802
2011	288 293	228 222	30 302	21 888	35 967
2012	330 287	238 652	25 371	26 272	41 525
2013	383 817	293 150	18 545	22 231	49 890
2014	387 913	279 449	21 051	31 497	55 915

TABLE **06**

DISPOSAL OF CUTTINGS FROM DRILLING WITH OIL-BASED FLUIDS (TONNES)

Reporting year	Cuttings exported to other fields	Cuttings Discharged to sea	Cuttings Volume injected	Cuttings Transported to land	Total amount cuttings/ mud generated
2004	0	0	51 691	20 329	148 071
2005	0	0	60 242	20 287	246 018
2006	0	0	54 433	22 679	211 942
2007	467	0	50 321	28 875	191 191
2008	0	0	49 108	24 275	228 743
2009	424	0	47 640	39 072	252 562
2010	0	0	26 938	81 188	125 123
2011	0	0	19 699	68 190	64 614
2012	0	0	23 409	65 429	91 843
2013	0	0	37 874	54 433	82 567
2014	0	0	22 032	54 897	76 929

TABLE **07**

DISPOSAL OF CUTTINGS FROM DRILLING WITH WATER-BASED FLUIDS (TONNES)

Reporting year	Cuttings exported to other fields	Cuttings Discharged to sea	Cuttings Volume injected	Cuttings Transported to land	Total amount cuttings/ mud generated
2005	0	72 684	895	893	87 845
2006	325	80 757	1 423	2 226	74 472
2007	0	86 405	1 191	722	84 731
2008	651	70 199	2 717	2 501	88 381
2009	0	132 003	1 624	251	76 068
2010	0	207 655	664	9 896	133 878
2011	0	195 062	5 741	10 885	218 215
2012	0	171 841	1 169	3 774	211 688
2013	0	122 402	50	2 210	176 784
2014	0	113 505	24	525	124 662

TABLE **08**

TOTAL AMOUNT OF CUTTINGS/MUD IMPORTED TO FIELDS (TONNES)

Reporting year	Oil-based
2005	3 268
2006	2 383
2007	1 668
2008	3 692
2009	7 579
2010	14 994
2011	91
2012	0
2013	0
2014	0

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TABLE 09

SELECTED GROUPS OF ORGANIC COMPOUNDS DISCHARGED IN PRODUCED WATER (KG)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Alkylphenols C1-C3	257 668	335 937	341 254	324 626	310 191	310 217	298 324	300 662	295 596	399 079
Alkylphenols C4-C5	13 273	15 571	12 513	12 473	12 949	10 258	14 360	15 892	13 177	12 846
Alkylphenols C6-C9	302	132	173	198	184	294	219	124	146	231
Others	8 131 449	7 519 086	7 959 150	8 838 787	7 814 585	7 905 978	8 611 126	8 424 293	7 971 565	9 063 413
BTEX	1 479 637	1 644 661	1 826 674	1 803 998	1 902 925	1 818 173	1 675 059	1 855 037	1 920 150	1 963 541
EPA 16	44 392	66 968	52 567	48 312	51 512	1 541	1 863	1 794	2 255	2 448
Phenols	170 118	179 405	212 822	207 560	185 041	166 660	179 546	206 564	503 045	653 851
Oil in water	2 097 498	1 057 837	1 178 851	947 549	1 156 501	1 200 078	1 235 608	1 325 326	1 689 917	1 560 328
Organic acids	34 711 299	34 838 267	35 818 064	31 263 700	27 204 909	24 752 275	22 251 835	22 144 558	53 788 966	31 606 050
PAH	121 454	89 899	73 776	81 157	101 664	140 867	155 915	166 366	156 528	169 764

* Naphthalene and phenanthrene were removed from EPA-PAH in 2010.

TABLE 10

BTX COMPOUNDS DISCHARGED IN PRODUCED WATER (KG)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Benzene	683 080	771 347	871 200	862 411	868 175	832 031	771 333	848 713	864 843	973 116
Ethylbenzene	32 648	34 271	34 565	34 675	46 135	41 758	37 913	43 761	45 843	53 131
Toluene	571 545	628 213	674 719	672 398	722 851	700 550	655 169	710 617	733 847	725 968
Xylene	192 364	210 830	246 189	234 513	265 764	243 835	210 644	251 946	275 617	211 326

TABLE 11

HEAVY METALS DISCHARGED IN PRODUCED WATER (KG)

Substance	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Arsenic	267	380	660	614	483	895	656	604	622	645
Barium	7 015 319	6 137 119	6 939 336	7 762 350	7 008 907	7 071 530	7 639 584	7 554 262	7 321 592	8 219 090
Lead	173	348	255	386	290	239	428	309	64	191
Iron	1 108 015	1 370 415	1 008 440	1 058 121	797 369	825 822	959 698	863 198	645 476	833 664
Cadmium	11	30	28	41	28	22	32	18	6	11
Copper	312	730	103	102	102	89	162	143	109	249
Chrome	4 018	192	175	213	154	225	221	131	107	124
Mercury	8	7	6	11	9	9	15	13	8	8
Nickel	1 073	735	299	299	142	200	223	198	118	128
Zinc	2 253	9 129	9 847	16 651	7 100	6 948	10 108	5 418	3 463	9 303

TABLE 12

PHENOLS
DISCHARGED IN PRODUCED WATER (KG)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
C1-Alkylphenols	161 542	214 511	226 609	207 855	203 376	199 007	186 923	190 276	181 272	266 814
C2-Alkylphenols	70 094	92 631	82 571	87 634	80 707	83 860	82 207	70 392	73 887	89 033
C3-Alkylphenols	26 032	28 794	32 074	29 137	26 108	27 350	29 194	39 995	40 438	43 232
C4-Alkylphenols	11 115	12 524	10 438	10 451	11 624	8 707	11 195	11 315	9 447	9 393
C5-Alkylphenols	2 157	3 047	2 076	2 022	1 325	1 551	3 165	4 577	3 730	3 453
C6-Alkylphenols	66	51	86	84	78	125	81	52	40	46
C7-Alkylphenols	62	20	26	61	22	55	61	53	95	120
C8-Alkylphenols	81	37	33	39	20	71	45	11	7	15
C9-Alkylphenols	92	23	28	13	64	44	31	8	4	50
Phenol	170 118	179 405	212 822	207 560	185 041	166 660	179 546	206 564	194 126	241 695

TABLE 13

ORGANIC ACIDS
DISCHARGED IN PRODUCED WATER (KG)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Butyric acid	752 861	671 281	777 200	714 602	627 237	519 296	453 964	456 609	552 200	343 341
Acetic acid	29 820 022	29 837 132	30 327 152	26 381 307	22 509 255	20 693 558	19 028 018	19 045 328	48 544 545	28 083 291
Formic acid	159 966	501 911	449 707	314 221	563 669	493 913	450 016	341 274	1 294 414	517 012
Naphthenic acid	259 322	262 712	283 637	250 405	264 051	179 185	99 691	96 547	133 352	138 301
Valeric acid	336 195	344 439	374 276	341 590	338 214	241 354	159 998	165 674	175 335	167 286
Propionic acid	3 382 933	3 220 793	3 606 091	3 261 575	2 902 484	2 624 969	2 060 148	2 039 125	3 089 121	2 356 819

TABLE 14

PAH COMPOUNDS
DISCHARGED IN PRODUCED WATER (KG)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acenaphthene*	276	238	200	164	198	196	225	217	415	350
Acenaphthylene*	155	185	45	174	93	83	94	93	127	158
Anthracene*	118	36	36	60	10	7	9	8	36	49
Benzo(a)anthracene*	32	29	13	18	9	8	8	9	14	23
Benzo(a)pyrene*	11	14	6	5	4	3	3	3	7	13
Benzo(b)fluoranthene*	25	132	13	16	9	9	10	10	8	14
Benzo(g,h,i)perylene*	21	17	5	7	6	6	6	6	5	5
Benzo(k)fluoranthene*	5	13	2	4	2	1	1	1	10	5
C1-dibenzothiophene	3 238	1 345	1 886	1 589	2 438	2 222	2 873	2 957	2 817	3 086
C1-Phenanthrene	1 953	1 521	690	761	667	601	716	808	1 077	1 097
C1-naphthalene	59 929	50 250	43 939	44 155	47 410	45 000	49 202	54 446	31 845	41 387
C2-dibenzothiophene	3 344	1 982	1 823	1 976	2 706	2 598	3 747	3 748	3 980	4 247
C2-Phenanthrene	2 096	1 453	663	634	939	878	1 160	1 217	1 461	1 612
C2-naphthalen	27 251	21 143	16 086	19 636	24 669	21 880	26 936	27 707	30 949	27 602
C3-dibenzothiophene	466	187	375	306	662	694	1 157	1 111	1 588	1 743
C3-Phenanthrene	474	342	71	92	20	22	27	26	4 845	6 822
C3-naphthalene	21 957	11 226	7 813	11 614	21 719	17 219	22 363	23 230	26 057	22 525
Dibenz(a,h)anthracene*	9	12	3	4	3	2	3	2	2	2
Dibenzothiophene	748	449	429	394	435	407	465	518	490	517
Phenanthrene	2 553	1 723	1 518	1 565	1 712	1 576	1 775	1 781	1 648	2 008
Fluoranthene*	88	53	38	28	25	27	45	37	35	43
Fluorene*	1 769	1 308	1 132	1 166	1 175	1 126	1 384	1 327	1 459	1 599
Indeno(1,2,3-c,d)pyrene*	5	12	2	3	2	1	1	2	2	1
Chrysene*	74	61	40	61	42	30	41	38	76	122
Naphthalene	39 133	63 073	49 450	44 963	48 175	47 770	45 492	48 816	47 517	54 669
Pyrene*	117	64	64	74	49	43	34	42	59	64

* Included in EPA-PAH. Naphthalene and phenanthrene were also part of this group until 2010.

TABLE 15

DISCHARGE AND CONSUMPTION OF CHEMICALS BY NEA COLOUR CATEGORY (TONNES)

NEA colour category	Reporting year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Green	Consumption	296 091	303 976	338 485	344 559	385 425	374 541	351 387	368 199	450 084	421 301
	Discharge	80 105	93 141	113 159	114 403	159 569	127 249	138 019	146 620	152 929	151 819
Yellow	Consumption	85 297	90 592	94 905	94 500	92 410	103 061	80 141	82 714	100 232	95 227
	Discharge	10 240	11 078	12 005	12 819	14 701	11 727	12 305	13 532	13 828	14 510
Red	Consumption	6 375	5 659	5 376	4 261	3 206	2 894	1 842	2 088	2 963	3 191
	Discharge	93.0	39.0	23.0	15.0	32.0	16.0	8.1	7.5	6.4	16.3
Black	Consumption	121	40	50	60	16	1 259*	1 140*	746**	578	684
	Discharge	3	3	1	2	1	1	0.6	2.4**	6.8	13.9

* This includes consumption of hydraulic oil in closed systems from 2010. These substances are provisionally categorised as black because most of them are not tested.
** Some discharges of fire extinguishing foam are included from 2012. Complete reporting will begin in 2015 because of the time required to amend the regulations.

TABLE 16

DISCHARGE OF OIL-CONTAMINATED WATER

Water type	2005	2006	2007	2008
DRAINAGE				
Oil index volume to sea (tonnes)	16	9	8	10
Water volume to sea (cu.m)	1 148 995	902 487	905 396	953 964
Total water volume (cu.m)	1 200 245	979 867	962 543	993 156
Injected water volume (cu.m)	51 515	77 086	53 328	36 298
DISPLACEMENT				
Oil index volume to sea (tonnes)	76	78	94	58
Water volume to sea (cu.m)	47 403 128	41 633 651	42 080 398	35 781 227
Total water volume (cu.m)	47 403 128	41 633 651	42 080 398	35 781 227
Injected water volume (cu.m)				0
JETTING				
Oil index volume to sea (tonnes)	67	15	26	13
Water volume to sea (cu.m)				
Total water volume (cu.m)				
Injected water volume (cu.m)				
PRODUCED				
Oil index volume to sea (tonnes)	1 510	1 308	1 532	1 569
Water volume to sea (cu.m)	147 269 373	144 741 847	161 825 645	149 241 700
Total water volume (cu.m)	177 388 172	173 349 396	182 807 754	173 375 110
Injected water volume (cu.m)	32 569 423	31 693 056	26 665 258	30 379 135

	2009	2010	2011	2012	2013	2014
	6	8	8	8	8	11
	917 986	727 811	867 531	953 596	953 570	983 595
	1 099 819	763 736	891 951	979 802	990 812	1 065 747
	184 247	19 875	16 740	18 831	33 566	86 527
	55	47	51	58	56	43
	31 567 044	31 953 823	27 025 783	31 491 555	32 227 733	33 230 953
	31 567 050	31 953 823	27 025 783	31 491 555	32 227 733	33 230 953
	0	0	0	0	0	0
	24	65	53	43	37	43
	1 487	1 443	1 478	1 535	1 542	1 761
	134 770 215	130 842 793	128 550 571	130 909 973	127 782 957	140 981 579
	158 559 726	157 890 256	160 758 982	162 958 696	161 138 014	176 815 686
	29 547 450	33 217 136	31 095 328	32 756 572	37 292 502	39 360 701

TABLES

TABLE

17 TOTAL CONSUMPTION, DISCHARGE AND INJECTION OF CHEMICALS BY APPLICATION (TONNES)

Application		2005	2006	2007	2008
DRILLING AND WELL CHEMICALS	Consumed	320 491	323 238	352 533	357 736
	Injected	80 640	79 872	78 166	88 506
	Discharged	63 116	72 641	87 682	90 841
GAS PROCESSING CHEMICALS	Consumed	14 540	17 760	18 804	22 257
	Injected	412	1 241	757	1 502
	Discharged	10 555	13 062	11 619	13 124
AUXILIARY CHEMICALS	Consumed	2 962	3 279	6 269	7 135
	Injected	403	369	250	810
	Discharged	1 919	2 223	3 622	4 031
INJECTION CHEMICALS	Consumed	15 115	14 730	15 361	15 517
	Injected	687	1 742	1 464	1 486
	Discharged	1 335	132	332	235
CHEMICALS FOR RESERVOIR MANAGEMENT	Consumed	1	1	2	14
	Injected	0	0	0	0
	Discharged	1	1	2	0
CHEMICALS FROM OTHER PRODUCTION LOCATIONS	Consumed	419	438	434	614
	Injected	228	59	41	210
	Discharged	1 140	917	697	847
CHEMICALS ADDED TO THE EXPORT FLOW	Consumed	7 805	5 866	5 180	5 443
	Injected	0	0	0	0
	Discharged	282	188	311	439
PRODUCTION CHEMICALS	Consumed	24 405	30 069	29 131	31 278
	Injected	2 995	5 881	3 323	4 046
	Discharged	11 131	14 049	15 317	17 208
PIPELINE CHEMICALS	Consumed	2 159	4 886	5 189	3 385
	Injected	20	0	0	0
	Discharged	962	1 049	2 015	516
TOTAL	Total consumed	387 897	400 267	432 904	443 381
	Total injected	85 385	89 165	84 000	96 560
	Total discharged	90 441	104 260	121 597	127 240

	2009	2010	2011	2012	2013	2014
	402 110	409 337	357 665	373 038	470 082	429 864
	65 682	44 204	37 685	36 627	59 657	54 397
	137 008	104 966	111 839	112 391	118 921	116 905
	21 381	17 905	21 061	22 563	25 505	26 342
	1 634	1 406	1 628	4 133	663	5 390
	11 849	9 698	11 097	16 079	16 113	16 697
	7 886	8 091	8 073	7 671	8 313	9 417
	501	420	377	190	394	334
	4 795	4 244	4 489	4 903	4 699	5 250
	12 997	11 487	9 830	9 155	9 340	10 011
	1 485	1 367	1 492	2 945	1 115	1 324
	200	188	212	176	1 173	1 356
	12	14	6	4	16	25
	0	0	0	0	0	2
	9	5	2	3	12	9
	475	536	0	0	0	0
	24	117	114	150	99	895
	753	753	692	952	985	677
	5 085	5 094	4 665	5 269	5 813	6 121
	0	0	0	0	0	0
	1 664	1 847	1 483	1 951	615	383
	27 720	26 816	28 564	29 018	31 298	31 449
	4 500	4 403	4 598	4 082	4 841	4 040
	17 033	16 001	17 272	19 577	21 891	21 854
	2 973	2 477	4 609	7 029	3 491	7 174
	146	599	936	494	917	1 282
	917	1 308	3 245	4 130	2 362	3 230
	480 640	481 756	434 472	453 747	553 858	520 404
	73 973	52 515	46 829	48 621	67 688	67 664
	174 228	139 009	150 332	160 162	166 770	166 360

TABLE 18 CONSUMPTION AND DISCHARGE OF CHEMICALS BY ENVIRONMENTAL PROPERTIES (KG)

NEA category description	NEA colour category		2005	2006	2007
Biodegradability < 20% and log Pow ≥ 5	Black	Consumption	69 251	7 464	990
		Discharge	2 365	861	569
Biodegradability < 20% and toxicity EC_{50} or LC_{50} ≤ 10 mg/l	Black	Consumption	50 683	31 908	4 141
		Discharge	685	2 147	398
Biodegradability < 20%	Red	Consumption	2 997 005	2 928 386	3 016 508
		Discharge	59 872	17 794	13 236
Hormone-disrupting substances	Black	Consumption		494	
		Discharge	150	206	100
List of priority chemicals included in result target 1 (priority list, Proposition no 1 (2009-2010) to the Storting)	Black	Consumption	1032	594	497
		Discharge	3.29	6.6	0.6
Substances on the Plonor list	Green	Consumption	228 475 800	227 535 746	251 002 945
		Discharge	56 369 558	63 423 630	72 584 564
Two out of three categories: biodegradability < 60%, log Pow ≥, EC_{50} or LC_{50} ≤ 10 mg/l	Red	Consumption	3 378 432	2 730 168	2 359 348
		Discharge	33 273	21 317	9 500
Inorganic and EC_{50} or LC_{50} ≤ 1 mg/l	Red	Consumption	-	-	-
		Discharge	-	-	-
Water	Green	Consumption	67 614 818	76 440 340	87 481 939
		Discharge	23 735 816	29 716 997	40 574 911

TABLES

	2008	2009	2010	2011	2012	2013	2014
	908	1 173	1 238 234	1 128 385	694 302	526 781	621 749
	824	1 010	1 275	405	64	2 764	3 884
	1 405	1 233	20 616	11 994	10 853	4 779	14 156
	459	66	80	108	1 050	195	4 720
	3 079 264.00	2 144 671	2 386 670	1 493 063	1 287 072	1 636 560	1 820 975
	10 515	16 318	14 455	6 403	3 600	2 957	5 315
	19800	13758	0	27.7	3.87	24.8	13.8
	1027	61.2	90.7	53.7	10.1	0.3	0.2
	146	57.9	5.88		3.4	5.6	
	140	19.6	0.15		3.4	5.6	
	252 779 521	289 681 616	286 277 021	273 273 649	282 200 932	346 408 225	322 526 410
	74 569 494	111 268 937	90 611 749	99 503 072	103 431 611	114 256 578	107 230 113
	1 181 523	1 061 115	506 942	348 519	801 011	1 326 315	1 370 251
	4 579	15 830	1 584	1 710	3 904	3 399	10 957
	-	-	-	-	-	92	130
	-	-	-	-	-	0	29
	91 779 833	95 743 461	88 264 187	78 113 608	85 997 959	103 676 110	98 774 938
	39 833 569	48 300 298	36 637 585	38 515 435	43 188 663	38 672 671	44 588 635

TABLE

18 CONSUMPTION AND DISCHARGE OF CHEMICALS (CONT) BY ENVIRONMENTAL PROPERTIES (KG)

NEA category description	NEA colour category		2012	2013	2014
Yellow in sub-category 1. Expected to biodegrade fully	Yellow	Consumption	7 335 852	8 069 394	7 759 286
		Discharge	3 708 051	3 848 522	3 672 639
Yellow in sub-category 2. Expected to biodegrade to environmentally non-hazardous substances	Yellow	Consumption	4 988 993	7 463 230	5 391 492
		Discharge	1 767 544	1 728 398	1 701 696
Yellow in sub-category 3. Expected to biodegrade to substances which could be environmentally hazardous	Yellow	Consumption	-	6162	772
		Discharge	-	1120	154
Substances covered by Reach annexes IV and V	Yellow	Consumption	-	1 378 210	4 878 723
		Discharge	-	210 602	368 432
Substances with biodegradability > 60%	Yellow	Consumption	-	83 315 498	77 196 583
		Discharge	-	8 039 121	8 767 279
Substances thought to be, or which are, hazardous to genes or reproduction	Black	Consumption	-	272	12
		Discharge	-	257	0
Substances with no test data	Black	Consumption	-	46 290	47 978
		Discharge	-	3 605	5 247

TABLE 19

DISCHARGE OF CONTAMINANTS IN CHEMICALS (TONNES)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Other		0.228				0.14			1.99	4.80
Arsenic	0.06	0.07	0.07	0.18	0.20	0.15	0.18	0.51	0.48	0.23
Lead	1.63	2.29	2.35	1.39	2.56	1.47	1.48	3.51	4.26	3.19
Cadmium	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.06	0.03	0.06
Chrome	0.46	0.48	0.57	0.51	0.82	0.73	0.78	0.88	1.08	0.89
Mercury	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.03	0.02
Organohalogens	0	0	0	0	0	0.000	0.000	0.000	0.008	0.013

TABLE 20

DISCHARGE OF ADDITIVES IN CHEMICALS TOTAL VOLUME (TONNES)

Substance	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lead	1.63	2.29	2.35	1.51	2.52	1.470	1.480	3.510		0.043
Organohalogens						0.000	0.000	0.000	0.391	4.132

TABLE 21

ACUTE DISCHARGES TO THE SEA

Utslippstype	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CHEMICALS										
Number < 0.05 cu.m	44	35	22	36	59	64	58	52	65	133
Number 0.05 -1 cu.m	49	40	47	66	61	62	65	51	61	68
Number > 1 cu.m	37	27	40	30	42	32	28	38	31	36
Volume < 0.05 cu.m	0.6	0.4	0.3	0.4	0.6	0.6	0.6	0.6	0.6	1.1
Volume 0.05 -1 cu.m	14.8	13.5	11.7	18.8	22.9	20.0	24.5	14.8	17.9	21.2
Volume > 1 cu.m	402.0	429.0	5403.0	347.0	13029.0	6245.0	176.0	350.0	1267.2	745.8
Total number	130	102	109	132	162	158	151	141	157	237
Total volume (cu.m)	418	443	5 415	366	13 052	6 265	201	365	1 286	768
OIL										
Number < 0.05 cu.m	85	78	112	130	106	109	101	85	93	36
Number 0.05 – 1 cu.m	56	37	42	34	37	24	28	20	19	15
Number > 1 cu.m	6	7	12	9	4	7	1	3	6	8
Volume < 0.05 cu.m	0.9	0.9	1.0	1.0	0.6	0.6	0.6	0.5	0.6	0.3
Volume 0.05 – 1 cu.m	15.0	7.9	11.2	7.9	9.3	4.9	8.1	5.2	5.6	4.3
Volume > 1 cu.m	361	113	4476	186	104	105	10	8	41	152
Total number	147	122	166	173	147	140	130	108	118	59
Total volume (cu.m)	377	122	4488	195	114	111	18.6	13.3	47.1	156.3

TABLE 22

EMISSIONS TO THE AIR (TONNES)

Reporting year	Emissions CO_2 (tonnes) direct	Emissions NOx (tonnes)	Emissions SOx (tonnes)	Emissions PAH (tonnes)	Emissions PCB (tonnes)	Emissions dioxins (tonnes)	Volume fuel gas (cu.m)	Volume liquid fuel (tonnes)	Discharges to the sea from well tests (tonnes)
2005	11 873 588	54 416	691	0.056	0.0016	7.20E-08	4 545 142 236	242 849	0.9
2006	11 562 015	54 348	695	0.174	0.0049	2.22E-07	4 457 179 375	258 750	2.8
2007	13 223 453	53 997	680	0.029	0.0008	3.80E-08	5 322 484 423	263 782	0.5
2008	13 771 403	50 882	520	0.046	0.0013	5.90E-08	5 361 502 095	274 966	3.0
2009	12 444 220	49 804	473	0.060	0.0018	8.00E-08	4 824 405 725	312 627	1.0
2010	12 581 242	50 048	557	0.090	0.0017	8.00E-08	4 800 873 166	316 645	2.8
2011	12 283 631	51 475	899	1.590	0.0017	8.00E-08	4 725 836 624	377 017	3.4
2012	12 508 377	50 704	822	0.170	0.0023	8.00E-08	4 797 773 639	391 683	3.4
2013	12 283 844	50 887	914	0.047	0.0009	3.96E-08	4 573 287 959	435 173	1.4
2014	13 099 231	52 582	868	0.117	0.0021	9.74E-08	5 031 145 644	426 515	4.9

TABLE 23 **EMISSIONS TO THE AIR BY SOURCE** (TONNES)

Source	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
OTHER SOURCES										
Emissions nmVOC			211	809	685	1 363	1 137	49	24	33
Emissions CH_4			92	581	537	1 635	2 559	185	90	122
Emissions SO_x						0	0	0	0	0
Emissions NO_x					151	63	15	0	2	2
Emissions CO_2		2 471	76 603	106 978	91 028	113 691	100 019	62 058	36 241	46 431
WELL TESTING										
Emissions nmVOC	14	30	9	23	20	85	30	25	18	33
Emissions CH_4	3	4	2	1	3	8	3	9	0	5
Emissions SO_x	5	14	1	11	12	47	60	13	21	18
Emissions NO_x	162	256	117	78	160	470	168	502	32	94
Emissions CO_2	40 519	68 001	30 990	32 778	46 011	152 940	55 619	129 190	18 481	48 362
FLARING										
Emissions nmVOC	26	24	2 074	236	92	73	76	75	126	75
Emissions CH_4	104	97	3 879	827	321	263	278	267	263	238
Emissions SO_x	4	3	12	3	3	3	224	215	200	201
Emissions NO_x	5 202	4 787	3 472	979	607	606	589	556	644	552
Emissions CO_2	1 094 076	993 153	2 317 829	2 514 504	1 438 349	1 379 989	1 319 289	1 199 498	1 462 960	1 216 554
BOILERS										
Emissions nmVOC	40	29	194	11	17	21	37	33	21	26
Emissions CH_4	117	102	68	80	22	37	32	31	30	19
Emissions SO_x	14	9	4	10	26	12	23	27	15	26
Emissions NO_x	349	246	85	250	78	95	195	155	169	176
Emissions CO_2	206 064	177 279	122 527	196 580	152 171	156 106	152 706	242 413	234 446	235 416
ENGINES										
Emissions nmVOC	976	1 024	1 048	1 049	1 217	1 283	1 554	1 487	1 708	1 735
Emissions CH_4	36	29	29	30	19	16	14	15	16	15
Emissions SO_x	507	498	491	389	320	387	488	412	493	1 215
Emissions NO_x	14 437	14 503	14 639	14 663	16 302	16 822	19 980	19 494	21 509	21 246
Emissions CO_2	722 703	734 423	752 988	764 384	823 882	856 490	1 025 526	989 393	1 130 513	1 148 162
TURBINES										
Emissions nmVOC	919	888	905	898	883	890	867	883	834	933
Emissions CH_4	3 488	3 377	3 450	3 418	3 354	3 692	3 563	3 653	3 424	3 874
Emissions SO_x	162	171	173	106	112	108	105	156	185	135
Emissions NO_x	34 266	34 557	35 083	34 590	32 506	31 993	30 528	29 997	28 530	30 511
Emissions CO_2	9 810 225	9 586 688	9 922 517	10 156 180	9 892 780	9 922 026	9 630 473	9 885 826	9 401 204	10 404 306

TABLES

TABLE 24 EMISSIONS OF CH_4 AND nmVOC FROM DIFFUSE SOURCES AND COLD VENTING (TONNES)

Reporting year	nmVOC emissions	CH_4 emissions
2005	7 411	14 410
2006	6 617	14 057
2007	7 701	14 935
2008	9 114	19 023
2009	9 161	18 483
2010	7 186	18 068
2011	8 254	19181
2012	10 083	18 267
2013	8 233	17 167
2014	13 437	23 703

TABLE 25 EMISSIONS FROM WELL TESTING

Reporting year	Combusted diesel (tonnes)	Combusted gas (cu.m)	Combusted oil (tonnes)
2005	103	12 245 846	3 840
2006	43	18 662 837	8 558
2007	0	8 304 214	2 469
2008	0	4 442 709	6 997
2009	15	11 509 318	6 301
2010	48	31 426 218	24 947
2011	88	6 046 803	7 483
2012	0	8 560 987	10 891
2013	27	1 173 525	4 827
2014	21	4 804 194	9 739

TABLE 26 EMISSIONS OF CH_4 AND nmVOC FROM STORAGE AND LOADING (TONNES)

Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
STORAGE										
Emissions nmVOC	6 163	4 251	2 099	3 578	6 397	4 607	4 041	2 978	3 407	1 077
Emissions CH_4	465	580	119	332	998	308	596	337	610	247
LOADING										
Emissions nmVOC	78 000	66 677	61 954	34 714	27 032	21 483	15 072	17 409	18 436	32 236
Emissions CH_4	10 650	7 940	7 521	6 631	5 890	4 017	2 711	2 894	2 287	1 825

TABLE 27 **SEPARATED WASTE BY SOURCE**
(TONNES)

Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Other	943	4 669	1 728	6 094	951	4 747	5 425	7 043	5 700	2 288
Blasting sand										161
EE waste	404	461	638	625	530	590	773	692	774	987
Glass	89	105	103	85	98	94	115	115	102	114
Food-contaminated waste	1 303	1 464	1 922	2 026	2 198	2 622	2 781	3 390	3 582	3 668
Metals	6 932	9 305	8 487	8 787	8 945	9 059	9 432	11 180	11 474	12 644
Paper	640	1 497	700	809	828	926	980	1 100	983	1 120
Cardboard (brown paper)	500	443	521	433	414	440	483	457	465	326
Plastic	306	337	457	422	490	597	635	676	722	749
Residual waste	4 217	3 707	3 381	3 132	3 079	3 718	3 750	2 586	2 485	2 177
Wood	1 442	1 620	1 895	1 891	1 855	2 385	2 604	2 338	2 419	2 463
Wet organic waste	137	161	206	143	120	107	89	115	267	361

TABLE 28 **HAZARDOUS WASTE**
(TONNES)

Water type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Drilling waste and other	94 679	103 894	119 576	142 142	151 704	258 482	308 456	305 669	314 952	418 059
Batteries	119	118	149	41	33	36	50	32	65	37
Blasting sand	130	52	73	61	29	41	73	248	64	9
Mixed chemicals w/halogen	12 081	7 593	5 341	118	381	916	5 084	6 978	5 991	6 890
Mixed chemicals w/metal	9	6	37	1	0	0	0	0	16	0
Mixed chemicals wo/halogen or heavy metals	387	137	170	69	54	28	30	119	16	55
Lightbulbs	37	28	34	9	6	4	6	9	10	10
Paint	451	433	289	139	67	164	83	159	86	48
Oil-contaminated waste	3 098	3 220	3 876	1 256	1 218	1 088	1 966	1 291	1 663	1 106
Pure chemicals w/halogen	1	442	11	43	6	0	0	0		37
Pure chemicals w/heavy metals	16	29	16	11	12	5	3	8	4	0
Pure chemicals wo/halogen or heavy metals	240	102	123	35	34	6	17	7	14	3
Spray cans	15	19	23	3	4	3	5	2	6	1

TABLE

30 HAZARDOUS WASTE
(TONNES)

Water type	2004	2005	2006	2007
Drilling waste and other	101 939	94 679	103 894	119 576
Batteries	95.7	119.0	118.0	149.0
Blasting sand	95.1	130.0	52.1	73.4
Mixed chemicals w/halogen	1 354	12 081	7 593	5 341
Mixed chemicals w/metal	4.4	9.2	6.4	37.4
Mixed chemicals wo/halogen or heavy metals	163	387	137	170
Lightbulbs	25.3	37.3	27.7	33.8
Paint	282	451	433	289
Oil-contaminated waste	1 815	3 098	3 220	3 876
Pure chemicals w/halogen	3.8	1.4	442	11
Pure chemicals w/heavy metals	12.1	15.5	28.6	16.4
Pure chemicals wo/halogen or heavy metals	87	240	102	123
Spray cans	11.9	14.9	18.8	23.1

	2008	2009	2010	2011	2012	2013
	142 142	151 704	258 482	308 456	305 669	314 953
	40.7	32.8	35.6	50.3	32.2	64.5
	61.0	29.4	41.4	72.5	248.0	64.1
	118	381	916	5 084	6 978	5 991
	0.7	0.3	0.2	0.3	0.2	16.1
	69	54	28	30	119	16
	8.5	6.0	4.1	5.6	8.5	10.0
	139	67	164	83	159	86
	1 256	1 218	1 088	1 966	1 291	1 663
	43	6	0	0	0	0
	10.8	12.2	4.7	2.8	7.6	4.4
	35	34	6	17	7	14
	2.5	3.6	3.3	5.2	2.3	5.5

9 TERMS AND ABBREVIATIONS

CH_4	Methane
CO_2	Carbon dioxide
NGL	Natural gas liquids
nmVOC	Non-methane volatile organic compounds
NO_x	Nitrogen oxides
SO_x	Sulphur oxides
SO_2	Sulphur dioxide
b/d	Barrels per day
oe	Oil equivalent
scm	Standard cubic metres
THC	Total hydrocarbon content

EEH
Environment Hub

ETS
EU emission trading system.

NCS
Norwegian continental shelf.

NEA
Norwegian Environment Agency.

NPD
Norwegian Petroleum Directorate.

IOGP
International Association of Oil and Gas Producers

Ospar
Oslo-Paris convention for the protection of the marine environment of the north-east Atlantic. Fifteen countries with coasts on or rivers emptying into these waters are signatories.

Plonor
"Pose little or no risk to the marine environment", a list from Ospar of chemical compounds considered to have little or no impact on the marine environment if discharged.

Conversion factors
based on the energy content in hydrocarbons. Calculated in accordance with definitions from the NPD.

Oil 1 cu.m = 1 scm oe
Oil 1 barrel = 0.159 scm
Condensate 1 tonne = 1.3 scm oe
Gas 1 000 scm = 1 scm oe
NGL 1 tonne = 1.9 scm oe

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