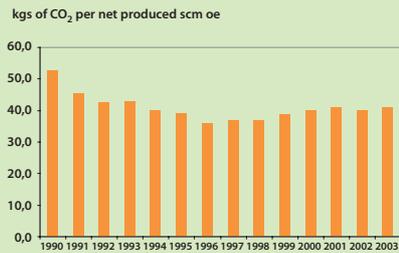


# 8

## Environmental considerations in the Norwegian petroleum sector





**Figure 8.1** Emissions of taxable CO<sub>2</sub> per produced unit  
(Source: NPD)



**Figure 8.2** Emissions of NO<sub>x</sub> per produced unit  
(Source: MPE, NPD)

In 1971, the Storting gave the growth of a Norwegian petroleum sector due consideration, and its industry committee drew up a recommendation which contained what would later be known as the “ten oil commandments”. The ten oil commandments became guidelines for Norwegian oil and energy policy and two of these would become significant for the protection of the external environment:

- Development of the oil industry must take other industries into account, as well as nature and protection of the environment.
- Natural gas that could be exploited must not be flared off except during brief test production periods.

Present day goals state that Norway, as an important energy nation, should also be a pioneer in the protection of the environment. Since the early 1970s, legislation and regulations that protect the environment have gradually been established, and today the petroleum industry is thoroughly regulated in order to protect the external environment.

The environment is protected in all phases of the industry. The petroleum legislation requires that impact assessments are carried out before new areas are opened to the petroleum industry, and conditions may be set before an area is opened. Development plans (PDO/PIO) must also be officially approved, and the impact assessments play an important part in these. This ensures that environmental aspects of petroleum activities are taken into account at an early stage.

The authorities also take environmental considerations into account when awarding development licences on the Norwegian Continental Shelf (NCS), and can impose special requirements on the petroleum industry in specific areas. This is an accurate measure that ensures environmentally sound operation of the petroleum industry in potentially vulnerable areas. There may, for example, be seasonal regulation of certain activities, or special limitations on discharges.

## Regulation of emissions to the air

The most important emissions to the air from the petroleum industry are CO<sub>2</sub> and NO<sub>x</sub> from energy production and flaring, as well as emissions of nmVOCs from loading and storage of oil. Norway has undertaken to reduce these emissions in accordance with such international agreements as the Kyoto and Gothenburg protocols, and in accordance with national targets.

Since its introduction in 1991, the CO<sub>2</sub> tax legislation has been the most important measure for reducing CO<sub>2</sub> emissions. The CO<sub>2</sub> tax gave Norway a stringent regulation which has led to considerable reductions in emissions. CO<sub>2</sub> emissions are also regulated by the flare licences granted by the Ministry of Petroleum and Energy (MPE), which are based on the provisions of the Petroleum Act. Flaring is only permitted if necessary for safety reasons.

Until the present time, NO<sub>x</sub> emissions have not been regulated, although this will change when EU Directive 96/61 EC, concerning integrated pollution prevention and control (IPPC), is written into Norwegian legislation. This will lay down specific NO<sub>x</sub> emission limits, based on the requirement for best available technology (BAT), before 2007. A number of NO<sub>x</sub>-reducing initiatives have been implemented on the NCS, including the installation of several gas turbines employing low-NO<sub>x</sub> technology.

nmVOC emissions from oil loading and storage offshore are regulated by the Norwegian Pollution Control Authority (NPCA), and are based on the provisions of the Pollution Act. As a result of the stringent emission requirements, the companies operating on the NCS have formed a joint venture to install recycling equipment for nmVOCs on tankers. This will lead to a noticeable reduction in nmVOC emissions by 2008.



Figure 8.3 nmVOC emissions per produced unit (Source: MPE, NPD)

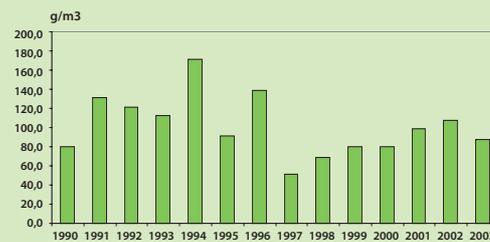


Figure 8.4 Content of production, injection and pipeline chemicals in produced water (Source: EnvironmentWeb)

### Regulation of offshore discharges

The most significant offshore discharges from the petroleum industry are chemical discharges from wells and well operations, and discharges of oil and naturally occurring chemical substances from discharges of produced water. Sea discharges are regulated by discharge permits from the NPCA, based on the provisions of the Pollution Act.

Active research and development of chemicals with no negative environmental impact is being carried out to reduce chemical discharges. New cleaning technologies to reduce the content of oil and naturally occurring chemical substances in produced water that is discharged to the sea are being developed. At several fields, produced water is reinjected into the reservoirs to avoid discharges.

The authorities have established a strategy that has been defined by the so-called zero discharge targets, to achieve reduction of discharges to the sea. As of now, in principle, no environmentally hazardous substances shall be discharged, nor shall there be any discharge, or discharge shall be minimised, of environmentally harmful substances. The authorities and the industry have established a working group which is considering various discharge-reducing measures, in order to achieve the targets. This dialogue is contributing to the development of new hi-tech solutions within the industry.

It is usually possible to use environmentally sound techniques in new fields, but there are several

reasons why this can be difficult in existing fields.

Work towards zero discharge targets must therefore include a comprehensive assessment of environmental impact, safety concerns, technical reservoir conditions and costs. The conditions at certain fields may be such that the practically achievable target is to minimise discharges.

In the Lofoten – Barents Sea area the authorities have established special, more stringent requirements concerning discharges to the sea. This involves no discharge to the sea of produced water, drill cuttings or mud under normal operating conditions. In this area, petroleum activities will be subject to even more stringent environmental regulation than on other parts of the NCS.

The work on reducing discharges to the sea is important for several reasons. At present, there is no scientific agreement about any long-term effects of these discharges. In order to improve available knowledge, the Ministry of Petroleum and Energy, the Ministry of the Environment and the petroleum industry are financing a research programme under the Norwegian Research Council into the long-term effects of sea discharges from the petroleum operations (PROOF).

For more detailed information about the petroleum and energy authorities' safeguarding of environmental interests, please see the Ministry of Petroleum and Energy's environmental publication, *Environment 2005*.

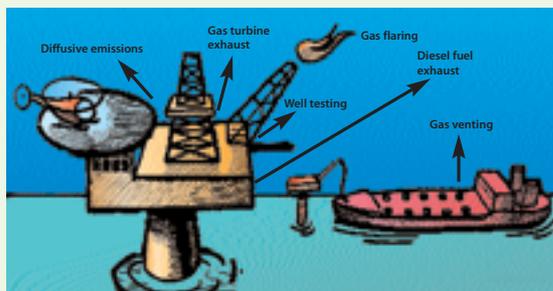


Figure 8.5 Emissions to the air

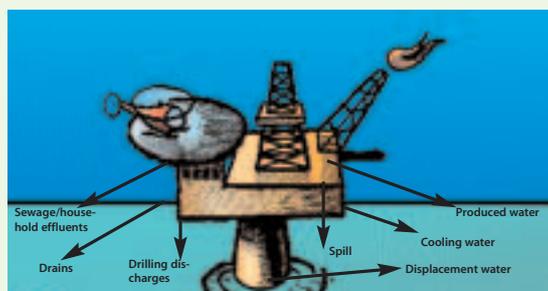


Figure 8.6 Discharges to the sea

