A.2 Norway

Volumes of Associated Gas Flared on Norwegian Continental Shelf

Norway is a major oil producer, and its oil fields are located offshore in the Norwegian Continental Shelf (NCS). In 2002, oil accounted for about 44 percent of Norwegian exports and 24 percent of government revenue.

In 2002, crude oil production from the NCS was 174 million standard cubic meters of oil equivalent (scm of oe). It has almost doubled since 1990 and increased sixfold since 1981, when Norway produced about 95 million and 27 million scm of oe respectively. The amount of gas flared has varied from year to year, mostly depending on the number of new fields that came into operation. However, flaring volumes as a percentage of oil production has decreased substantially over the last two decades.

Figure A.4 provides an overview of crude oil production and annual flaring volumes over the last two decades. It shows that, despite a steep increase in oil production, annual gas flaring volumes have remained stable or decreased. As a consequence, flaring volumes as a percentage of oil production have substantially decreased over the last two decades.

Gas Flaring and Venting Regulation

• The Norwegian Petroleum Directorate (NPD), which is part of the Ministry of Petroleum and Energy (MPE), and the Norwegian Pollution Control Authority (SFT) are the two principal authorities that supervise air emissions and the petroleum activities under the Petroleum and Pollution Act, respectively. NPD is responsible for energy efficiency and safety on installations and for gas flaring and venting operations and enforces legislation concerning the carbon dioxide (CO₂) tax on the NCS. SFT has overall responsibility for emissions to the sea.

• Environmental and Gas Flaring Policy

Since the beginning of oil production in Norway in 1970, the government’s policy prohibited gas flaring to avoid wasting valuable energy. The pollution aspect of flaring and venting was introduced later. The Norwegian environmental policy historically has been based on direct regulation of environmentally harmful emissions and discharges. Increasingly, economic instruments such as taxes have been used.

The Norwegian authorities consider a close cooperation with the industry essential to achieve the established environmental goals, including reducing flaring and venting volumes, without imposing excessive economic cost burdens on the society. The “Miljøsok,” a cooperative body, was established in 1995 to promote such collaboration with all interested parties in the petroleum industry.

---

81 The oil fields in the NCS are located in the North Sea, Norwegian Sea, and Barents Sea.
84 Miljøsok seeks to reconcile the need for cost-effective oil and gas exploration with environmental concerns through a wide ranging cooperative body composed of government ministers, top executives in the industry, and special interest groups such as the Norwegian Fishery Association.
The goal of this initiative was to maintain the position of the NCS as being internationally competitive and at the same time to promote environmentally sound oil production processes and procedures. Miljøsok ended in 2000, but its recommendations have been followed up by a new collaborative organization, the “Environment Forum.” The Environmental Forum has 45 members, and the director general of NPD participates in the Forum’s Executive Committee.

**Associated Gas Use and Permission to Flare**

Operators in the NCS may lift, process, and use associated gas in operations; reinject; or flare gas, subject to relevant consents and approval of a development plan. Operators can market associated gas downstream.\(^85\)

The Norwegian government does not set specific gas flaring and venting targets, but permission to flare gas is very restricted. Gas flaring, other than volumes necessary for safety reasons during normal operation, is not permitted under the Petroleum Act without the approval of the MPE.\(^86\)

---

\(^85\) Until 2002, gas marketing was subject to the coordination of sales by the Gas Negotiating Committee. It is now a matter of individual sales contracts by each company.

\(^86\) Petroleum Act 1996, Article (§ 4-4).
Applications for annual offshore flaring permits are evaluated directly by the NPD, and the permits are issued by MPE.

Permit applications must specify the type and level of atmospheric emissions and the technology applied to avoid or reduce pollution. Emission limits are set on a case-by-case basis, with consideration of relevant and applicable national and regional standards.

The operating company has to have a solution for using associated gas before the field development plan will be approved. As a part of the approval process, NPD and MPE also evaluate the flaring equipment and operating procedures.

**Gas Flaring and Venting Regulations in the Development and Production Phase**

The development and production of oil fields involves continuous emissions to the air, including emissions of CO\(_2\) from flaring. Several policy instruments are deployed by the authorities to limit the environmental impact of flaring during the operating phase. These include conditions attached to plans for development and operation and installations carbon tax, and flaring permits.

Before an operator can develop a discovery, the Petroleum Act requires that a plan for development of the operation (PDO), and possibly a plan for installation and operation (PIO), be approved by the relevant authorities. As part of the PDO-PIO process, the operator must submit an environmental impact assessment (EIA). The EIA describes any environmental effects of expected emissions and discharges (including flaring and venting) and includes a systematic review of costs and benefits of any mitigating measures. Both the program and the actual impact assessment are subject to public consultation.

The NPD has recently carried out an assessment of opportunities for achieving further reductions in greenhouse gas emissions from flaring. The authority has concluded that important technical measures have largely been implemented and further reductions of flaring can most likely be achieved through a stronger focus on better operating routines and fewer unplanned shutdowns.

**Carbon Dioxide Tax and Gas Flaring**

Increased energy utilization and reduced flaring have contributed to the reduction of emissions. This can be attributed partly to general improvements in technology but also to measures that create incentives to reduce emissions, such as a carbon tax on emissions.

The government introduced a CO\(_2\) tax to encourage operators to reduce gas flaring volumes. The bulk of CO\(_2\) emissions by the petroleum sector derives from offshore production installations. Virtually all CO\(_2\) emissions from installations on the NCS derive from gas turbines and flaring and burning of diesel as part of the oil production process.

---

87 At an international level the OSPAR Commission is in the process of expanding descriptions of best available techniques (BATs) and best environmental practice (BEP) related to oil and gas condensate flaring from well testing. A draft OSPAR recommendation on BATs and BEP for oil, condensate, and gas flaring from well testing is due to be presented for discussion at the meeting of the Offshore Industry Committee in 2004.


90 Other sources include gas receiving terminals.
On January 1, 1991, Norway introduced a tax on CO₂ emissions from offshore platforms. This tax is levied on all fossil fuels, primarily natural gas and diesel, which emits CO₂, and also includes gas flaring. The CO₂ tax is assessed on the volume of gas flared, on the volume of natural gas vented, and on CO₂ separated from petroleum and vented on platforms or other installations used for production or transportation of petroleum. The tax is levied both in territorial waters and on the continental shelf but only in quantities corresponding to Norwegian ownership in fields that extend into foreign jurisdictions.

The tax rate is reviewed periodically, and as of January 1, 2003, the tax rate on the NCS is Norwegian Kroner (NOK) 0.75 per m³ of gas (or US$0.1066 per m³). Although not deductible against royalty or SPT (Special Petroleum Tax, 50 percent), it is deductible as a cost for corporate income tax purposes.

Fuel and flare figures for payment of the CO₂ tax must be reported to the NPD every six months using a standard form. Vented gas also has to be metered and reported along with gas-to-fuel and flaring, but it is a relatively small amount of gas compared with fuel and flare.

Each year, the NPD compiles historical emission data and prepares forecasts for the activities, including gas flaring and venting. Figure A.5 shows that the major oil and gas production CO₂ emission sources include fuel gas, flaring, and diesel. Turbines, flaring, and diesel engines on installations represent major offshore sources. In 2002, 10 percent of the CO₂ tax revenue collected came from flaring of associated gas.

Figure A.5  Taxed CO₂ Emission from Oil and Gas Production, 2002

Flaring 10%
Diesel 4%
Fuel Gas 86%

The CO₂ tax has undoubtedly created financial incentives for operators to reduce gas flaring. In addition, an extensive offshore gas pipeline network that is connected to the Norwegian mainland, continental Europe (Germany), and the United Kingdom has enabled operators to market associated gas in these markets.
The Norwegian government is now aiming to align the CO\textsubscript{2} tax with EU and global emission trading schemes. It is envisaged that the CO\textsubscript{2} tax will eventually be abolished and replaced by tradable emission quotas that companies will either use themselves or sell or trade to others that may have overused their own quota.

**Measuring and Reporting**

The authorities have acknowledged that environmental objectives can be achieved only if emissions are effectively measured and monitored. Supervising environmental measures and activities is an integral function of the NPD. The NPD also supervises internal control systems for operators to ensure that the activities are planned and implemented in accordance with the authorities’ requirements and the companies’ acceptance criteria goals.

The NPD supervises the use of equipment that measures fuel consumption and the quantity of gas used for flaring and venting. It also collects the CO\textsubscript{2} tax on the shelf, and the Directorate evaluates the companies annually to assess the impact of the tax on CO\textsubscript{2} emissions.

Operators are responsible for metering gas-to-fuel, flare, and venting during the operational phase and are obliged to establish an internal control system that ensures that the requirements of the regulations are met. These responsibilities include the obligation to check sensor calibration every six months.

Operators are required to keep an emissions inventory, which must be submitted to the NPD with a copy to the SFT, before March 1 of each year.

The amount of gas to the flare system is measured through a metering system with an accuracy of plus or minus 5 percent. This system is subject to audits from the authorities. The operating company has to operate within the flaring permit and reports the amount of flared gas daily. The operating company has to notify the authorities if it reaches the permit’s limits. For tax purposes, the amount of gas to flare is reported every six months.