Production of oil and gas on the Norwegian continental shelf

- **Oil production incl NGL and condensate**
- **Gas**

Environment 2001 figure 1

Source: MPE/NPD/FIN
Goverment’s net cash flow from petroleum operations 1988-2001

Net cash flow
Share of state revenues

*estimate

Environment 2001 figure 2
Source: MPE/NPD/FIN
Sources of Norwegian emissions of CO$_2$ 1999

- Road traffic: 22%
- Petroleum operations: 24%
- Heating: 20%
- Other industrial processes: 18%
- Other mobile sources: 6%
- Costal traffic and fishing: 10%

Environment 2001 figure 3
Source: Statistics Norway/Norwegian Pollution Control Authority
CO$_2$ emissions from oil and gas production broken down by source, 2000

- Fuel gas: 78%
- Flaring: 17%
- Diesel: 5%

Source: MPE/NPD
Total emissions of CO₂ from the Norwegian petroleum sector

Environment 2001 figure 5

Source: MPE/NPD
Emissions of CO$_2$ per produced unit

kg CO$_2$ per net produced scm oe


Environment 2001 figure 6

Source: MPE/NPD
Sources of NO\textsubscript{x} emissions in Norway, 1999

- Costal traffic and fishing: 40%
- Road traffic: 24%
- Petroleum operations: 17%
- Heating: 7%
- Other mobile sources: 7%
- Other industrial processes: 5%
- Costal traffic and fishing: 40%

Source: Statistics Norway/Norwegian Pollution Control Authority
NO\textsubscript{x} emissions from oil and gas production broken down by source, 2000

- Fuel gas: 62%
- Flaring: 19%
- Diesel: 19%

Source: MPE/NPD
Emissions of NO\textsubscript{x} from Norwegian petroleum sector

Environment 2001 figure 9

Source: MPE/NPD
Emissions of NO\textsubscript{X} per produced unit

Environment 2001 figure 10

Source: MPE/NPD
Sources of nmVOC emissions from the petroleum sector, 1999

- Petroleum operations: 59%
- Road traffic: 13%
- Heating: 4%
- Other industrial processes: 19%
- Other mobile sources: 4%
- Coastal traffic and fishing: 1%

Source: Statistics Norway/Norwegian Pollution Control Authority
Sources of emissions of nmVOC from the petroleum sector, 1999

- Buoy loading on the shelf: 89%
- Terminal: 7%
- Diffuse emissions: 3%
- Fuel: 1%

Source: MPE/NPD
Total emissions of nmVOC from the Norwegian petroleum sector

Environment 2001 figure 13

Source: MPE/NPD
nmVOC emissions per produced unit

Source: MPE/NPD
Chemical discharges on the continental shelf broken down by activity, 1999

Drilling chemicals 89%
Production chemicals 4%
Gas treatment chemicals 6%
Other chemicals 1%
Pipeline chemicals 0%

Source: Norwegian Pollution Control Authority
Total discharges of chemicals from the Norwegian petroleum activities

Environment 2001 figure 16

Source: MPE/NPD
Total discharges broken down by source

Source: Norwegian Pollution Control Authority/NPD
Discharges of drilling chemicals per metre drilled

Environment 2001 figure 18

Source: MPE/NPD
Oil discharges on the shelf broken down by activity, 1999

Produced water 85%
Ballast and drainage water 10%
Acute discharges 5%

Environment 2001 figure 19
Source Norwegian Pollution Control Authority/ NPD
Discharges of oil per cubic metre of produced water

Environment 2001 figure 20

Source Norwegian Pollution Control Authority/ NPD
Production, injection and pipeline chemical content in produced water

The amount of chemicals in 1998 includes water in which the chemicals are dissolved.

Environment 2001 figure 21

Source: Norwegian Pollution Control Authority
Acute oil spills

Environment 2001 figure 22

Source: Norwegian Pollution Control Authority
Forecast of the discharge of produced water

Environment 2001 figure 23

Source NPD
Development of operational oil discharges from 1984-1999

Source: Norwegian Pollution Control Authority
Total discharge of chemicals according to per cent in weight in 1999 compared with 1998 and 1997 per environmental category

Environment 2001 figure 25

Source: Norwegian Oil Industry Association 2000
Technological developments within drilling and well operations

Environment 2001 figure 26
Source: Statoil
Technological solutions for the treatment of produced water

- Selective water shut-off
- Separation on the seabed with reinjection to the subsurface
- Separation on the platform and discharge to sea
- Separation on the platform and reinjection to the reservoirs
- Downhole separation and reinjection
- Sidetracking to zones with a higher fraction of oil