



UNITED  
NATIONS



Framework Convention on  
Climate Change

Distr.  
RESTRICTED

FCCC/IDR.1/NOR  
3 July 1996

ENGLISH ONLY

---

## NORWAY

Report on the in-depth review of the national communication of Norway

Review team:

Katya Simeonova, Bulgaria  
Luis Caceres Silva, Ecuador  
Richard Begley, Australia  
Fiona Mullins, OECD secretariat  
Lucas Assunção, UNFCCC secretariat, Coordinator

Also available on the World Wide Web (<http://www.unep.ch/iucc.html>)

Under Articles 4 and 12 of the Convention, Parties are required to prepare national communications on their implementation of the Convention. Guidelines for the preparation of national communications and the process for their review were agreed on by the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, by its decisions 9/2 and 10/1, and by the Conference of the Parties, at its first session, by its decisions 2/CP.1 and 3/CP.1 (see FCCC/CP/1995/7/Add.1). In accordance with these decisions, a compilation and synthesis of the first 15 national communications from Annex I Parties was prepared (A/AC.237/81).

When reviewing the implementation of the Convention by Parties, the subsidiary bodies and the Conference of the Parties will have this report available to them in English as well as the summary of the report in the six official languages of the United Nations. (These bodies will also have before them the executive summary of the first national communication of Norway and country-specific information drawn from a compilation and synthesis report covering all countries that have submitted national communications.)

## Summary<sup>1</sup>

1. The in-depth review of Norway was carried out between October 1995 and March 1996 and included a visit to Oslo from 23 to 27 October 1995. The review team included experts from Bulgaria, Ecuador, Australia and the secretariat of the Organisation for Economic Co-operation and Development (OECD).
2. The in-depth review greatly improved the transparency of the national communication and the team's understanding of Norway's economy and the challenges it faces regarding climate change. Norway is the second largest oil exporter in the world; virtually 100 per cent of its electricity demand is met from domestic hydroelectric power and it has become an increasingly large exporter of natural gas to other countries in Europe. The demand for gas in these countries is growing for economic and environmental reasons but also as a result of efforts by countries to diversify energy supply. Norway's natural gas production increased sharply in the late 1970's, but remained at a relatively stable level in the 1980s and 1990s. As a result of contracts for future deliveries, Norwegian gas production is expected to double by 2005, with a potential for further increases in the years to follow. Most of it is exported directly, with virtually no domestic use of natural gas in the mainland. The petroleum sector alone accounted for 22 per cent of Norway's CO<sub>2</sub> emissions in 1990.
3. Norway is to be commended for its early implementation in 1991 of a CO<sub>2</sub> tax which at present is applied to sources of 60 per cent of CO<sub>2</sub> emissions in the country. The tax is levied on gasoline, diesel, mineral oil, coke and coal at levels which are considerably higher than in other countries. The tax is also levied on gas and oil used in the extraction and transportation of petroleum products in the offshore sector. Non-fuel combustion process emissions from industry, fishing vessels and aviation are exempted from the tax. Process industries have been an important source of CO<sub>2</sub> emissions growth. Emissions of other greenhouse gas (GHG) from the process industries have, however, declined.
4. During the review, Norway provided additional material which considerably augments the information contained in its national communication. Subsequently in 1995, the Government submitted to the parliament a report on the Norwegian policy to mitigate climate change and reduce nitrogen oxides (NO<sub>x</sub>) emissions. This report (the "White Paper") stresses that the climate change problem can only be solved through binding international cooperation. It reiterates Norway's intention to maintain a catalytic role in international climate negotiations and its preparedness to take on its share of new commitments under the Convention. In addition, the White Paper introduces measures which enhance the national climate change policy programme. These include measures which aim at improving energy efficiency, promoting renewable energy sources, introducing voluntary agreements in industrial sectors not currently subject to the CO<sub>2</sub> tax, setting requirements for methane (CH<sub>4</sub>)

<sup>1</sup> In accordance with decision 2/CP.1 (see FCCC/CP/1995/7/Add.1), the full draft of this report was communicated to the Norwegian Government, which had no further comments.

recovery from landfills and promoting activities implemented jointly in the pilot phase. The White Paper also reiterates the important principle of Norway's climate policy that all policies and measures at both national and international levels should be as cost-effective as possible.

5. The White Paper concludes that Norway will maintain its current high CO<sub>2</sub> tax level, while adopting a more comprehensive approach to combating climate change. The nationally established target to stabilize CO<sub>2</sub> emissions at 1989 levels by 2000 remains an important guiding principle for Norwegian climate policy. At the same time, a comprehensive approach to deal with the threat of climate change is adhered to. Emissions of greenhouse gases totalled 51,000 gigagrams (Gg) in CO<sub>2</sub> equivalents in 1994, which is roughly the same as in 1989 and 1990. This total level of emissions does not take into account the increased uptake of CO<sub>2</sub> stemming from the enhancement of sinks. Due to difficulties in estimating accurately the substantial enhancement in its sink capacity, Norway has for the time being elected not to deduct the CO<sub>2</sub> absorption from its total GHG emissions.

6. The projections in the White Paper indicate that total GHG emissions are expected to be 3 per cent higher in 2000 compared to 1990 levels, using 1994 global warming potential (GWP) figures and including the effects of the recently launched regulation on landfills. In spite of the current high CO<sub>2</sub> tax level and the strengthened measures introduced in the White Paper, Norway will not meet its national target with respect to the most important greenhouse gas, CO<sub>2</sub>. Rather, an increase of 16 per cent in CO<sub>2</sub> emissions by 2000 was expected at the time of the visit. This represented an upward revision compared to the 12 per cent increase projected in the national communication. Recently published projections now indicate a 14 per cent growth in CO<sub>2</sub> emissions by 2000. This update does not incorporate expected emissions from two planned gas-fired plants which may be in operation by 2000. None of the projections mentioned take into account Norway's sink capacity. Fifty per cent of the increase in CO<sub>2</sub> emissions between 1989 and 2000 is expected to come from the extraction and transportation of natural gas in the offshore sector. Norway's projections of future GHG emissions are transparent and were based on plausible assumptions, though the lack of estimates of the impacts of some individual measures is a major concern.

7. The team noted that there is still scope for CO<sub>2</sub> emission reductions by improving energy efficiency in residential energy use, in commercial and official buildings, in industry and in petroleum production, and by promoting modal shift in the transport sector. Potential has also been identified for significant reductions in CH<sub>4</sub>, perfluorocarbon (PFC) and sulphur hexafluoride (SF<sub>6</sub>) emissions compared to 1990 levels, although significant achievements have already been made regarding PFC emissions.

8. Norway's annual contribution to the Global Environment Facility (GEF) has amounted to Nkr 55 million since the inception of GEF in 1991, covering both the pilot and the first phase. The team noted with appreciation that Norway has historically kept its official development assistance (ODA) contributions at a level equivalent to or above 1 per cent of gross domestic product and that in 1995 this ratio reached 1.17 per cent. It also noted that in 1996, the nominal level of ODA is expected to increase by 8 per cent.

9. Norway places strong emphasis on activities implemented jointly (AIJ) as a potential mechanism to identify cost-effective measures abroad as a supplement to domestic measures either in the industrial or in the transport sector. Norway is exploring cost-effective energy policies, for example through AIJ projects in Mexico and Poland, as well as options for verifying GHG reductions as a concrete contribution to the pilot phase of AIJ.

10. A substantial amount of climate-related research is carried out in Norway to improve understanding of atmospheric processes and the relationship between the oceans and the atmosphere and between economic processes and their impacts on climate change. Still, the most serious impact of climate change on Norway is expected to come through its possible effects on other more vulnerable countries through trade relations.

11. In Norway, climate change is clearly perceived as an environmental problem with potential economic costs associated with international inaction, but also to environmental benefits if international action is taken. No specific adaptation measures as such have been reported.

## I. NATIONAL CIRCUMSTANCES

12. Norway ratified the Convention on 9 July 1993. The secretariat received Norway's first national communication on 21 September 1994. The in-depth review of the national communication was carried out during the period October 1995 to March 1996, including a country visit from 23 to 27 October 1995 to Oslo. The review team consisted of Ms. Katya Simeonova (Bulgaria), Mr. Luis Caceres Silva (Ecuador), Mr. Richard Begley (Australia), Ms. Fiona Mullins (OECD secretariat) and Mr. Lucas Assunção (UNFCCC secretariat, Coordinator). The team met with representatives of several ministries as well as with members of the scientific and academic community and representatives of business and environmental organizations.

13. Due to its geography, Norway has long been concerned with environmental problems and has worked at the international level to find solutions that protect its own environment, as well as that of other countries. Ninety per cent of Norway's airborne pollution comes from abroad, as it is a downwind (acid rain) and downstream (marine pollution) country. These facts have led to a genuine desire to play an active role in the field of international cooperation on environmental protection.

14. The review team has gained a thorough understanding of Norway's situation: it is the second largest oil exporter in the world, virtually 100 per cent of its electricity demand is met from domestic hydroelectric power and it has become an increasingly large exporter of natural gas to other countries in Europe, where the demand for gas is growing for economic and environmental reasons and as a result of efforts to diversify energy supply.

15. Around 50 per cent of Norway's total final energy consumption takes the form of electricity, all hydropower-based. Oil represents 42 per cent of that consumption, biomass roughly 5 per cent and coal 4.5 per cent, while natural gas is not consumed domestically. There is no nuclear power generation in Norway and virtually no coal-fired power. Hydropower has been a major feature of the Norwegian economy since 1900, and a number of dedicated industries have developed based on this energy source. These industries are often located in the fjords, with local communities dependent on them for employment and income. Further development of hydropower is possible since only 62 per cent of the national potential is currently used. Twenty per cent of the total potential has been protected for environmental reasons. Of key importance is the fact that today roughly 15 per cent of Norway's gross national product (GNP) is directly derived from the offshore (oil and natural gas) industries. The first offshore oil discoveries were made in the 1960s in the Ekofisk field. Natural gas production increased sharply in the late 1970's, but remained at a relatively stable level in the 1980s and 1990s. Most of it is exported directly, with virtually no domestic use of natural gas. The petroleum sector accounted for 22 per cent of carbon dioxide (CO<sub>2</sub>) emissions in 1990.

16. In 1990, CO<sub>2</sub> emissions represented 70 per cent of total GHG emissions in Norway, methane (CH<sub>4</sub>) 12 per cent and nitrous oxide (N<sub>2</sub>O) 9 per cent, while perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>) together contributed 9 per cent, which is a much higher proportion of total greenhouse gas (GHG) emissions than in other countries. Most of the CO<sub>2</sub> emissions (64 per cent) originate in the transport and industry sectors, with an unusually high level (18 per cent) coming from the industrial process sector. The dominant sources of methane emissions are waste landfills and enteric fermentation in animals. The main N<sub>2</sub>O emission sources are the use of nitrogenous fertilizer and the production of nitric acid. However, these emission estimates are regarded as highly uncertain, especially with regard to the use of nitrogenous fertilizer in agriculture.

17. Norway is to be commended for its early implementation in 1991 of a CO<sub>2</sub> tax which now applies to 60 per cent of CO<sub>2</sub> emissions in the country. The tax is levied on gasoline, diesel, mineral oil, coke and coal as well as on gas and oil used in the extraction and transportation of petroleum products in the offshore sector. Non-fuel combustion process emissions from industry, fishing vessels and aviation are exempted from the tax. Norway is one of the few countries to have introduced CO<sub>2</sub> taxes, and the overall tax level on fossil fuel is considerably higher than in other countries. In certain areas, such as the offshore sector, the CO<sub>2</sub> tax has proved to have significant effects on emission trends. Although the effects of the tax have not been fully assessed, it has reportedly promoted the uptake of more efficient technologies, particularly in the offshore petroleum sector, and limited fuel demand in the transport sector. In October 1995, the review team was informed that CO<sub>2</sub> tax levels are not expected to be reduced in 1996.

18. Following a report submitted to the parliament in 1989, as a response to recommendations made by the Brundtland Commission, the Norwegian Government committed itself to the "overriding objective of sustainable development to be met by cross-sectoral policies at all levels of the Norwegian society." This commitment has

underlined the cross-sectoral, inter-ministerial and consultative decision-making process associated with climate change policies in Norway, including the early introduction of a CO<sub>2</sub> tax in 1991. Norway's climate policy is founded on the ultimate objective of the Convention and the scientific findings of the Intergovernmental Panel on Climate Change (IPCC) and prescribes that all measures, at both national and international levels, should be as cost-effective as possible. In 1993, the Inter-ministerial Steering Committee on Climate Change and Acid Rain was established to coordinate Norway's policies related to climate change, both at the national and international level, and to ensure a cross-sectoral and cost-effective approach in the identification and implementation of these policies. It was also charged with the preparation of Norway's national communication, submitted in 1994.

19. During this review, Norway provided additional material which considerably augments the information contained in its national communication. Subsequent to the submission of the communication, the Government submitted to the parliament a report on the Norwegian policy to mitigate climate change and reduce nitrogen oxides (NO<sub>x</sub>) emissions. The White Paper stresses that the climate change problem can only be solved through binding international cooperation. It reiterates Norway's intention to maintain a catalytic role in international climate negotiations and its preparedness to take on its share of new commitments under the Convention. In addition, the White Paper states that the Government will:

- (a) enhance its efforts to improve energy efficiency;
  - (b) reactivate the system of grants to promote new renewable energy sources (particularly biomass) and energy efficiency (saving) technologies;
  - (c) introduce voluntary agreements in industrial sectors not currently subject to the CO<sub>2</sub> tax;
  - (d) enhance its efforts to develop new technologies with lower GHG emissions;
- and
- (e) through county governors, set requirements for CH<sub>4</sub> recovery from landfills in addition to new landfill standards introduced in 1994.

The White Paper reiterates the principle of Norway's climate policy that all policies and measures at both national and international levels should be as cost-effective as possible. In this connection, more emphasis is being placed on activities implemented jointly as a mechanism to identify mitigation measures that could be implemented internationally and which would be more cost-effective than some domestic mitigation options.

20. Norway has chosen to retain its CO<sub>2</sub> stabilization target, despite the impracticalities of achieving it, as it believes it still is a useful yardstick against which to measure progress. It recognizes that the target does not embrace a comprehensive all-GHG approach, an approach which will be considered in the future in accordance with the effort to develop cost-effective solutions in the mitigation of climate change. Norway has no national targets for non-CO<sub>2</sub>

gases. Although the Government recognizes that an all-GHG stabilization target would have been more easily achieved domestically, it prefers that the international community agrees on international commitments, for example through a protocol, with an equitable distribution of commitments among Parties. In this burden-sharing scenario, the Government would reportedly be in a better position to take the lead in moving towards an international target and introduce stronger mitigation measures.

## II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

21. Norway has fulfilled its commitment to report comprehensive GHG inventories for 1990. It has developed, periodically updated and presented its national GHG inventory in a comprehensive and transparent manner. Overall, the Norwegian GHG emission methodology is robust and consistent with the IPCC methodology. The national inventory methodology is well documented and two verification studies have been carried out that confirm its comparability with both the IPCC and the CORINAIR<sup>2</sup> methodologies. Norway has the capacity to update its GHG inventory every year. The results of its 1994 inventory were presented and discussed during the review. The inventory exercise has served not only to produce annual results and analyse trends but also to improve estimates of emission factors. The team noted, however, that for municipal solid waste more work is required to improve data collection and emission estimates. Regarding PFCs, SF<sub>6</sub> and hydrofluorocarbon (HFC) emissions, Norway is in a position to make substantive contributions to IPCC, especially regarding the estimation of emission factors. Emission figures are estimated by Statistics Norway in collaboration with Norwegian Pollution Control Authority (SFT), the latter being responsible for the calculation of emission factors for all sources and the emission measurement in large industrial plants. Statistics Norway has prepared several emission models based on information provided by SFT and other sources including energy statistics from industry. Emissions of tetrafluorocarbon (CF<sub>4</sub>), hexafluoroethane (C<sub>2</sub>F<sub>6</sub>), SF<sub>6</sub> and HFC are monitored by SFT and emission data is collected directly from industries.

22. In 1990, CO<sub>2</sub> represented 70 per cent of total GHG emissions (using 1994 global warming potential (GWP) values), CH<sub>4</sub> 12 per cent, N<sub>2</sub>O 9 per cent and PFCs together with SF<sub>6</sub> 9 per cent. In 1994, CO<sub>2</sub> emissions amounted to 37,647 Gg, representing 74 per cent of overall GHG emissions that year and a 5 per cent rise above the 1990 level. The largest share of CO<sub>2</sub> emissions (38 per cent) comes from transport, another 22 per cent comes from oil and gas production (including stationary combustion in these sectors) and 18 per cent from process emissions in industry. In 1994, road transport was the largest single source of CO<sub>2</sub> emissions, accounting for roughly a quarter of the total, while coastal traffic and fishing represented another 10 per cent. There is a comparatively low level of uncertainty in CO<sub>2</sub> emission estimates thanks to reliable statistical data on fuel use, industrial activities and emission factors.

<sup>2</sup> CORINAIR is the component dealing with air emissions inventories of the European Community's CORINE (Coordination d'information environnementale) programme.

23. Methane emissions in 1994 amounted to 297 Gg (compared with 290 Gg in 1990), of which 57 per cent came from waste landfills and 32 per cent from enteric fermentation in livestock. Methane emissions from oil and gas systems are negligible compared to other countries (only 2 per cent of the total) since Norway does not have a domestic gas distribution network.

24. Nitrous oxide emissions in 1994 amounted to 14 Gg (10 per cent below the 1990 level), the major sources being the use of fertilizers (45 per cent), production of fertilizers (37 per cent), oil and gas production and industry (10 per cent) and transport (8 per cent). Although activity data are reliable for most sources, emission factors have a high uncertainty level. N<sub>2</sub>O emission measurements are available from fertilizer production plants, but data on emissions from fertilizer use are highly uncertain.

25. Emissions of PFCs, SF<sub>6</sub> and HFCs in 1994 amounted to 2,504 Gg in terms of CO<sub>2</sub> equivalent (using 1994 GWP values), i.e., 5 per cent of total GHG emissions. Although they remain among the highest levels in OECD countries due to the relatively high production of aluminium and magnesium per capita, a remarkable decrease in PFC and SF<sub>6</sub> emissions was achieved between 1985 and 1994. HFC emissions are currently insignificant in Norway, but are expected to increase sharply in coming years. These emission estimates have a high degree of confidence since basic data are collected directly from industry. Data on SF<sub>6</sub> and HFCs depend on quantities imported and actually consumed. PFC emissions depend directly on the level of anode effect in aluminium production, where producers have had clear incentives to reduce emissions in order to raise overall efficiency. Considerable measurement and research work has been done to improve estimates for these emissions because of their relatively high share in the total GHG balance. In addition to the GHGs covered in the communication, new data have been collected on HFC-125, 143a and 23.

26. In developing its GHG inventory methodology, Norway has used an approach that is consistent with the structure of economic activities and energy balances produced by Statistics Norway. According to this methodology all emissions are calculated with a four-dimensional (cube) model with, as axes, technical emission sources, emission carriers (27 in number), economic sectors (130 in number) and time. The model applies nationally developed emission factors to calculate emissions from combustion activities in each economic sector, or from major point sources (in the case of NO<sub>x</sub>, non-methane volatile organic compounds (NMVOC), PFCs, SF<sub>6</sub> and HFCs) as a function of economic activity. A similar approach has been used for emissions from non-combustion activities. Emission levels obtained through actual measurements are used when available. For example, estimates of N<sub>2</sub>O emissions from nitric acid production are based on monitoring data or on-site sampling. The model also allows for the consideration of emissions from the non-energy use of fuels as feedstocks. A special model is used for the transport sector that includes the type of vehicle and age, its technology, fuel type and driving mode.

27. Biomass for energy is counted as a CO<sub>2</sub> source in the (biotic) sinks table (to account for wood waste burned as fuel in sawmills and wood industries, black liquor and residues burned as fuel in pulp and papermills, and wood used for private households). In accordance

with the IPCC Guidelines, emissions of CO<sub>2</sub> from biomass for energy are not included under fuel combustion activities since biomass is assumed to be harvested sustainably. The methodology used in estimating CO<sub>2</sub> sinks is consistent with the IPCC Guidelines and is based on measurements of actual annual forest growth and cut to account for the net increment. Uncertainty levels in these estimates are considered low by international standards, even though CO<sub>2</sub> sink data were only presented for 1992. A revision of forest sink capacity made after the communication indicated a lower sink capacity for 1992, 10,200 Gg of CO<sub>2</sub> instead of 12,200 Gg per year.

28. In the area of waste treatment, the team found the inventory robust and transparent and the underlying assumptions plausible. Over a 40-year time span, the average breakdown values assumed are that 45 per cent will turn into CO<sub>2</sub> and 55 per cent into CH<sub>4</sub>. For the CO<sub>2</sub> component, it is assumed that only 10 per cent is carbon-based (e.g. plastics) while the remainder is biomass, which, according to the IPCC Guidelines, should not be counted as a source. The inventory also assumes that 70 per cent of municipal solid waste is deposited in landfills, with the rest being burned for energy (18 per cent) or recycled (12 per cent).

29. Norway's emission methodology also accounts for the non-energy use of fossil fuels as feedstocks based on data from Norway's energy balance. In the case of coal and coke, however, the energy balance does not provide a suitable basis for emission estimation. Coal and coke are therefore only treated as feedstocks (88 per cent of total quantity consumed) when they are used as a reducing medium in aluminium, ferro-alloys and silicon carbide manufacturing. In the case of natural gas, even though it is also used as feedstock in the production of plastics, emissions are considered only at the stage of waste treatment. Therefore, emissions resulting from the production of plastic goods correspond only to those goods disposed of in Norway. Emissions from the production of exported plastic goods are not reported. It is hoped that importing countries will account for such emissions in their own inventories at the stage of waste incineration. This is not explicitly specified in the IPCC methodology. National experts drew attention to the need for further clarification on this issue by the IPCC.

30. Emissions from international bunker fuels are relatively high in Norway, when compared with other Annex I Parties. This is primarily a result of the high number of ships in international traffic bunkering in Norwegian harbours. These emissions have been estimated and reported separately as requested in the guidelines. The estimates are based on bunker fuel sold from Norwegian harbours and airports to ships engaged in international traffic and to foreign aircraft in international air traffic. Emissions from all fishing activities are accounted for as international bunkers, but included in the national emission inventory.

31. Emissions originating from some oil and gas platforms have been split between Norway and the United Kingdom in proportion to their economic participation in each oil and gas extraction field. Some clarification of this issue would be welcome and should be reflected in the IPCC methodology to avoid underestimation of emissions in cases where a Party does not report on emissions from a platform shared with another Party.

32. Norway has followed the reporting guidelines and the team confirmed that its GHG inventories and projections do not include any temperature adjustment or other technical adjustment. Norway expressed concern regarding the fact that some Annex I Parties have adjusted the level of 1990 emissions for net electricity import, when part of the electricity in question was generated from hydroelectric power.

### III. POLICIES AND MEASURES

33. Norway has implemented measures relating to all greenhouse gases and their major sources in the country. Information provided during the review on the most relevant measures greatly amplified their description in the national communication.

34. In June 1995, the Government submitted a new report to the Storting, the Norwegian parliament, on its "Policy to Mitigate Climate Change and Reduce Emissions of Nitrogen Oxides". This so-called "White Paper" cannot be regarded as a national climate action plan. Rather, it highlights the importance for Norway of international cooperation and coordination in the pursuit of effective mitigation options and calls for stronger energy efficiency measures, enhanced promotion of renewable energy sources and a wider range of mitigation options which would include GHGs other than CO<sub>2</sub> through voluntary agreements with industry and strict technical requirements for waste landfills. Finally, it proposes a review of "the long-term role taxation policy can play in achieving employment, economic and environmental objectives" based on deliberations of the Green Taxation Commission and creates regional energy efficiency centres.

35. The review team took note that the White Paper enhances Norway's commitment to FCCC goals and emphasizes the use of economic instruments and the adoption of a comprehensive all-GHG approach to introduce new cost-effective mitigation measures. In this regard, the White Paper can be seen as a major advance in Norway's climate change policy which, to date, has been almost exclusively based on a tax, targeting a single gas in sectors where the economic cost of implementation is relatively low.

36. A notable development in Norway's energy system, with direct relevance to climate change, has been the deregulation of the electricity market. Through a law enacted in January 1991, the Government committed itself to opening the electricity market to competition. Owing to high rain precipitation in the following years and some efficiency gains, electricity prices have dropped for most individual and institutional/commercial consumers. They can now choose among several suppliers. Lately, steps have also been taken to deregulate electricity trade among Nordic countries and enhance integration among the North European markets. In these markets, the alternative primary energy source is often fossil fuel (coal). In Norway, the electricity market reform does not directly reduce CO<sub>2</sub> emissions because of the total reliance on hydroelectricity. The lower electricity prices may,

however, have caused in recent years a shift from oil to electricity, particularly for residential heating. As in other countries, such market deregulation, while promoting efficiency gains through competition, may reduce the scope for government-driven energy efficiency and demand-side management programmes.

37. It will, however, be important for Norway to continue its efforts to improve energy efficiency in view of the growth trend in GHG emissions. In this regard, early results are expected from the new regional energy efficiency centres being funded by an electricity tariff charge, the implementation of the European Union (EU) energy labelling initiative, the establishing of voluntary agreements on energy efficiency and the promotion of greater awareness of climate change.

38. Transport remains the largest single source of CO<sub>2</sub> emissions in Norway (40 per cent) and more than half of these emissions come from road traffic. Although a fairly high CO<sub>2</sub> tax has been implemented with significant impacts on fuel prices, there seems to be room for further mitigation in the mainland transport sector by using other tools such as limiting road building, promoting modal shift, implementing the approved land-use planning guidelines and giving greater weight to fuel saving during mandatory inspections of domestic shipping.

#### A. The carbon dioxide tax

39. The CO<sub>2</sub> tax is Norway's principal measure to control GHG emissions. The tax was introduced on 1 January 1991, and since then its coverage has been gradually evolving. The White Paper has not introduced changes to the CO<sub>2</sub> tax, nor is the tax likely to be further increased in real terms until there are clear indications that other Annex I Parties will introduce CO<sub>2</sub> taxes. A newly established independent Green Taxation Commission is to report to the Government by June 1996 on new directions to take regarding the current tax. The Commission, comprising members from ministries, academia, trade unions, industry and environmental organizations, was appointed to review the long-term role taxation policy can play in achieving higher employment and improving the state of the environment. None the less, the White Paper states that the CO<sub>2</sub> tax will continue to play a major role in Norway's climate change efforts.

40. The CO<sub>2</sub> tax is currently levied on transport fuels and mineral oils used domestically, on diesel and gas used in offshore oil and gas production, and on coal and coke used for energy generation. The tax covers 60 per cent of Norway's emissions from fossil fuels. Exemptions intended to preserve international competitiveness relate to mineral oils used in air transport, ships engaged in foreign trade, the North Sea supply fleet and the national fishing fleet. Other important exemptions include CO<sub>2</sub> emissions associated with the production of steel, aluminium, methane, cement and concrete. The domestic pulp and paper and the fish-meal industries as well as the coastal goods transport sector pay only 50 per cent of the tax.

41. The tax basically has two rates per tonne of CO<sub>2</sub>. The two rates have been periodically increased in order to maintain value in real terms, resulting in increasing variation among products. Currently, the highest rate equates to around US\$ 50 per tonne of CO<sub>2</sub>, and is applied to petrol at the refinery gate (both leaded and unleaded) and to the use of gas and diesel in offshore installations (generally for processing, compression and gas flaring). The tax increases the price of petroleum by around US\$ 20 per barrel, and when combined with other basic taxes on domestic petroleum, and the 23 per cent value added tax, results in one of the highest domestic fuel prices among OECD countries, second only to Japan. [Currently, the wholesale gasoline price is NKr 7.94 per litre for unleaded, compared with NKr 8.25 in Japan.] The rate applied to diesel, mineral oils, coal and coke is in general half the top rate, i.e., around US\$ 25 per tonne of CO<sub>2</sub>.

42. The application of the two rates and exemption for emission sources responsible for 40 per cent of total emissions were explained as being related to possible impacts on international competitiveness. With respect to natural gas, the tax has little impact on final demand, since there is virtually no domestic consumption; the entire gas production is exported to other countries in Europe and most is sold under long-term contracts for energy-intensive industries. European countries have been very keen to obtain Norwegian gas to improve fuel security and ensure diversity of supply -- other major gas exporters being the Russian Federation and Algeria.

43. While it has been difficult to assess with exactitude the mitigation effects of the tax, there are indications that in some key sectors, such as oil and gas production and transportation, the tax has promoted technological improvements and raised efficiency in energy use. Statistics Norway estimates that the tax may have reduced emissions by 9 to 12 per cent, i.e., roughly 1,000 Gg of CO<sub>2</sub>, from fuel combustion sectors between 1991 and 1993. Another national study estimates, however, that the current tax would have to be raised by four to five times on the products currently taxed to achieve stabilization of CO<sub>2</sub> emissions in 2,000 at 1989 levels. If the tax was to be raised by this amount, the effect would be a 1 per cent reduction in GDP, amounting to roughly US\$ 1 billion<sup>3</sup>.

44. In the oil and gas production sector the tax represents 11 per cent of the total tax burden. The CO<sub>2</sub> tax is however deductible from income at the time the income tax is calculated. While the price of gasoline has been adjusted to reflect the tax, in the offshore gas industry the practice of long-term contracts with foreign clients has meant that the tax cannot be passed on to prices. Rather, its impact has been to reduce profit margins and, consequently, to provide a strong incentive to reduce CO<sub>2</sub> emissions in the extraction processes through the introduction of new technologies. In the case of gas, the greatest impact of the tax is also believed to have been in driving capital investment to reduce emissions of CO<sub>2</sub> and retain profit margins. Emission reductions have stemmed from

<sup>3</sup> In 1991, GDP amounted to NKr 763 billion: NKr 103 billion from the offshore oil industry and ocean transport and NKr 582 billion from economic activities on the mainland, of which NKr 86 billion was from industry. The exchange rate to the US dollar was NKr 6.3 at the time of this review.

technological advances in flaring and the installation of more efficient gas turbines to drive gas compressors. There seems to be room for further reductions, especially in new plants. Some interesting possibilities for the development of more efficient gas turbine technology have also been identified.

45. Since the imposition of the tax in 1991, extraction of petroleum products has increased by 24 per cent, while associated CO<sub>2</sub> emissions from fossil fuels used in the extraction and transportation of petroleum products have increased by only 2.5 per cent. Other estimates indicate that CO<sub>2</sub> emissions per unit of gas and oil production declined by 8 per cent between 1991 and 1993, with 80 per cent of this reduction attributable to 'no regrets' investments and the remaining 20 per cent directly attributable to the tax.

46. In the case of domestic petroleum consumption, however, the tax is reflected in end-use petroleum prices since it is levied on the final product itself and the very low elasticity of demand allows a high pass-through to consumers. With respect to aviation, the review team was informed that since April 1995, a tax of roughly US\$10 per flight has been levied on domestic air transport in the south of the country and a passenger tax for international flights will probably be introduced at a level ranging from US\$12 to US\$22. These two taxes are unlikely to have a significant effect on air travel, nor on aircraft efficiency.

47. Despite the individual sectoral assessments, no comprehensive modelling of the projected impact of the tax was available. Preliminary sectoral estimates provided to the team indicate that emissions in 2000 will be 3 per cent lower as a result of the tax. The gross revenue from the tax amounted in 1994 to US\$ 1 billion. The CO<sub>2</sub> tax revenue has not been earmarked for the funding of new mitigation measures.

48. Overall, there is likely to be some cost to the economy from the tax. The tax is likely to have had some impact on equity as there is no compensation for lower income deciles. This impact would mainly have come from higher petrol prices, although increased costs for mineral oil heating in the residential sector may have also contributed. As household heating in Norway is mainly based on hydroelectric power, the negative distributional effects of introducing or increasing taxes on fossil fuels are less significant than in other countries. Finally, the team noted that the tax was introduced without an education campaign which, in retrospect, could have optimized the potential behavioural change triggered by the tax, particularly in vehicle use.

#### B. Stationary energy use

49. An energy efficiency grant scheme introduced in 1990 was scrapped in 1993 because of budgetary constraints and the findings of an evaluation that the grants were not cost-effective in the residential sector and allowed for free-riders. In that same decision, energy efficiency grants for the industrial and commercial sector were discontinued, despite the fact that the evaluation showed that these latter grants were cost-effective. The White Paper announced, however, that energy efficiency grants for government buildings will be reinstated.

50. Stationary energy demand in Norway is supplied mainly by electricity from hydropower plants (77 per cent of demand in 1990) and oil (13 per cent). Oil is mainly used in water heating applications. Despite the large exploitation of gas reserves for export, natural gas is not currently used as an energy carrier domestically, due to the lack of gas infrastructure.

51. Norway is probably the only country in the world which has based its entire mainland electricity production on hydropower. As a result, unlike most countries, there is less scope for emission reductions. Nevertheless, the CO<sub>2</sub> tax applies to fuel oils used domestically and therefore helps to reduce emissions, as do energy efficiency measures directed at heating applications based on oil. Due to the limited potential for development of new hydropower, some industries may also shift between electricity and oil, increasing the use of oil.

52. However, energy efficiency in electricity use remains important from a climate change perspective because trade in electricity with neighbouring countries may result in coal-based thermal power being imported into the Norwegian grid (from Denmark and Finland). At the same time reduced Norwegian demand or excess supply in milder seasons frees clean Norwegian power for export to these countries, particularly in peak periods. The team noted that electricity trade is likely to become increasingly important in climate discussions, given the trend towards competitive international markets.

53. Norway was one of the first countries to introduce a fully competitive market in electricity. The development of new hydropower has noticeably decreased as compared with the 1970s and 1980s. The team noted that the utilization of a rate-of-return regulation of the monopoly elements of transmission and supply provides incentives to expand the supply of energy at the expense of demand-side measures. The team noted that there is still scope for CO<sub>2</sub> emission reductions through improvements in energy efficiency in residential energy use, in commercial and government buildings and in industry.

### C. Transport

54. Road and rail transport, domestic coastal shipping, and domestic air transport generated 32 per cent of 1990 CO<sub>2</sub> emissions. The CO<sub>2</sub> tax is clearly the main policy instrument to limit CO<sub>2</sub> emissions in the sector. Norway's petrol and car retail taxes are significantly higher now than in 1990, although CO<sub>2</sub> emissions from transport have remained relatively stable over the last years. Statistics Norway has estimated that emissions from energy used in domestic heating and transport fell by 3 to 4 per cent (roughly 300 Gg of CO<sub>2</sub>) per year from 1991 to 1993 as a result of the CO<sub>2</sub> tax. It is also estimated that a 10 per cent increase in fuel prices could further reduce emissions in the transport sector by 2 to 4 per cent, although these figures are uncertain. Econometric calculations indicate that price elasticity of demand for transport is lower than the average in other OECD countries, which may reduce the effect of increased taxes on fuel in this sector.

55. The promotion of alternative fuels is not regarded as having much potential, although a survey was conducted to assess the benefits of introducing liquefied natural gas as a fuel, and other gaseous fuels such as liquefied petroleum gas have been tested in buses. An interesting experience in Norway has been its high purchase taxes on private cars (100 per cent plus a value added tax of 23 per cent) according to the value and weight of different models. Although no precise estimates of effects are available, the weight element may be an incentive to buy lighter, more energy-efficient cars. A vehicle inspection system will be implemented during the 1996-1998 period. The EU NO<sub>x</sub> emission standards are also likely to have a positive impact. The Government is also considering giving greater weight to fuel saving during the inspection process. With effect from 1996, the Government has changed the purchase tax to replace its value-based element with an energy performance one.

56. Although the team was informed that the growth trend in distances travelled has been stable and is only expected to increase slightly, a major road-building programme may have an effect on these projections. The programme is expected to cost roughly NKr 18 billion over the next four years plus NKr 4 billion for new investment funded from toll revenues. The emphasis is on linking distant settlements by road, while modal shift options and integrated land-use and transport planning are considered in some cases. The Planning and Building Act provides clear guidelines for local authorities on land-use planning as a mechanism to assess local needs, with the emphasis on environmentally friendly transport.

57. In 1990, 10 per cent of total CO<sub>2</sub> emissions came from coastal shipping, including coastal fishing, mobile oil platforms and passenger ferry ships. Nearly half of the domestic freight is carried by water. The team was informed about plans for a promising new measure which would introduce higher fuel efficiency standards during the regular inspection of ships. No assessment of its potential, nor timetable or modalities for its implementation have been provided. The team noted that there might still be scope for promoting modal shifts from private cars to public transport in urban areas. The potential for other shifts seems limited.

#### D. Industry

58. The White Paper paves the way for the establishment of voluntary agreements with process industries that are not covered by the CO<sub>2</sub> tax, such as aluminium, ferro-alloys, cement and oil refining. Agreements will be developed jointly with industries and ministries concerned through a cooperative process. A first step has focused on the bottom-up assessment of potential emission reductions and investment costs. The team was informed that pilot projects are being considered in a few cement and aluminium plants. Industry regards ongoing government-funded research, demonstration projects and other incentives as an integral part of voluntary agreements, although government funding is likely to be limited.

59. Although estimates of the possible effects of different technical options were prepared as background for the White Paper, the overall effects of voluntary agreements have not been appraised. Potential has been identified for significant reductions in PFC emissions. A promising and cost-effective measure being considered is the reduction of PFC emissions in the aluminium industry by improving the technology used in older plants, even though in

some plants, PFC emissions have already been reduced with the introduction of pre-bake technology, which has fewer anode effects. Another possible candidate is the promotion of improved processes in nitric acid production, which could greatly reduce N<sub>2</sub>O emissions. Discussions are also under way concerning efficiency improvements in coal and coke use, as well as "no regrets" improvements in magnesium production which could reduce SF<sub>6</sub> emissions from 800 to 500 g of SF<sub>6</sub> per tonne produced. Regarding HFCs, no mitigation measures are envisaged so far as part of the voluntary agreements programme. Instead, a new tax or other potential incentives are being considered to reduce HFC emissions.

60. Agreements with industry regarding energy use will be based on the existing industrial energy network. This network has been in operation since 1989 and has so far been very successful. The agreements will be implemented in three steps. First, the company has to establish an energy monitoring system. This might also include a monitoring system aimed at the environmental aspects. In this phase, the Government supports the company with training of key personnel and covers part of consultant fees. In the second phase, the company goes through an in-depth analysis of its energy use. The third phase includes financial support for reference installations in selected companies within a defined business category. The companies have to commit themselves in terms of man-hours and financial support before they can move from one phase to another. The scheme is mainly oriented towards small and medium-sized companies. A pilot project was started in 1995 and the main scheme will come into force during 1996.

#### E. Residential and commercial

61. There has been a steady decrease in CO<sub>2</sub> emissions in the commercial and residential sectors, mainly as a result of the continued shift from oil to electricity for heating. The significant change in the fuel mix of energy used in these sectors is related to trends in energy prices and, possibly, some behavioural change. The only new measure announced since the submission of the communication is a 50 per cent increase in government spending on energy efficiency grants for government and municipal buildings in 1996. Additionally, the establishment of regional energy efficiency centres in every county is expected to be accomplished in 1996. The centres will be financed by the 0.2 öre/kWh levy on electricity and are expected to ensure a more uniform supply of energy efficiency services to the public. The current policy approach in these sectors focuses on information campaigns, with very limited use of other instruments such as energy labelling, which was introduced in 1995 but only for refrigerators and freezers. It is expected that efficiency improvements will result from the electricity market deregulation. The introduction of demand-side management activities by electricity distributors has been discarded since the onset of the competitive market and the accompanying decline in electricity prices. Fuel switching from heating oil to electricity can be explained by fluctuations in electricity and oil prices. Varying prices for electricity and oil are important signals for energy users concerned with what is economically and environmentally sound. It seems that the improvement in energy intensity in Norway has partly been driven by fuel switching and partly by increases in end-use energy efficiency.

This is explained by the fact that hydroelectricity has low conversion losses and can easily be converted to heat, making it more efficient than fuel oil. A study by the ECON consultancy group suggests that energy efficiency savings have still the potential to deliver emission reductions at negative net cost, with positive returns to the economy.

#### F. Forestry

62. The volume of standing forests has doubled in the last 60 years due to good management practices and some afforestation. The annual forest growth rate is higher than annual harvesting. Although this trend is not likely to change, Norway has not yet established methods to estimate sink enhancement, i.e., CO<sub>2</sub> uptake is not subtracted from total emissions. While no forestry measures have been introduced exclusively for climate change reasons, a significant forestry trust fund amounting to roughly US\$ 15 million a year provides subsidies for forest planting and sustainable management.

#### G. Waste

63. Fifty-eight per cent of methane emissions originated from waste landfills in 1990. About 1.5 million tonnes of waste are deposited in landfills in Norway each year, corresponding to 70 per cent of all municipal waste. Since 1990, CH<sub>4</sub> emissions have been reduced compared to a situation without any measures. Eight plants were in operation in 1993, and have altogether reduced CH<sub>4</sub> emissions by more than 10,000 tonnes. As a result of strict landfill standards, stressing mainly the safe collection and treatment of waste water leakage, the number of existing landfills is expected to drop from 320 in 1995 to 100 in 1998. These landfill standards are driven by the polluter pays principle and by local environmental concerns, with wide public support. They also promote the capture and use of CH<sub>4</sub> for electricity, district heating and industrial use and keep owners responsible for landfill for 30 years after closure. In addition to the strict guidelines for landfill standards that were introduced in 1994, the White Paper established in 1995 that county governors are responsible for issuing landfill permits and for requesting annual reports from landfill managers. It also envisages technical inspections if deemed necessary. It is estimated that the introduction of these measures will reduce CH<sub>4</sub> emissions from landfills by 50 per cent by 2000.

### **IV. PROJECTIONS AND EFFECTS OF POLICIES AND MEASURES**

64. In spite of the current high CO<sub>2</sub> tax level and the strengthening of measures introduced in the White Paper, it has been estimated that Norway will not meet its national target of stabilizing CO<sub>2</sub> emissions at 1989 levels by 2000. Rather, an increase of 16 per cent in CO<sub>2</sub> emissions by 2000 was expected at the time of the country visit. This projection assumes that no further mitigation measures are introduced. This represents an upward revision of the 12 per cent expected at the time the national communication was submitted. As compared to 1990, the expected growth in CO<sub>2</sub> emissions amounts to 15 per cent by 2000. Total GHG emissions are expected to be 3 per cent higher in 2000 compared to 1989 levels, using 1994 GWP figures. Sixty-five per cent of the increase in CO<sub>2</sub> emissions between 1989 and 2000 is

expected to arise from the offshore extraction and transportation of gas. It has been estimated that if other conditions remain unchanged and no additional measures are introduced, Norway's carbon taxes would probably have to be raised to four to five times the current level to make the stabilization of CO<sub>2</sub> emissions at 1989 level possible. In setting its national target in 1991, the Government had expected international cooperation to make more progress during the 1990s than has been the case so far. Norway therefore considers itself more isolated in its use of policy instruments than the authorities had hoped in 1991. Furthermore, the national policy approach has evolved from focusing on national targets for each gas to a focus on cost-effective solutions across all GHGs and national borders. In this respect, concern was expressed regarding the way emissions are reported by neighbouring countries which typically attribute CO<sub>2</sub> emissions to electricity imported from Norway when this is of hydroelectric origin.

65. Norway's projections of future GHG emissions are transparent and were based on plausible assumptions. Although considerable additional information was provided during the review, the team strongly recommends that a "without measures" scenario be presented in the next communication. The Government explained that, owing to its early start in implementing the CO<sub>2</sub> tax, it could be difficult to reconstruct emission trends discounting the multiple impacts of that measure. The CO<sub>2</sub> projections assume a constant oil price of US\$ 17 per barrel and include the expectation that Norway's petroleum production will rise sharply to 2000. The team suggested that sensitivity analyses be done for some key assumptions such as the future scenarios for the oil market, the demand for natural gas and energy intensity levels in Norwegian industries.

66. The team felt that the robustness of the projections could be improved with the incorporation of analyses done in studies on the CO<sub>2</sub> taxes and other measures carried out by the Ministry of Finance, Norwegian Pollution Control Authority and Statistics Norway. Though some of these background studies were not available in English during the visit, the team considered that this type of information would be most useful for other Parties and recommends that the results of these studies be included in future communications.

67. The lack of estimation of the impacts of individual measures is a major concern. At present, Norway's projections for the year 2000 only include the effects of the CO<sub>2</sub> tax, though such effects were not clearly presented in the communication. It is surprising that even for such an important measure as the CO<sub>2</sub> tax, there appears to be little work outlining its impacts on emissions or its costs in terms of GDP, including administrative costs. This type of information would be extremely useful for other Parties considering such a measure.

68. Although other measures have been implemented and there are indications that they may have resulted in improved energy efficiency and consequent emission reductions, their effects have not been incorporated in the current projections for 2000. During the review, however, estimates were provided for a measure setting stricter landfill requirements which is expected to bring about substantial methane removal from waste landfills. Although some of its elements seem to have considerable uncertainty, the measure is expected to result in a reduction of 50 per cent in total CH<sub>4</sub> emissions. In the case of other measures, the team

would encourage efforts to report on estimates of their expected effects, even if these are considered rough preliminary estimates. It would seem that this work was done for the White Paper by the Norwegian Pollution Control Authority in conjunction with Statistics Norway.

69. In the course of the background analysis done for the preparation of the White Paper some estimates were made on the effects of possible measures and technical options and their cost-effectiveness. Results showed that some of the options were "cost-effective" in as much as their "cost" was lower than the reference cost of the tax. This was the case of the removal of CH<sub>4</sub> from landfills and the introduction of new technology for the reduction of PFC emissions in the aluminium industry. Although the team was not provided with specific information, it seems that these estimates were made accounting for investment costs, capital costs of new technology and technical estimates of the effectiveness in reducing emissions.

70. Overall, the methodology used in projections was deemed very reasonable. Statistics Norway has developed a suite of models which are used for estimations of national income, unemployment rates and emission levels. The models generate very disaggregated results which are used in reporting to the parliament. As an example, the projection scenario contained in the White Paper follows the "solidarity alternative" in the Long-Term Programme 1994-1997, which includes an upward revision of activity in the petroleum sector and new assumptions on demographic factors. The team noted, however, that there may be a need for improved coordination among agencies involved in the preparation of projections to ensure that effects and progress in the implementation of measures are duly incorporated in the modelling work. At the moment, Statistics Norway develops the models, the Ministry of Finance manages them and prepares assumptions on exogenous parameters, such as technological change, and the Norwegian Pollution Control Authority reports on the implementation of measures.

71. Norway has adopted 1989 as base year for the purposes of its national target but, in accordance with the reporting guidelines, projections are also presented using 1990 as the base year. Projections use the same base year figures reported in GHG inventories, with no adjustments made to account for temperature corrections or electricity imports.

72. Projections for non-CO<sub>2</sub> gases are based on emission projections provided by each industry. Projections for the process industries were done separately through individual questionnaires. For example, aluminium industry plants were asked about the use of pre-bake technology and its effect on emissions. PFC emissions were then estimated to be roughly the same in 2000 as in 1994, even if it is assumed that there will be an increase in aluminium production. Additionally, these emissions were reduced by roughly 40 per cent between 1985 and 1992.

73. No projection of Norway's sink capacity was provided in the national communication, although a substantial amount of detailed data is gathered on forest growth in Norway, including estimates of forest growth from actual spot measurements every five years. During the review, data on the country's total anthropogenic sink capacity were corrected from 12,200 to 10,200 Gg of CO<sub>2</sub> per year, based on the 1992 forest inventory. A working group on

climate-related forestry measures has recently been created to assess possible measures to facilitate sound forest management practices. The team suggested that projections for forest growth and harvesting be provided in future communications.

## V. PROJECTED PROGRESS IN GREENHOUSE GAS MITIGATION

74. After a slight decrease in 1991, when the Norwegian economy was still recovering from the recession of the late 1980s, CO<sub>2</sub> emissions increased each year from 1992 to 1994. The main force driving this growth was the increase in consumption of fuel oil in boilers, especially in the pulp and paper industry, and the increase in oil and gas extraction. The pulp and paper industry is required to pay only half of the CO<sub>2</sub> tax on fuel oil and has the capacity to switch quickly from electricity to oil as a consequence of market price fluctuations. Many large energy-intensive industries have benefited from long-term electricity supply contracts at low prices set by the Government and approved by the parliament. [The deregulation and restructuring of the electricity market and in particular the large state-owned producer Statkraft could make such a practice less feasible in the future.] However, these industries have been able to switch to fuel oil when electricity prices rise, since there are no obstacles to the re-selling of electricity contracted on favourable prices on the spot market. Households have also at times switched from electricity to fuel oil. CO<sub>2</sub> emitted in the process industries has also increased due to higher demand for aluminium, ferro-alloys, cement and carbides during the recent economic recovery. However, it should be noted that although the economy grew by 2.1 per cent in 1993, 5.7 per cent in 1994 and 4 per cent in 1995 most of the growth in emissions occurred in the offshore sector rather than in the mainland industry. In early 1996, applications were filed for two new gas-fired power plants (350 MW each) which, if approved and built, may considerably increase CO<sub>2</sub> emissions (possibly by as much as 5-6 per cent above current projections) in 2000. It seems that part of the rationale for building these new power plants is to provide for future electricity exports and compensated the limited scope for further hydropower development.

### Activities implemented jointly

75. Although Norway considers activities implemented jointly (AIJ) an efficient mechanism to explore cost-effective climate policies at the international level, AIJ are not seen as a way to meet Norway's current mitigation commitments for 2000 under the FCCC. The Government has renewed its support for developing AIJ reporting criteria and crediting options, in addition to showing early results with ongoing pilot projects. Norway has co-funded two AIJ pilot projects. The first involves converting several coal-fired power plants in Poland to gas with an expected emission reduction of 6,700 tonnes of CO<sub>2</sub> per year. The second is to promote CFL lighting in two cities in Mexico, with an expected reduction of 100 tonnes of CO<sub>2</sub> and 220 tonnes of CH<sub>4</sub> per year.

76. Norway is now developing further AIJ projects. It has signed a three-year cooperative agreement with the World Bank to catalyse opportunities and maximize learning, by demonstrating workable solutions, showing the risk component of AIJ activities, providing

examples of institutional frameworks (contracts, monitoring, verification, reporting), and showing overall costs, developing the potential role of the private sector and mobilizing private sector funds. The Government also plans to co-finance two projects per year through multilateral channels with the World Bank, as well as to develop new methodologies, in cooperation with the private sector in Norway, to implement bilateral AIJ projects. The White Paper announced that about Nkr 85 million have been earmarked for these activities.

## **VI. EXPECTED IMPACTS OF CLIMATE CHANGE**

77. A considerable number of research projects have been carried out focusing on Norway's vulnerability to climate change. Only limited information was provided on how research results are integrated into decision-making, particularly with regard to the agriculture and forestry sectors. Direct impacts are assumed to be small and manageable.

## **VII. ADAPTATION MEASURES**

78. There are no adaptation measures as such under implementation or being envisaged for the future. The approach adopted by Norway is that it should first focus on the assessment of climate change impacts on ecosystems by expanding existing research programmes. The team was informed that possible adaptation measures will only be considered at a later stage.

## **VIII. FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER**

79. The team noted with appreciation that Norway has historically kept its ODA contributions at a level equivalent to or above 1 per cent of its GDP and that in 1995 this ratio was expected to reach 1.17 per cent. Moreover, 1996 ODA is expected to increase by roughly US\$ 100 million in nominal terms (an 8 per cent increase over 1995).<sup>4</sup> The team noted with disappointment that, following an OECD directive approved in 1994, a large proportion (up to 84 per cent) of GEF contributions could be reported as ODA starting in 1996. The directive allows Development Assistance Committee member countries to report their contributions to GEF and the Montreal Protocol fund as part of their individual ODA, making it difficult to assess whether contributions to the financial mechanism under the Convention are "new and additional" to assistance committed for other purposes. Norway has not yet decided whether or not to report its GEF contributions as ODA.

<sup>4</sup> The national accounts methodology in Norway was recently changed to improve reporting on activity in the services sector. As a result, the nominal GDP level increased by 8 to 10 per cent in 1995 while the ODA level (in order to keep the 1 per cent of GDP commitment) is expected to increase by some Nkr 657 million (roughly US\$ 100 million) in 1996.

80. In addition to providing ODA, Norway established in 1991 a National Climate Fund with an annual budget of Nkr 75 million (US\$ 11.6 million). This Fund is the source of Norway's contributions to GEF and to its AIJ programme. Norway's annual contributions to GEF have amounted to Nkr 55 million since the inception of GEF in 1991, covering both the pilot and the first phase.

81. Climate change is admittedly not a major focus of ODA in Norway. However, an evaluation commission is to submit a White Paper to the parliament in the near future suggesting that future ODA should cover a broader range of developing countries, including East European countries and others not previously involved in Norway's bilateral programmes.

#### **IX. RESEARCH AND SYSTEMATIC OBSERVATION**

82. A substantial amount of climate-related research is carried out in Norway to improve understanding of both atmospheric processes and the relationship between economic processes and their impacts on climate change. The team felt that both natural and social science studies carried out in Norway are of relevance to other Parties and encouraged Norway to continue to disseminate their results widely.

#### **X. EDUCATION, TRAINING AND PUBLIC AWARENESS**

83. The team felt that the effectiveness of current and planned mitigation measures could in the future be greatly improved through the simultaneous launching of more aggressive public awareness campaigns.

- - - - -