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REVIEW OF THE IMPLEMENTATION OF COMMITMENTS AND OF OTHER PROVISIONS OF THE CONVENTION

REVIEW OF INFORMATION COMMUNICATED UNDER ARTICLE 12

NATIONAL COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION

Second compilation and synthesis of second national communications

CONTENTS

I. INTRODUCTION

A. Background

1. Articles 4.1, 4.2 and 12 of the Convention require Parties included in Annex I to the Convention to communicate information periodically to the Conference of the Parties (COP). By its decision 9/CP.2[1], the COP requested Parties to submit second national communications by 15 April 1997, while communications by Parties with economies in transition should in principle be submitted not later than 15 April 1998. In preparing these communications, Parties should use the guidelines contained in the annex to decision 9/CP.2.

2. In response to a request by the COP also in decision 9/CP.2, a first compilation and synthesis of second national communications from Annex I Parties was prepared for consideration by the COP at its third session. At that session, the COP requested the secretariat to prepare a full compilation and synthesis of second national communications from Annex I Parties for consideration at its fourth session (decision 6/CP.3[2]). In response to this, the present document and its two addenda have been prepared.

3. This second compilation and synthesis draws upon the second national communications of 30 Annex I Parties[3], the draft second national communication of the Russian Federation (RUS), excerpts from the forthcoming second national communications of Italy (ITA) and Luxembourg (LUX) and first national communication of Slovenia (SVN), and the first national communications of Lithuania (LTU) and Ukraine[4] (UKR).

B. Approach

4. This document generally follows the structure and approach used in the previous compilation and synthesis of first national communications from Annex I Parties as well as the first compilation and synthesis of second national communications. The document contains

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[1] For the full text of decisions adopted by the Conference of the Parties at its second session, see document FCCC/CP/1996/15/Add.1.

[2] For the full text of decisions adopted by the Conference of the Parties at its third session, see document FCCC/CP/1997/7/Add.1.

[3] Australia (AUS), Austria (AUT), Belgium (BEL), Bulgaria (BUL), Canada (CAN), Czech Republic (CZE), Denmark (DNK), Estonia (EST), European Community (EU), Finland (FIN), France (FRA), Germany (DEU), Greece (GRE), Hungary (HUN), Iceland (ICE), Ireland (IRE), Japan (JPN), Latvia (LAT), Monaco (MON), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (POR), Slovakia (SLO), Spain (ESP), Sweden (SWE), Switzerland (CHE), the United Kingdom (GBR), and the United States (USA).

[4] Lithuania and Ukraine have only submitted a first national communication, and as they were not considered in earlier compilation and synthesis reports of the first national communications, they are considered in this report.

narrative text with illustrative charts and tables, while a summary is contained in document FCCC/CP/1998/11 and technical data on inventories and projections are included in tables contained in document FCCC/CP/1998/11/Add.2.

5. This report builds upon the first compilation and synthesis of second national communications, which covered only 17 Annex I Parties and Monaco. The various sections of the report have been elaborated to reflect the information from the remaining Annex I Parties' second national communications. In preparing this report, the secretariat has been assisted by experts from the Asian Energy Institute (AEI), the Centre for Energy, Environment, Science and Technology (CEEST), the International Energy Agency (IEA), the Latin American Energy Organization (OLADE) and the Organisation for Economic Co-operation and Development (OECD). In order to prepare the full compilation and synthesis requested by the COP at its third session, additional sections have been prepared on national circumstances, financial resources and transfer of technology, research and systematic observation, expected impacts of climate change, vulnerability assessment and adaptation, and education, training and public awareness, which were not included in the first compilation and synthesis of second national communications. A section highlighting some key reporting issues has been included, to draw the attention of Parties to issues which may need consideration in the ongoing process of considering revisions to the UNFCCC guidelines for preparation of national communications. Issues related to the revision of the guidelines for the preparation of national communications are mentioned briefly throughout the full document. At its eighth session, the Subsidiary Body for Scientific and Technological Advice (SBSTA) defined a process and schedule for revising further the reporting guidelines, with the aim of proposing revisions at COP 5 (FCCC/SBSTA/1998/6). The issues identified in the full compilation and synthesis could serve as inputs to this process.

6. At its seventh and eighth sessions, the SBSTA requested the secretariat to prepare, for consideration at its ninth session, a number of documents on methodological issues identified by the secretariat while processing national greenhouse gas emission inventories from Annex I Parties and through in-depth reviews (FCCC/SBSTA/1997/14, FCCC/SBSTA/1998/6). As these issues are discussed in detail in documents FCCC/SBSTA/1998/7 and FCCC/SBSTA/1998/8, prepared for the ninth session of the SBSTA, this analysis of methodological issues is not duplicated in the compilation and synthesis. Similar technical analysis is planned on methodological issues related to projections and the evaluation and monitoring of effectiveness and the effects of specific polices and measures. When available, this analysis will complement the discussion on methodological issues related to projections contained in the full compilation and synthesis.

7. Parties are required to submit information related to their greenhouse gas (GHG) inventories on an annual basis (decision 9/CP.2). The secretariat tabulation of these data will be made on an annual basis, while for the fourth session of COP, a summary tabulation of the information provided by 30 September will be available (FCCC/CP/1998/INF.9), and serve to supplement the GHG inventories data provided in the full compilation and synthesis.

II. NATIONAL CIRCUMSTANCES

8. Most national communications contain a description of the national circumstances in which current and planned activities take place relating to the implementation of the Convention. An understanding of national circumstances facilitates an understanding of approaches followed by each Party, the extent to which policies and measures are or can be implemented, the area of the economy in which they are most effectively introduced, and the types of policy instrument adopted.

9. Second national communications generally provided a good overview of a country's socio-economic situation and trends, but in many cases this overview was not directly comparable between communications. National circumstances were described in a number of ways and through the use of various indicators. For example, some Parties reported information on economic growth in terms of gross national product (GNP) and some gross domestic product (GDP); information about energy use was presented in terms of primary supply or final consumption; information about sectors such as transport was presented either in absolute terms or on a per capita basis and also for different years; information as to the number of vehicles per capita, when reported, was presented as cars per capita or motor vehicles (including goods transport) per capita, or a number was provided while the specific units were undefined.

10. In some countries there is a high reliance on renewable energy sources such as hydropower for power generation (e.g. Iceland, Norway, Switzerland), whilst in others nuclear power dominates electricity generation (France). For these countries, energy efficiency and conservation programmes generally have less impact on reduction of carbon dioxide emissions than countries reliant on fossil fuel. Natural endowments can play an important role in determining the fuel mix and affect the scope for fuel switching. For many Parties concern about security of supply is an important issue that limits the extent to which they may switch away from domestically produced coal, even when it is relatively expensive.

11. Energy-pricing policies and associated subsidies are a key determinant of the effectiveness of energy efficiency measures, as well as for the adoption of more ambitious mitigation measures. Whilst there is a broad convergence in the cost of different fuels owing to international trade, consumer prices vary widely among Parties because of different levels of taxes and/or subsidies, as well as costs related to domestic transportation and energy production. Firms and householders facing higher energy prices realize a more rapid return on energy efficiency investments. Subsidies, especially for fossil fuel use in electricity generation, may be, *inter alia*, motivated by reasons of employment and energy supply security and thus affect Parties' willingness to implement certain measures. Few reporting Parties provided details of energy prices, energy taxes or energy subsidies.

12. Other important factors for countries are their physical and demographic characteristics. Parties' geography, both latitudinal location and territorial characteristics (eg. mountainous, coastal) and population density, dispersal and growth, influence levels and types of energy consumption, for example owing to transport preferences and scope for district heating.

13. The importance of the agricultural sector varies considerably between Parties, with some being major exporters of agricultural goods (e.g. New Zealand), while other countries rely heavily on imports. The type of agriculture varies considerably as well and hence the pattern of emissions, with some countries suited to rearing of livestock and others to arable crops. Emissions in this sector are highly dependent on general agricultural policy, yet details on agricultural subsidies were only provided in a few cases. For some Parties enhancing sink capacities is an important supplement to the adoption of mitigation measures (e.g. New Zealand), while other Parties have less capacity to enhance sinks in their climate change programmes due to either physical or economic factors (e.g. United Kingdom).

14. Centrally important to the understanding of a country's climate change activities is a description of the policy instruments available to governments and the function of the constitutional powers accorded to central and state governments. The extent to which GHG mitigation and environmental concerns in general are integrated into government decision-making varies across Parties. Political systems also influence a country's approach to mitigation and implementation of policies and measures. Some policies and measures are decided at the national level but measures require implementation at the local level where there is not always the resources, know-how or motivation to implement them. The institutional framework of each government and the level of decentralisation and relations amongst its agencies and ministries are important factors related to climate change policies and measures. It is also important to understand competing demands faced by governments which may conflict with GHG policy, e.g. economic growth, increased mobility, security of energy supply, and employment. These policies differ between Parties and are not well described. In many reporting Parties inter-ministerial committees have been established to support coordination and monitoring of such measures. In these Parties this is seen as an important step towards the integration of climate change consideration into economic and energy policies.

15. All Parties with economies in transition (EIT Parties) emphasized that the process of transition to a market economy was characterized by important changes in their economic and social structure, the collapse of traditional foreign markets, and decreases in domestic consumption and industrial output. In most of the countries, economic recovery started in 1993-1995. Even in these countries, however, financial constraints still persisted, and to a large extent, these limited the abilities of these countries to introduce measures to address climate change, especially in financing specific projects. Most EIT Parties emphasized that in formulating and implementing climate change policy, synergy was sought between climate change and other objectives of their policy agenda, such as improving the overall economic performance through privatization and price liberalization, establishing capital markets and solving urgent social problems. Furthermore, they also recognized that the period of transition to a market economy

provided an opportunity to improve the quality of the environment by implementing new legislative, regulatory and economic instruments with direct and indirect impacts on GHG emissions.

16. The modifications of longer-term trends in anthropogenic emissions, in particular socio-economic driving forces and activities that result in emissions of greenhouse gases, have yet to receive serious attention; the need for behavioural changes has begun to be recognized (e.g. in Japan, the Netherlands, Sweden).

III. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS OF GREENHOUSE GASES FOR THE PERIOD 1990 TO 1995

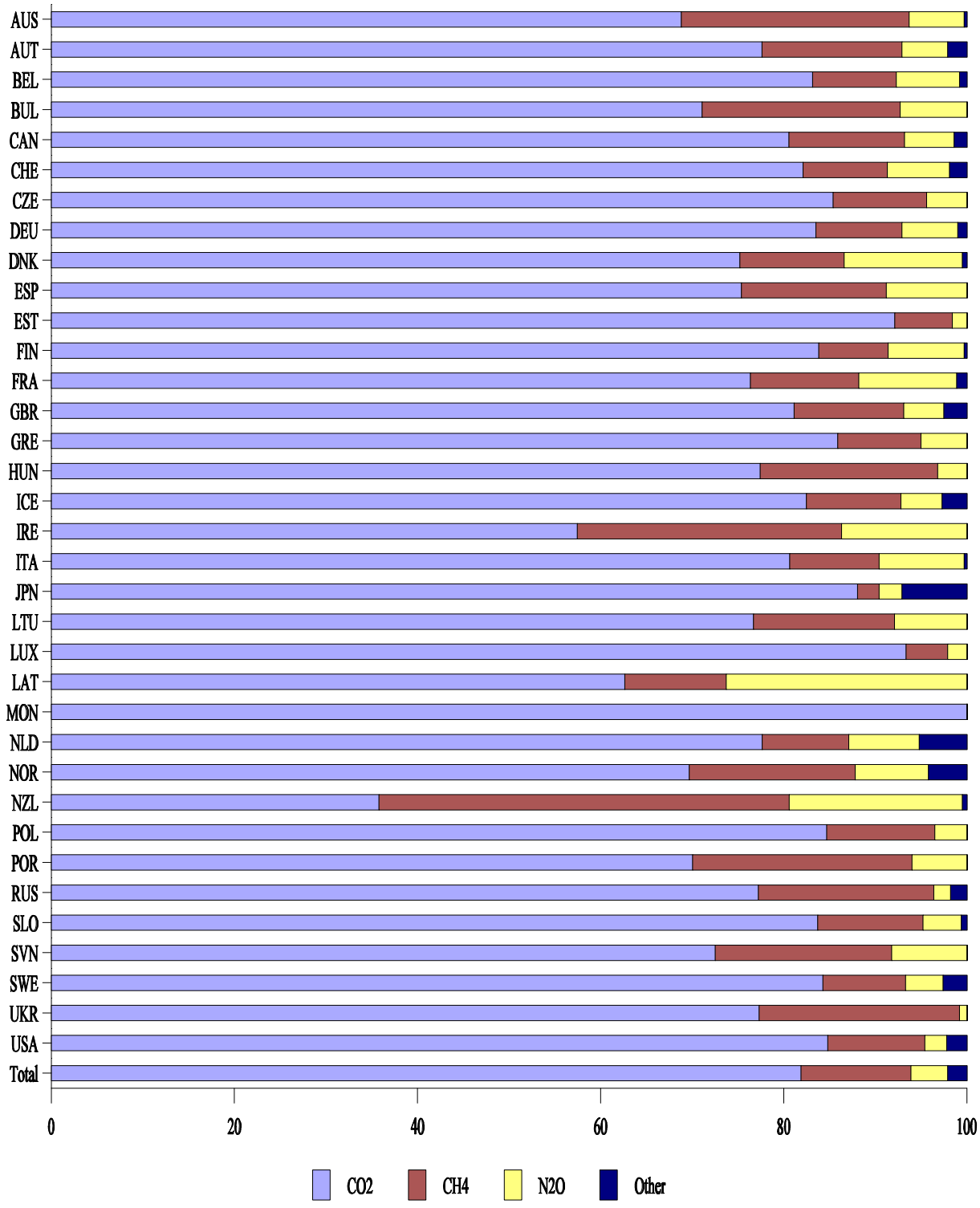
17. This section covers inventory data submitted by 36 reporting Parties for carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), emissions from international bunkers, other greenhouse gases, ozone precursors and sulphur dioxide (SO_2) for 1990 and 1995. Information on the trends in aggregate GHG emissions, as well as for CO_2, CH_4 and N_2O, and the trends for the most important sources, for the years 1990 to 1995 are provided below. Detailed numerical data are provided in the tables in document FCCC/CP/1998/11/Add.2. Although 36 Parties are considered in this document, an analysis of the trends for the years 1990 to 1995 is presented for 30 Annex I Parties, and Monaco, owing to the fact that three Parties (LTU, SVN, UKR) did not provide inventories other than for 1990 and the European Community is not presented, information from all its Member States being considered individually.

18. The largest share of total Annex I Party GHG emissions in 1995, expressed in CO_2 equivalent, was that of CO_2, accounting for 82 per cent. CH_4 and N_2O accounted respectively for 12 per cent and 4 per cent of total emissions, while emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) taken together amounted to 2 per cent of the total emissions. The relative share of each gas did not change significantly from 1990 to 1995, with the exception of that of HFCs, PFCs and SF_6, whose contribution as a group rose from 1.5 to 2.1 per cent over the period. CO_2 was the most important anthropogenic greenhouse gas for all Parties, except for New Zealand, for which CH_4 was the most important. The relative contribution of each GHG to a Party's aggregate GHG emissions is shown in figure 1.

A. Emission sources

19. The largest source of carbon dioxide emissions was *fuel combustion*, accounting in 1995 for 96 per cent for the whole group of Annex I Parties. For 14 Parties (AUS, CZE, DEU, DNK, EST, FIN, GBR, HUN, LAT, LUX, NLD, POL, RUS, USA) CO_2 emissions from *fuel combustion* represented more than 95 per cent of total CO_2 emissions. For other Parties, such as Austria, Iceland, New Zealand and Norway, this share was lower. The lower share in these Parties could be a consequence of having reported combustion-related emissions from the iron and steel industry in the *industrial processes* rather than in the *fuel combustion* category.

Figure 1: Relative contribution of each GHG to aggregate GHG emissions, 1995



Note: Excludes land-use change and forestry. "Other" includes HFCs, PFCs and SF_6. IPCC 1995 GWP values with a time horizon of 100 years were used by the secretariat for comparative purposes. As estimates for 1995 were not fully provided, 1994 estimates are given in this table for Belgium, Poland, Portugal, Russian Federation and Spain. For Lithuania, Slovenia and Ukraine 1990 estimates are given here, but were not included in the total.

20. Within the *fuel combustion* sector, CO_2 emissions from the *energy industries* accounted on average for over 30 per cent of emissions and for more than 50 per cent for eight Parties (AUS, BUL, CZE, DNK, EST, GRE, POL, SLO). The *transport* sector was the second largest source of CO_2 emissions (27 per cent), where shares ranged from 51 (Norway) to 7 per cent (Czech Republic). For six Parties (AUT, FRA, LUX, NOR, NZL, SWE), this sector was the most important source of CO_2 emissions.

21. The largest sources of methane emissions in 1995 were *fugitive fuel* emissions and *agriculture*, responsible for 35 and 34 per cent, respectively, followed by waste, 28 per cent. The large relative share of *fugitive fuel* emissions is largely due to the sizeable influence on the total of these emissions from the Russian Federation. *Fugitive fuel* emissions represented the most significant share of total CH_4 emissions for five Parties (CAN, CZE, HUN, POL and RUS), with the share ranging from 36 (POL) to 68 per cent (RUS). For 17 Parties *agriculture* was the largest source of CH_4 emissions, with New Zealand having the highest share, 89 per cent. For nine Parties (AUT, BUL, DEU, FIN, GBR, ITA, NOR, POR, USA) *waste* was the most important source of CH_4 emissions, ranging from 74 per cent for Portugal to 36 per cent for the United States of America.

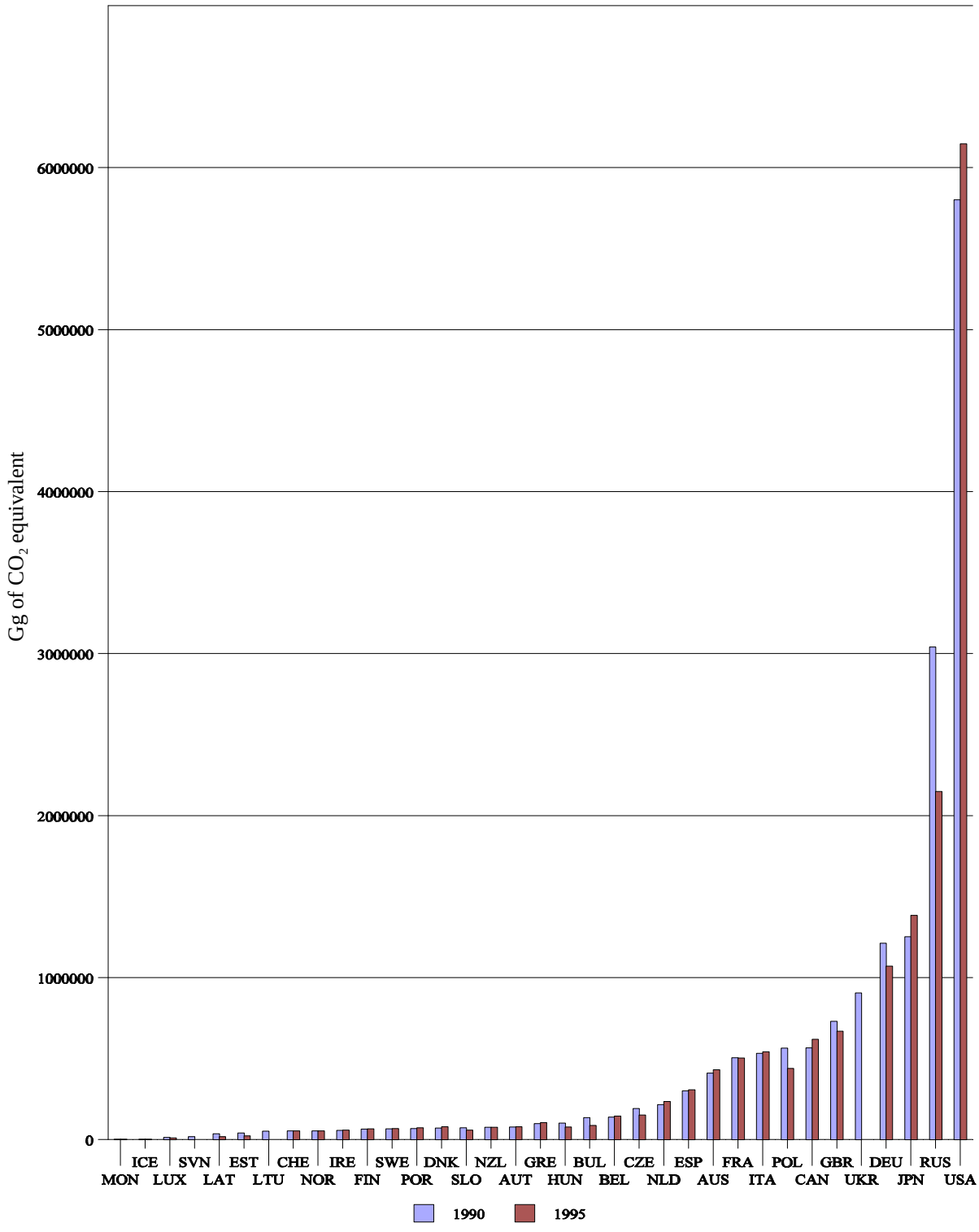
22. In 1995, *agriculture* accounted for the largest share, 45 per cent, of the aggregate nitrous oxide emissions, followed by *fuel combustion*, 26 per cent and *industrial processes*, 24 per cent. For 20 Parties *agriculture* (fertilizer use) was the largest source of N_2O emissions in 1995, while emissions from *fuel combustion* and *industrial processes* were the largest source for eight (AUT, BUL, CAN, CZE, EST, HUN, JPN and SWE) and three (BEL, FRA, GBR) Parties, respectively.

23. Twenty-one Parties reported emissions of one or more of the other greenhouse gases, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. In 1995, for Japan, the Netherlands and Norway these gases accounted for more than 4 per cent of their total GHG emissions.

B. Emission trends

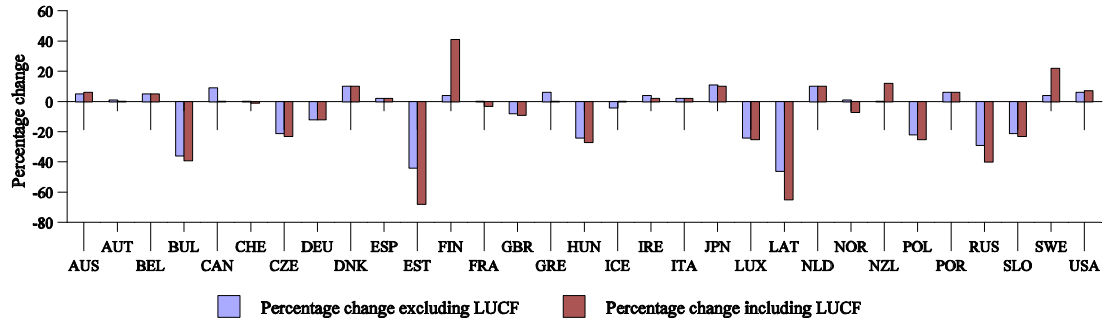
24. The inventories from the second national communications of Annex I Parties show that aggregate emissions of all GHGs from this group in 1995 were about 4.6 per cent lower than in 1990 (excluding land-use change and forestry), mainly as a consequence of decreases from Parties with economies in transition. Aggregate GHG emissions increased by up to 11 per cent from 1990 levels for 16 Parties (AUS, AUT, BEL, CAN, DNK, ESP, FIN, GRE, IRE, ITA, JPN, NLD, NOR, POR, SWE, USA). Aggregate GHG emissions decreased from 1990 to 1995 for 12 Parties (BUL, CZE, DEU, EST, GBR, HUN, ICE, LAT, LUX, POL, RUS, SLO). Only four of these were Annex II Parties (DEU, GBR, ICE and LUX); their decreases ranged from 24 (LUX) to 4 (ICE) per cent. These twelve Parties constituted 35 per cent of total Annex I emissions in 1990. Three Parties (CHE, FRA, NZL) reported that their emissions in 1995 were at approximately the same level as in 1990. Figure 2 shows the GHG emissions in 1990 and 1995 in gigagrams for each Party.

Figure 2: Aggregate GHG emissions, 1990 and 1995 (excluding land-use change and forestry)



25. Taking into account emissions and removals of the land-use change and forestry sector, as currently accounted for by the Intergovernmental Panel on Climate Change (IPCC), the overall decrease in total Annex I Party emissions was 6.2 per cent. In addition to the above-mentioned four Annex II Parties (DEU, GBR, ICE, LUX) reporting a decrease in emissions compared to 1990 levels, four more Annex II Parties (AUT, CHE, FRA, NOR) reported a decrease or stabilization if the emissions and removals of the land-use change and forestry sector are taken into account (see figure 3). These eight Annex II Parties constituted 16 per cent of total Annex I Party emissions (including land-use change and forestry) in 1990.

Figure 3: Percentage change in aggregate GHG emissions, 1990 to 1995 (excluding and including land-use change and forestry)



Note: For Canada, Greece, Iceland and Monaco estimates from the land-use change and forestry category were not available. For Austria total GHG emissions including land-use change and forestry in 1995 were the same level as in 1990, and France, New Zealand and Switzerland in 1995 reported emissions at the same level as in 1990, excluding the land-use change and forestry category.

26. All Annex II Parties (with the exception of CHE, DEU, GBR and LUX), constituting 60 per cent of total Annex I CO_2 emissions in 1990, reported an increase in $\underline{CO_2}$ emissions in 1995 from 1990 levels; 13 out of the 19 Parties reported an increase of more than 5 per cent since 1990, ranging up to 14 per cent (DNK). Twelve Parties, that is all Parties with economies in transition and the above-mentioned four Annex II Parties, reported a decrease in CO_2 emissions in 1995 compared to 1990, with emissions up to 51 per cent (LAT) lower than in1990. Emissions from these 12 Parties accounted for 35 per cent of 1990 emissions from Annex I. Within the *fuel combustion* category *transport* has been the fastest-growing source of CO_2 emissions since 1990, with an increase of between 2 (GBR) and 31 (LUX) per cent for 23 Parties.

27. In comparison to 1990, eight Parties (CAN, DNK, ESP, GRE, ITA, NOR, POR, USA), accounting for 36 per cent of Annex I $\underline{CH_4}$ emissions in 1990, reported increases in CH_4 emissions in 1995, whilst 20 Parties reported decreases. Two Parties (BEL, IRE) reported stabilization. *Waste* was the fastest-growing (or least declining) source of CH_4 emissions for 16 Parties, *fugitive fuel* emissions for 12 (AUT, BUL, CAN, DNK, FRA, GRE, HUN, IRE, JPN, LUX, NZL, NOR) and *agriculture* for three Parties (CHE, GBR, SWE).

28. The trend in total $\underline{N_2O}$ emissions between 1990 and 1995 ranged from a decrease of 48 per cent (EST) to an increase of 25 per cent (CAN). Ten Parties (AUS, AUT, BEL, CAN, CHE,

JPN, LUX, NLD, POR, USA), accounting for 37 per cent of Annex I emissions in 1990, reported increased emissions. Twenty-one Parties reported increased emissions from *fuel combustion*, largely from *transport*, where emissions increased for 22 Parties (AUS, AUT, BEL, CAN, CHE, CZE, DEU, DNK, ESP, FRA, GBR, GRE, ICE, IRE, ITA, JPN, LUX, NLD, NZL, POR, SWE, USA). For all of these, except Greece, Japan, Sweden and the United States, this increase was higher than 20 per cent. Only three Parties (BEL, CZE, USA) reported increased N_2O emissions from *industrial processes*, while for 14 Parties emissions from this sector decreased by more than 10 per cent. Likewise, only six Parties (AUS, AUT, CAN, ITA, NLD, USA) indicated increases from *agriculture*, with 22 Parties reporting decreases.

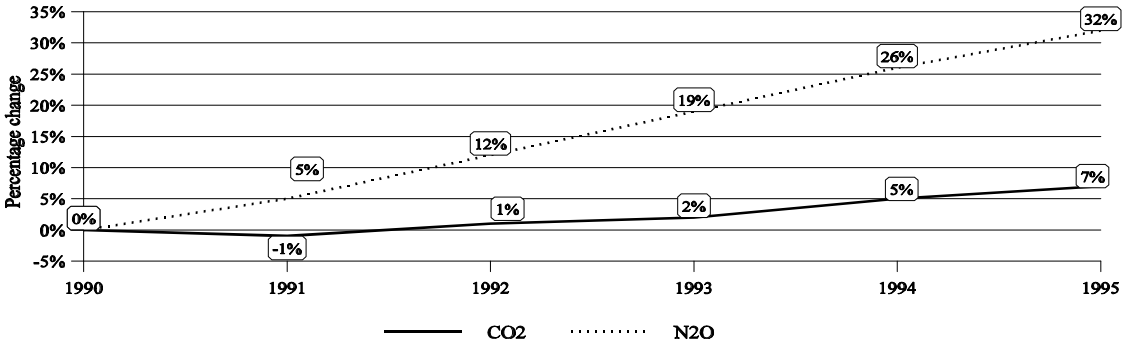
29. The majority of Parties reported decreased emissions of PFCs since 1990, except for Canada, Japan and the United States, where PFC emissions increased by 1,166 and 59 per cent, respectively. By contrast, emissions of HFCs and SF_6 increased for most reporting Parties, some having reported no emissions of HFCs for 1990 and others increases as high as 190 per cent. In particular, emissions of HFCs increased owing to their use as a replacement for substances controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer. For all Parties reporting emissions of HFCs, the percentage increase was greater than for any other GHG.

C. Transport

30. Emissions from transport have been increasing faster than emissions from other sources and the contribution of transport to total GHG emissions increased from 16 per cent in 1990 to 19 per cent in 1995.

31. The trend in CO_2 emissions from transport was practically homogeneous among Parties. Of the 30 Parties reporting emissions from transport, 23 reported increases up to 31 per cent (LUX) compared to 1990 levels, overall increase for Annex I as a group being 7 per cent (see figure 4). Five Parties (CZE, DEU, GBR, LUX, POL) with overall decreasing CO_2 emissions nevertheless reported increases from transport. Only seven Parties had lower CO_2 emissions from transport in 1995, but emissions were not necessarily decreasing throughout the six-year period. For Finland, Hungary and Switzerland, emissions fluctuated around 1990 levels, and for Bulgaria, Estonia and Slovakia, although a downward trend was evident in the years immediately following 1990, in later years emissions began to rise. Only Latvia reported a continuously decreasing trend.

Figure 4. Trends in Annex I Parties' emissions from transport, 1990 to 1995



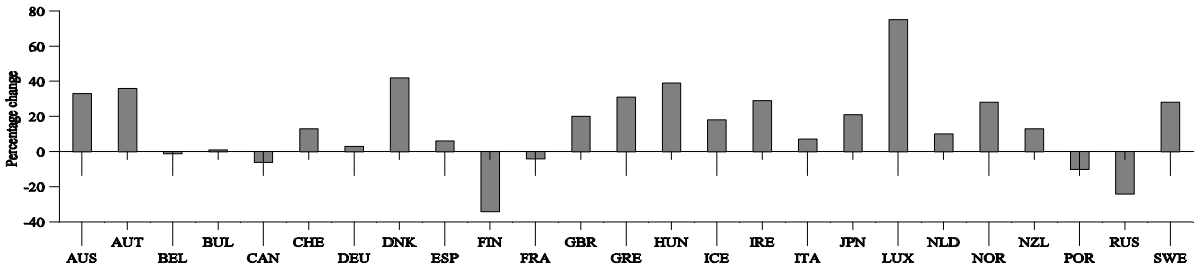
32. N_2O emissions from transport have grown substantially, by more than 30 per cent since 1990 for all Annex I Parties, although the share of these emissions was only 12 per cent of total N_2O emissions in 1995, and only 0.5 per cent of total GHG emissions. Increases of over 100 per cent were reported by Denmark (150), Ireland (172), Luxembourg (143) and the United Kingdom (144). Increases in N_2O emissions from transport are also a side-effect of the introduction of catalytic converters in vehicles in recent years.

33. For most of the reporting Parties, the bulk of transport emissions are the result of gasoline consumption by automobiles and other vehicles, while diesel and jet fuel consumption are responsible for a much lower share of emissions, but show a more rapid rate of growth.

D. International bunkers

34. CO_2 emissions from international bunkers increased by 10 per cent from 1990 to 1995 for reporting Annex I Parties as a group. With the exception of six (BEL, CAN, FIN, FRA, POR, RUS) out of 25 Parties, CO_2 emissions from *international bunker* fuels increased in 1995 compared to 1990, by more than 20 per cent for 11 Parties (AUS, AUT, DNK, GBR, GRE, HUN, IRE, JPN, LUX, NOR, SWE), with Denmark and Luxembourg having the highest increase, 42 and 75 per cent, respectively (see figure 5). For 15 Parties (AUS, AUT, BUL, CHE, DNK, ESP, GBR, GRE, HUN, ICE, IRE, JPN, LUX, NOR, SWE) the percentage increase in CO_2 emissions from international bunkers was more than the increase from transport. When aggregated with national CO_2 emissions, emissions from international bunkers were equivalent to between 1 and 10 per cent of total CO_2 emissions for 20 out of 25 Parties, while in Denmark, Belgium, Greece, Iceland and the Netherlands they were equivalent to 12, 13, 15, 17 and 24 per cent, respectively.

Figure 5: Percentage change in CO_2 emissions from international bunkers, 1990 to 1995

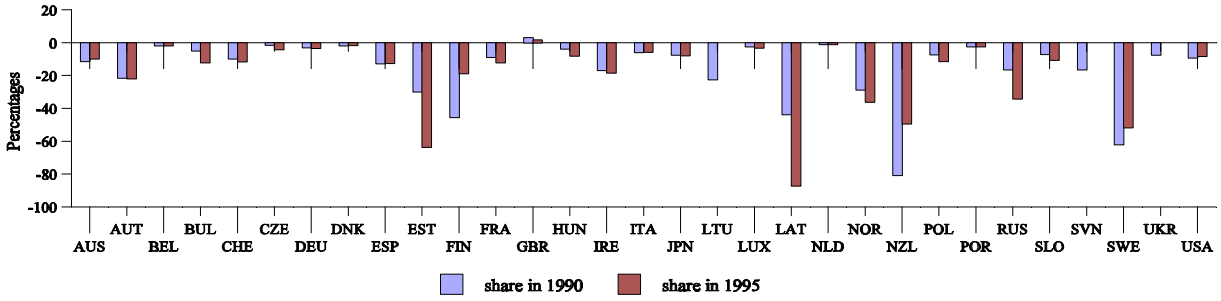


Note: The Czech Republic, Estonia, Latvia, Lithuania, Poland, Slovakia, Slovenia, Ukraine and the United States did not provide estimates for CO_2 emissions from international bunker fuels, and Monaco reported emissions as negligible.

E. Land-use change and forestry

35. For all Parties, except the United Kingdom, the *land-use change and forestry* sector constituted a net sink (figure 6), both in 1990 and in 1995. Australia reported CO_2 emissions from the IPCC subcategory *forest and grassland conversion* separately from its total emissions and removals of *land-use change and forestry*, due to the high uncertainty of emission estimates associated with land clearing, although an improvement in the confidence level has been achieved. If these emissions are taken into account, the land-use change and forestry sector would be a net source of CO_2 emissions for Australia.

Figure 6: Share of net removals or emissions from land-use change and forestry as a percentage of total CO_2 emissions, 1990 and 1995



Note: Negative values in percentage denote lower total CO_2 emissions with the inclusion of the land-use change and forestry category. For Canada, Greece, Iceland and Monaco estimates from the land-use change and forestry category were not available.

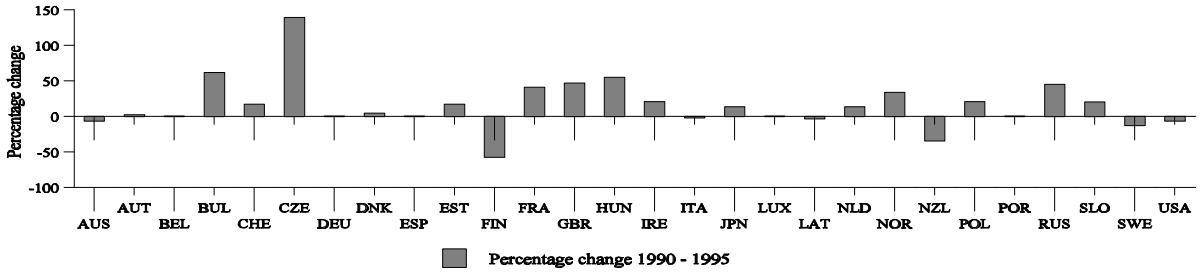
36. When estimates from *land-use change and forestry* are included in total CO_2 emissions, the percentage change in CO_2 emissions from 1990 to 1995 ranged from a 2 per cent increase (GBR) to an 87 per cent decrease (LAT) (figure 6). Net removals were equivalent to more than 10 per cent of total CO_2 emissions (excluding land-use change and forestry) for 15 Parties (AUT, BUL, CHE, ESP, EST, FIN, FRA, IRE, LAT, NOR, NZL, POL, RUS, SLO, SWE) in 1995. The *changes in forest and other woody biomass stocks* was the most important subcategory, constituting a sink for all Parties.

37. For 15 Parties (AUT, BUL, CHE, CZE, DNK, EST, FRA, HUN, IRE, JPN, NLD, NOR, POL, RUS, SLO,) net removals of CO_2 increased between 1990 and 1995 (figure 7). For the United Kingdom *land-use change and forestry* was a net source of CO_2 for 1990 and 1995,

although only half as much in 1995. Seven Parties (AUS, ESP, FIN, ITA, LAT, NZL, SWE, USA) reported lower removals in 1995. Finland and New Zealand having a reduction of more than 50 and 30 per cent, respectively.

Figure 7: Percentage change in net removals or emissions from land-use change and forestry, 1990 to 1995

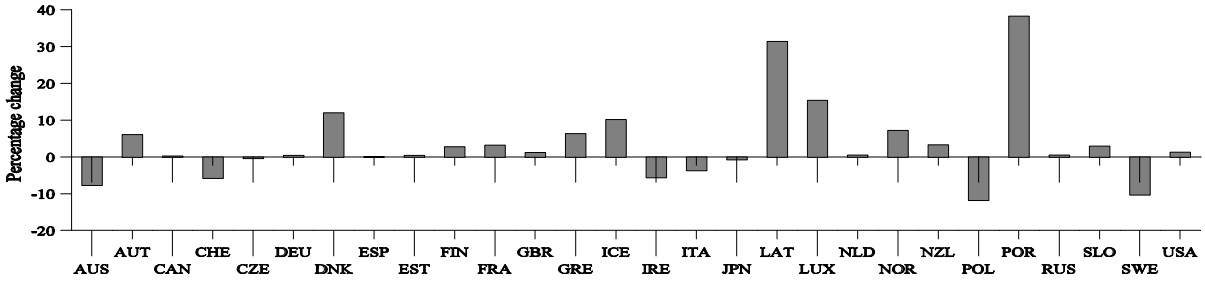
F. Changes in the 1990 inventory



Note: Positive values in percentage denote more removals or less emissions from this sector in 1995 as compared to 1990. For Canada, Greece, Iceland and Monaco estimates from the land-use change and forestry category were not available. Belgium, Germany, Luxembourg, Portugal and Spain reported the same values for 1990 and 1995.

38. With the aim of improving the accuracy of estimates, the 1990 (or base year) inventory data were revised in all cases where a new inventory was provided[5], as a result of changes in the methodology used, use of updated activity data and inclusion of new sources. The range of changes varied from 12 per cent below to 38 per cent above 1990 levels reported in the first national communications (figure 8). As a result of the revisions, aggregate GHG emissions in the year 1990 for the reporting Parties were about 38,600 Gg higher.

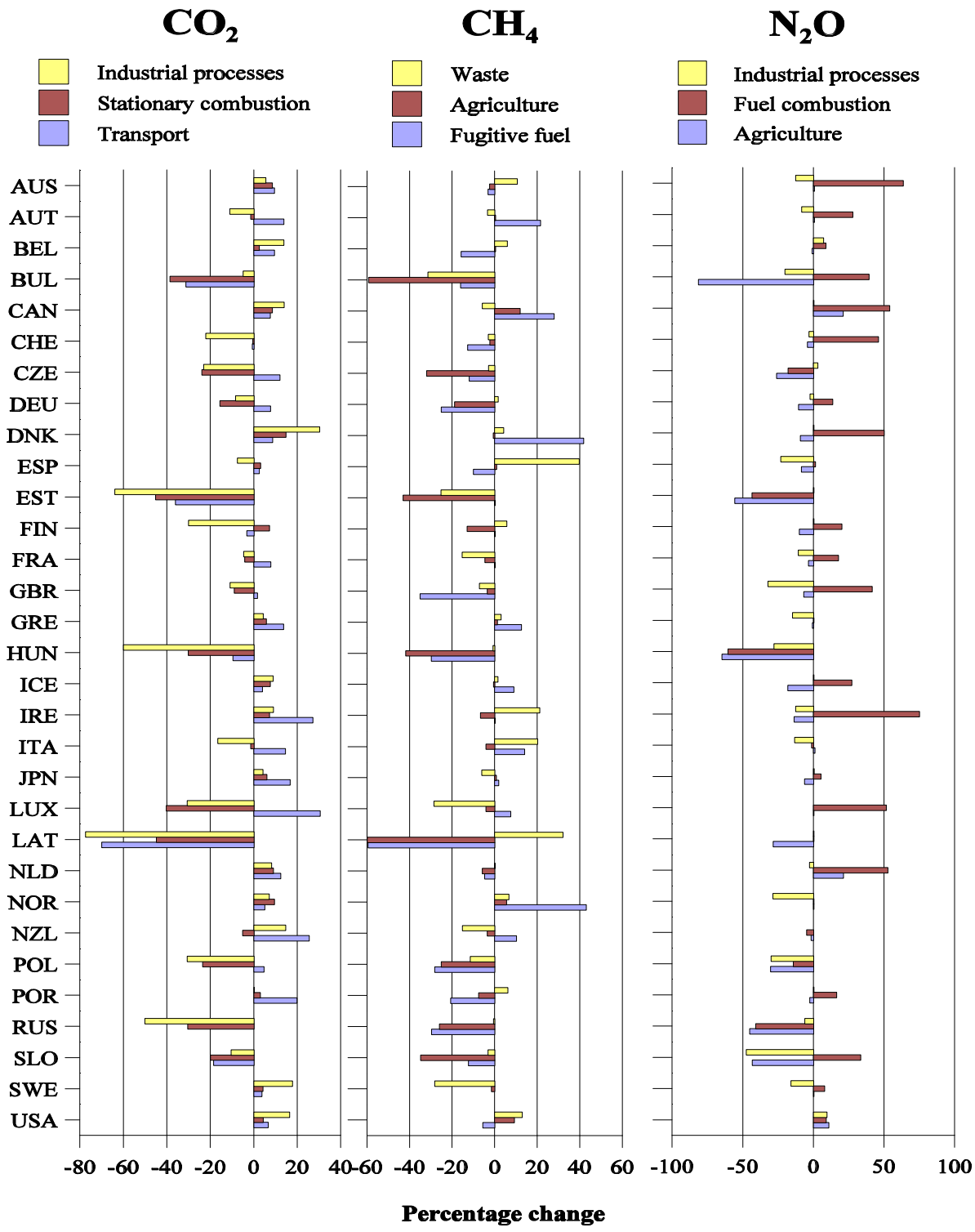
Figure 8. Changes in 1990 (or base year) GHG inventories between first and second national communications



Note: For purposes of consistency and comparability, emissions of HFCs, PFCs and SF_6, and emissions/removals from land-use change and forestry are not considered in this figure.

[5] Bulgaria did not revise its base year (1988) inventory, but did revise its 1990 inventory, and Hungary did not provide either a base year (1985-1987) or 1990 inventory in its second national communication.

Figure 9: Percentage change in CO_2, CH_4 and N_2O emissions from 1990 to 1995 for the major sources



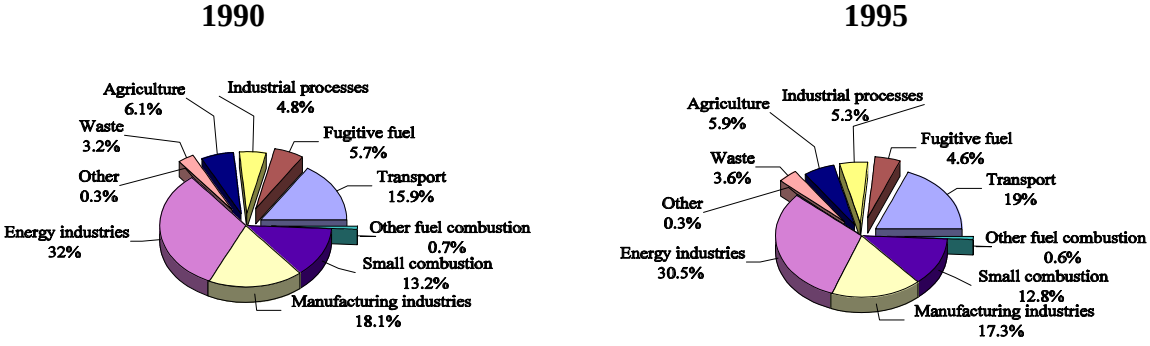
39. Parties also mentioned factors influencing emissions, such as climate (e.g. the Netherlands), electricity trade (e.g. Denmark) and "fuel-tourism" (e.g. Switzerland), although where adjustments to inventories were made they were given in addition to unadjusted figures.

IV. POLICIES AND MEASURES TO LIMIT ANTHROPOGENIC EMISSIONS AND PROTECT AND ENHANCE SINKS AND RESERVOIRS OF GREENHOUSE GASES

40. A wide range of policies and measures were reported in the second national communications, as in the first. For many measures, however, the primary objectives were to restructure energy sectors and promote energy efficiency, improve air quality or reduce congestion in the case of transport and improve economic efficiency by removing subsidies, rather than mitigate climate change. The spectrum of policies and measures included economic instruments, particularly taxes, regulations, research and development and information programmes. For a number of Parties, voluntary approaches by industry also figured predominantly, in particular those aimed at reducing GHG emissions per unit of output. Changes in emissions of CO_2, CH_4 and N_2O from the major sources are given in figure 9 above. The analysis in this section aims at highlighting policy trends in the various sectors; where countries are cited by way of example, this should not be taken as an exhaustive list of countries implementing a particular measure.

41. National circumstances, such as natural resource endowment, political and economic structures, and geographic position, influence the type and the range of measures implemented. In general, Parties did not report major shifts in focus or approach from the package of polices and measures described in the first national communications, although they reported, in varying degrees of detail, on updates on implementation, descriptions of new policies and measures implemented and details of any significant developments affecting greenhouse gas emissions. The share of aggregate GHG emissions by source did not change significantly between 1990 and 1995, except for an increase in transport and decrease in fugitive fuel emissions (see figure 10).

Figure 10: Share of GHG emissions by source, 1990 and 1995



A. General characteristics of policies and measures

42. Parties' strategies to mitigate GHG emissions have not changed considerably from policies and measures described in the first national communications. Parties continue to use both economic instrument and regulation to mitigate emissions supplemented by support for informational and educational measures. In general terms emphasis continues to be placed on "no regrets" measures, whereby savings in terms of energy, for example, outweigh the associated costs of measures (e.g. reform of energy markets).

43. Although all countries tax fuels and energy to varying degrees, mainly for revenue-raising purposes, five countries (DNK, FIN, NLD, NOR, SWE) reported both in the first and second communications that they had adopted combined carbon/energy taxes. However, rebates or exemptions for industry on competitiveness grounds are generally provided. While raising the price of energy provides incentives for efficiency improvements, taxing the carbon content of fuel inputs provides incentives to reduce CO_2 emissions through fuel switching.

44. Parties reported the strengthening of some measures. For instance, most of the Parties have further emphasized energy efficiency improvements in both energy end-use and energy supply as an objective for achieving GHG mitigation, for example, by increased financing of existing energy efficiency programmes (e.g. AUS, CHE, CZE, DNK, FRA, GRE, IRE, JPN, POL). Parties also reported continued efforts to promote combined heat and power (CHP) and to increase the share of fuels with low carbon and non-carbon content, including renewable sources. Other examples include increases in fuel and energy taxes (e.g. AUT, DNK, GBR, HUN, LAT, SWE), and improved regulation of waste management including, *inter alia*, reductions in waste volumes and regulations for waste incineration (e.g. Switzerland). For some Parties, particular measures have been eliminated or scaled down, generally because of insufficient funding or because they are no longer required because of shifts related to market reform.

45. Parties identified in their second communications broad policy objectives that were particularly important to their mitigation efforts. The main ones are summarized in box 1.

Box 1. Policy aims identified as important or emphasized by Parties in their second national communications

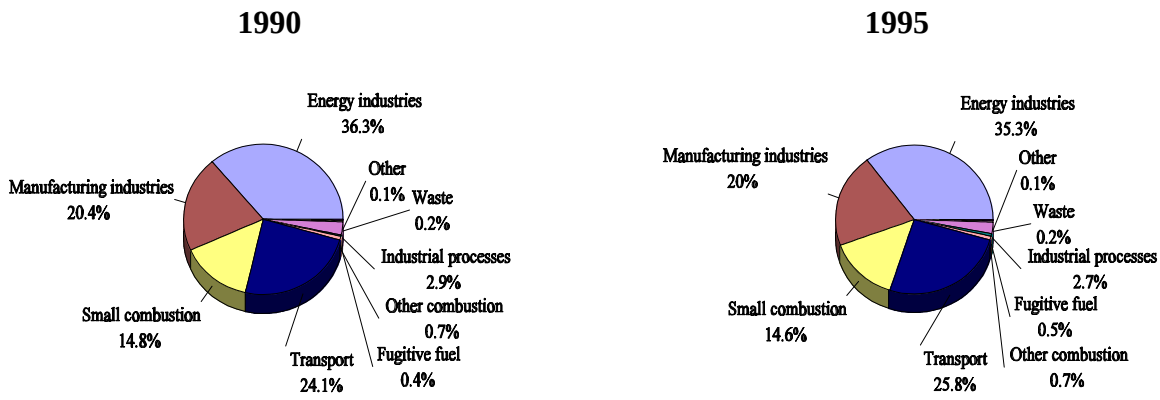
- **Increased efficiency in energy production and conversion, including co-generation**
- **Fuel switching from coal and heavy fuel oil to natural gas**
- **Research, development and shift to renewable energy**
- **Preservation and increase of carbon sinks in forests**
- **Increased energy end-use efficiency, improved thermal performance of new buildings and technical improvement in lighting, appliances and equipment**
- **Reduced livestock and fertilizer use**
- **Waste recycling, incineration, and methane recovery**
- **Improved efficiency of nitric and adipic acid, and aluminium production**
- **Improved average vehicle fuel economy**

B. Measures targeting carbon dioxide

1. Energy and transformation

46. CO_2 is emitted principally in the energy and transformation sector, from activities related to the transformation from primary to secondary forms and distribution to end-users (see figure 11). For all Parties, except New Zealand, this sector is the single largest source of CO_2 emissions. It accounted for 36 per cent of CO_2 emissions from all Annex I Parties in 1990 and for 35 per cent in 1995.

Figure 11: Distribution of CO_2 emissions by source, 1990 and 1995



47. Although reducing GHG emissions is not the primary purpose of energy market restructuring, the reform has proved important in that respect. Many Parties reported that steps are being taken towards the introduction of competition in the electricity and gas markets through reforms and deregulation. Privatization and market liberalization have provided incentives in some Parties to close the oldest, least efficient coal plant, to improve the efficiency of existing plant, and whilst gas prices remain relatively low, build combined cycle gas turbines. Improving the efficiency of electricity generation is considered an effective way to limit GHG emissions by almost all reporting Parties.

48. Market liberalization typically involves the removal of subsidies for fossil fuel production and creates incentives for improvements in the efficiency of primary energy production, electricity generation and the transmission and distribution of energy. In some countries, such as the United Kingdom the fuel of choice for new power plants is less carbon intensive. However, whether favourable fuel switching occurs as a result of such changes depends, in part, upon prevailing world energy prices. Furthermore, nuclear power stations are unlikely to be built in many countries without government support. The general effect of competition is to lower consumer prices and hence increase energy demand, although this can be offset by higher energy taxation. So, a priori, it is not possible to accurately predict the effects of market reform in particular countries.

49. A number of Parties are in the early phases of market restructuring and describe the uncertainty of structural developments in terms of fuel choice, investment and trade patterns, and the implications for CO_2 emissions. For most Parties other than Belgium, France, Luxembourg, Switzerland and the United States, that estimate effects of policies and measures, energy transformation accounts for substantial percentages of CO_2 reductions projected in 2000. However the level of these estimated sectoral reductions does not increase significantly between 2000 and 2010.

50. Emissions of sulphur dioxide are controlled under the United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution. In this regard, the retrofitting of some coal-fired plants with flue gas desulphurization equipment has not been economic for some plants, leading to their early retirement and replacement. If, as a result, new generation capacity is supplied by gas or renewable sources, this will result in CO_2 mitigation. Concerns about local air quality have also driven measures to limit emissions of SO_2 from electricity generation or transport, which may also result in lower CO_2 emissions. Such measures are highlighted by several Parties as prompting shifts to cleaner fuels (e.g. SWE, USA). Some Parties have introduced charges or user permits to limit sulphur emissions. Of these, some allocate part of the revenues derived from the pollution charges to pay for "environment-friendly" measures.

51. Some Parties also pursue fuel diversification options to ensure supply security, which in many cases is realized through the increased use or introduction of natural gas in national energy systems. Some Parties leave the choice of fuel to market mechanisms, but in others with state energy companies this is primarily determined by government decisions. For example, Denmark has announced that it will not permit new capacity in the power generation sector based on coal. In many countries, however, concerns about security of energy supply and employment associated with coal production are delaying the shift from coal to other less carbon-intensive sources.

52. Many Parties are supporting research and development of renewable energy technologies as well as providing additional support for their market penetration. Parties differ considerably in the technical potential for different types of renewable energy. Those with significant hydroelectric power have already almost fully exploited this source (e.g. CHE, NOR). In many countries (e.g. DNK, GBR, IRE) wind power appears to have the greatest technical potential and electricity generation from this source is becoming increasingly competitive with conventional power generation.

53. Several Parties subsidize technology development for biofuel use in electricity generation (e.g. FIN, SWE). Some also focus on lowering the costs so that renewable sources can compete with conventional generation, for example, wind, fuel cells, geothermal heat pumps. Measures used to promote technology deployment include tax breaks, direct subsidies, and guaranteed markets, the latter either in the form of requirements for utilities to obtain a quota of renewable or CHP resources through competitive tendering, or targets for public institutions to purchase "green" power (e.g. CAN). In Denmark an obligation for all consumers to purchase a certain

share of "green" electricity will come into force, while in Australia mandatory targets will be set for the uptake of renewable sources in the energy supply by 2010.

54. A range of measures have been used to promote renewable energy: research and development; economic and fiscal incentives; information/education campaigns; regulations and standards; voluntary actions and target setting. The Netherlands, for example, aims to increase the share of renewable energy (including hydroelectric power) in its total energy supply to 10 per cent in 2010. The proportion of renewable energy use in the United States is equivalent to half of that of all Annex I Parties.

55. The energy sector in EITs deserves special mention. The policy of energy price liberalization and subsidy removal in many EITs has gradually resulted in higher energy prices, creating incentives for energy saving and, coupled with energy security considerations, to fuel switching to less costly options, such as natural gas. In Slovakia and in Bulgaria, restructuring of the energy sector towards a more liberalized electricity market is being pursued as a part of harmonization with European Community (EC) legislation. Extensive removal of subsidies, however, is not expected to occur before 2000. Large potential gains are reported to exist through energy efficiency improvements. However, an indication is not provided in the national communications of the extent to which reductions have already been achieved.

56. Measures implemented in the energy sector in EITs also include the upgrading of existing coal-fired power plants to improve their efficiency and abate air pollution, the construction of new hydroelectric power plants, policies to reduce losses in the electricity and heat transmission and distribution network, as well as the introduction of new technologies, such as natural gas combined cycle and fluidized-bed combustion. In most of these countries the privatization of the energy sector was still at the early stage. The completion of new nuclear power projects will impact on future emission trends, as will decisions on whether to decommission the plants that are nearing the end of their lifetime or instead extend their lifetime with technical adjustments.

2. Industry and residential/commercial/institutional

57. This section covers emissions from energy end-use in the household, commercial and public sectors as well as from the combustion of fossil fuels and by-products from industrial processes. They are combined here as many Parties report similar GHG mitigation strategies for these sectors. These sectors accounted for approximately 38 per cent of CO_2 emissions from Annex I Parties in 1990 and in 1995.

58. All Parties have promoted energy efficiency measures as a major component of their overall CO_2 mitigation strategy. A variety of policies have been used, including economic instruments in the form of energy taxation, or subsidies for energy efficiency audits and investments. Some Parties, particularly those with cold climates, (e.g. Austria, Finland,) have improved standards for new building insulation and, in addition, energy rating for homes is becoming more commonplace. Sometimes measures have also been implemented to improve insulation of the existing building stock. Given that large firms are typically very conscious of

energy costs, most Parties' educational measures target small firms and households to encourage energy saving. Labelling of some domestic appliances such as refrigerators and washing machines, with energy rating have become widespread as a result of EC legislation, but thus far there is little evidence of this having had a significant impact on consumers' choice. In the public sector a number of Parties have set goals for reducing these emissions. This primarily involves investments in energy efficiency measures in buildings.

59. In general, Parties are concerned about the international competitiveness of their domestic industry, which constrains the type and extent of measures. For this reason, voluntary agreements feature prominently in many of the second national communications. In some cases (e.g. Germany) the agreements appear to be truly voluntary with most industries agreeing to targets to reduce energy use per unit of output. In other countries (e.g. the Netherlands), there are mandatory elements such as the possibility of applying alternative measures if voluntary measures fail. The chief way in which these measures succeed is by accelerating the development and deployment of less energy-intensive technology, although it is very difficult to assess these effects against what might have happened otherwise. Some Parties have voluntary agreements that involve local authorities or consumer groups assuming emission reduction targets.

60. Given concerns about firms' competitiveness and households' budgetary constraints, most measures appear to influence the purchase of new equipment and not to greatly increase the rate of capital stock turnover. Similarly, the standard of energy efficiency in new buildings is improving more than that in the existing stock. For these reasons, there may be a considerable time lag between the implementation of measures and the effect in terms of lowering CO_2 emissions. Furthermore, in many Parties, the industry and commercial sectors are growing and/ or the housing stock is increasing, so, despite improvements in efficiency, emissions from these sources may continue to grow.

61. Energy efficiency is also achieved through the restructuring of the most energy-intensive industries. Energy efficiency measures in industry are estimated to have considerable reduction potential in EITs (e.g. Bulgaria, Poland and Ukraine).

3. Transport

62. The transport sector, with 27 per cent of fuel combustion CO_2 emissions, ranks second after the energy and transformation industry. CO_2 emissions grew by 10 per cent from international bunkers in the period 1990-1995 and by 7 per cent for all transportation. All Parties have in common the problem of rising CO_2 emissions from the transport sector. Many Parties indicated that emissions from this sector are likely to continue to increase, even in cases where specific measures are already in place or envisaged.

63. For six Parties (AUT, FRA, LUX, NOR, NZL, SWE) transport was the largest source of fuel combustion CO_2 emissions in 1995. Across the range of Parties the actual shares vary from under 10 per cent (CZE, EST, POL, SLO) to above 40 per cent (ICE, NOR, NZL), reflecting,

among other factors, the status of economic development, as well as the fuel mix in the non-mobile energy end-use sector. EITs, in particular, anticipate and are planning for substantial growth in CO_2 emissions from transport, though this is from a relatively low base. Growth of fuel combustion CO_2 emissions within EITs is expected to outstrip the growth of emissions from other sectors, with EITs stressing that it would be very difficult for them to moderate this growth.

64. While the quantitative effects of planned measures are reported by some Parties, few report effects of measures already implemented and among those even fewer represent any significant success at mitigation. There are some cases where separate quantified effects for the measures cited are provided. Some Parties reported improvement in certain key indicators, for example, average fuel efficiency levels, but also noted large increases in other indicators, for example, the number of vehicle-kilometres driven and low occupancy levels, which in turn offset gains in fuel efficiency. The lack of quantification of measures reflects, among other factors, the complexity of making transportation energy projections as well as finding acceptable packages of measures to address the broad range of technological and behavioural determinants underlying travel and freight energy use.

65. Several Parties pointed out that the problem of rising CO_2 emissions from transport was in part due to the strong link between economic development and transport demand growth, and generally the measures reported and the monitoring data provided illustrate the difficulties that Parties face in dealing with transport emissions.

66. The most common approaches to mitigation in the transport sector are to:

- Increase the fuel efficiency of vehicles, principally through fuel and vehicle purchase and circulation taxes, regulations and/or voluntary approaches but also public research and development;
- Provide support for public transport, including improvements in bus and railway networks but also indirectly by deterring car use in urban areas and inducing modal shifts through economic incentives, regulations and voluntary actions;
- Reduce emissions of local air pollutants through regulations, in particular through enhancement of vehicle safety and emissions inspections, in some cases through measures to accelerate turnover of the fleet and also through promotion of alternative fuels, including biofuels; and
- Improve overall efficiency of the transport system, for example through education and training initiatives to encourage better driving behaviour and via research and development on intelligent transport systems for both passengers and freight. The restriction and enforcement of speed limits was commonly cited.

67. Parties also cited a diverse range of other implemented or planned measures for the transport sector, including employee transit programmes, advanced research and development on telecommuting, government fleet fuel efficiency programmes, company car policies and parking restrictions.

68. Some EITs reported plans to improve the road transportation networks and recognized that this would inevitably lead to increased traffic and therefore GHG emissions (BUL, CZE, EST, POL, SLO). Consequently, certain EITs have adopted the goal of preserving the share of public transport by providing subsidies and tax breaks for public transport in urban areas (CZE, HUN, LTU, SLO).

69. A number of initiatives specifically for the freight sector were cited - particularly by transit countries - such as advanced logistics including development of freight hubs, night-time heavy goods vehicle restrictions, the development of multimodal road, rail and waterway systems, including coastal shipping and transit quotas and tariffs.

70. Few of the many measures described were supported by reference to an integrated national transport and greenhouse gas emission plan (exceptions were AUS, AUT, CHE, DEN, FIN, NLD, and SWE), though some Parties are in the process of developing such plans (ICE, NZL).

71. Fuel and vehicle taxes to influence vehicle design, purchase and patterns of use are frequently cited instruments for limiting emissions. Vehicles and fuels in particular are already taxed, though there is significant variation in the level of taxes implemented and proposed among the Parties, as well as the way these are applied (on different fuels, by weight, engine volume, energy efficiency, etc.).

72. While it is recognized that packages of fiscal, regulatory and information measures which form part of local and national integrated approaches to transport emissions reduction demonstrate the greatest potential, Parties have reported little experience of overall success. While most measures cited have been implemented only to a limited extent, the introduction of corporate average fuel economy (CAFE) standards in the United States and the United Kingdom's policy on increasing road fuel duty are notable for their realized or projected emissions reduction potential. In the period 1978-1990, when the CAFE standards were being implemented, the average fuel efficiency in the United States increased from 9 to 13 kilometres per litre, and Canadian fuel efficiency exceeded the goal of corporate average fleet fuel economy of 8.6 litres per 100 km. In the United Kingdom, improved fuel efficiency is projected to be achieved in response to a significant change in the long-term fuel price, with road fuel duty increases of at least 5 per cent per year in real terms.

73. Given the long lead times both for land-use changes, the turnover of capital stock in the transport sector and the development of advanced fuel technologies and infrastructures, further effort on the part of Parties, including encouragement of the private sector, may need to be considered to improve the mid-term emissions outlook[6] .

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[6] While a number of Parties cited specific transportation-related research and development initiatives, the activities of the private sector in developing advanced hybrid and alternative-fuelled vehicles were not generally cited, though clearly these efforts represent potentially significant responses to the problem.

4. Land-use change and forestry

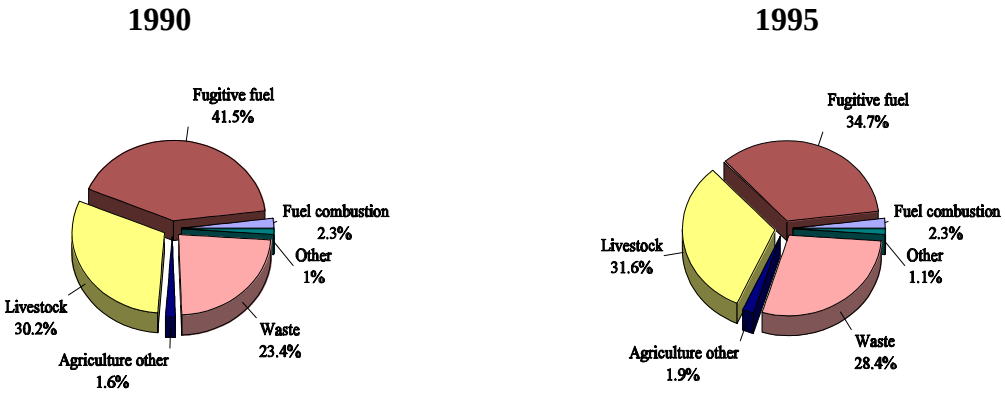
74. Enhancing sink capacities has emerged as an important supplement to the adoption of mitigation measures. The policies used to enhance or maintain carbon sinks in forests included sustainable timber management practices, regulations, subsidies for initial plantation, tax incentives and voluntary agreements. The measures undertaken with respect to forestry policy, although increasing CO_2 sequestration, were not necessarily the primary objectives, as concerns such as conserving biodiversity and ensuring a sustainable management of natural resources were objectives.

75. Afforestation was often identified as the primary measure for increasing CO_2 sequestration. According to the latest revision to the Forestry Act of 1996 in Denmark, an incentive structure will be established to promote private afforestation on agricultural lands, as part of an effort to achieve the objective of an afforestation rate of 40 km^2 per year. Other countries as well highlighted efforts to increase afforestation (e.g. AUS, AUT, FRA, GER, HUN, ICE, IRE, NZL). Other measures included forest or natural resource programmes (decreasing land degradation, including wetlands, preserving reservations), management practices to control damage from pests and fires (e.g. Greece, Japan), increasing the use of timber in construction (e.g. France) and reduction of fuel combustion emissions in the production processes of construction materials. There was some mention of the role of forest soils (fertilization, liming and scarification) and the necessity for their consideration in the carbon cycling process (e.g. Sweden). The possible increase in carbon reservoirs due to non-rotational set-aside polices in the agricultural sector was highlighted by some Parties (e.g. Germany, the United Kingdom). Research has also been directed towards reducing uncertainties in sequestration.

C. Measures targeting methane

76. Methane emissions decreased in the 1991 to 1994/95 period in all reporting Parties, except for eight (CAN, DNK, ESP, GRE, ITA, NOR, POR, USA). In Canada, Denmark, Greece and Norway the increases in emissions were, in part, related to higher oil and natural gas production, and in Italy, Portugal and Spain the increase was mainly due to increased emissions from waste. In the United States the increase was related to growth in emissions from the agriculture and waste disposal sectors. Data indicate that the relative share of the various CH_4 sources is shifting: while fugitive fuel emissions were the dominant source of CH_4 in 1990, in 1995 the shares of emissions from waste and agriculture increased (see figure 12). Most of the Parties, except Australia, Austria, Canada, Ireland and Spain, project stabilized or reduced CH_4 emissions in 2000 compared with 1990 levels.

Figure 12: Distribution of CH_4 emissions by source, 1990 and 1995



77. Methane emissions originate primarily from enteric fermentation in animals, leakages from natural gas in production and distribution and from coal mines, landfill waste sites and sewage treatment plants. CH_4 emissions from the agricultural sector are a significant source, having accounted for 32 and 34 per cent of total CH_4 emissions in 1990 and 1995, respectively. Emissions of CH_4 in the agricultural sector are highly dependent upon animal numbers, which depend upon agricultural policy. During the 1990s, there have been pressures for reform because of overproduction in some sectors. There has been a reduction of subsidies in New Zealand and some reforms to the Common Agricultural Policy in European Union (EU) member States, which encourage a reduction in cattle numbers, for example, by placing limits on subsidy payments related to stocking densities. Farmers already have incentives to improve the milk and meat yield from their animal stock which would reduce overall numbers. Some countries have reported that further emissions reductions are possible through improved feeding practices. Furthermore, the methods by which animal waste is managed affects CH_4 (and N_2O) emissions; reductions could occur if slurries from housed animals are stored and then spread as fertilizer. Changes in manure management practices are important in countries with colder climates where animals are more likely to spend greater periods inside. Improved waste management activities are expected to contribute to emissions reductions in a number of Parties (e.g. AUS, CZE, DEU, DNK, EST, FIN, GBR, IRE, JPN, LAT, NLD, NOR, NZL, POL, SLO). In Denmark the construction of biogas plants to produce electricity will lead to a reduction of CH_4 emissions from the storage of manure, reducing simultaneously emissions from fossil fuels.

78. Mainly for economic reasons coal subsidies have been or are being removed or reduced in several Parties, for example, the United Kingdom and Germany. A reduction in deep mine production is expected to reduce CH_4 emissions from this source. Furthermore, some Parties (e.g. Germany) have plans to capture and flare CH_4 from mines; in the case of Australia there is a voluntary measure to use the CH_4 for electricity production. For those Parties producing natural gas it is commonplace to have some gas flaring. There are obvious incentives for companies to minimize the amount of gas they burn during production, but safety reasons limit the extent of possible reductions. Several Parties which have town gas are replacing old cast iron local distribution networks with modern virtually leakproof alternatives, thereby reducing emissions.

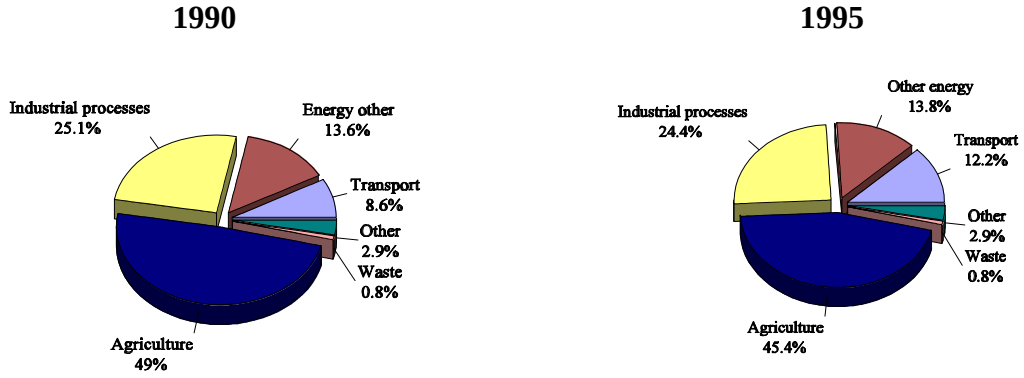
79. The largest CH_4 emission reductions are expected to emanate from improvements in waste management involving, *inter alia*, a reduction in the volume of waste disposed of in landfills through recycling schemes and waste incineration. In addition, significant CH_4 emission mitigation is expected from measures to collect gas from landfills and sewage treatment facilities, either for flaring or to generate electricity. Some of these measures have been adopted owing to limited capacity for landfill (e.g. CHE) or to safety concerns about CH_4, and as a result of the EC policy of reducing waste and improving waste management. In many countries improvements are being made in this area (e.g. Finland) even though it has been typically noted by these countries that this is not one of the most cost-effective ways of mitigating GHG emissions.

80. Regulations govern waste disposal practices in most reporting Parties. In some, these regulations compel or encourage recycling, separation and composting. Several, including the United Kingdom, have introduced taxes or landfill fees to provide incentives to reduce waste volumes. Diversion of waste from landfills to waste-to-energy plants is usually pursued through voluntary means or economic incentives, though a Swiss regulation requires incineration of all combustible waste, and in Denmark the landfilling of combustible waste has been prohibited from January 1997. Some Parties also report measures targeting waste reduction from industries.

D. Measures targeting nitrous oxide

81. Anthropogenic emissions of nitrous oxide originate primarily from the *agricultural sector*, particularly the use of inorganic nitrogenous fertilizers, followed by fuel combustion in *energy transformation* and *transport*, and the industrial processes sector. *Agriculture* is the largest source of N_2O emissions for the majority of reporting Parties, but emissions from *transport* have been the fastest growing in many of them (see figure 13).

Figure 13: Distribution of N_2O emissions by source categories, 1990 and 1995



82. Some Parties did not report specific policies and measures targeting N_2O. Many noted that measures to mitigate CO_2 or CH_4 emissions in energy and agriculture would also reduce N_2O emissions. Several Parties pointed out that while catalytic converters substantially reduce several key air pollutants, they emit N_2O as a side-effect. Measures include improved efficiency of

nitrogen fertilizer use, the promotion of organic farming instead of conventional farming and the use of set-aside schemes which limit the conversion of grasslands to intensive crop cultivation. Other measures employed include: voluntary agreements with industry; regulations requiring best available technology; research and demonstration for agricultural management; development of sustainable agriculture; and subsidy reform and implementation of EU directives in the agricultural sector.

83. Although only 10 Parties provided estimates of effects of measures, such measures are expected to achieve most of the emission reductions by 2000 and thereafter the emissions will remain at a relatively low level. In five Parties, the reductions are expected to result from a measure to limit N_2O emissions from adipic acid manufacturing. This is to be accomplished on a voluntary basis in Canada, Germany and Japan, and via regulation in France and the United Kingdom. Australia, Denmark, Slovakia and the United States project N_2O emission reductions in 2000 and beyond from measures to boost the efficiency of nitrogen fertilizer use.

E. Measures targeting HFCs, PFCs and SF_6

84. In line with the revised guidelines, the majority of Parties have extended their inventories to include hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride and mention them with respect to policies and measures in second national communications. Parties emphasize that emissions of these gases are currently low, but they are significant both in terms of their very high global warming potentials and the likely growth of emissions in the near future. In particular, emissions of HFCs are anticipated to increase by 2000 as they are used as a substitute for ozone-depleting gases controlled under the Montreal Protocol. This trend was highlighted by many Parties (e.g. DNK, GBR, ICE, JPN, NLD, NOR, USA).

85. Strategies to control HFCs, PFCs and SF_6 are not yet well developed in the majority of reporting Parties. The United States reported a national strategy to minimize future emissions of HFCs and PFCs. It features voluntary approaches with HFC-23 and primary aluminium producers to develop and implement favourable processing practices or technology and regulatory mechanisms to limit the use of HFCs and PFCs where alternatives are available. This strategy is projected to make a significant contribution to the United States' total GHG emission reductions in the 2000 to 2020 period.

86. Research on limiting emissions of HFCs, PFCs and SF_6 is being carried out in Denmark and Japan, focusing on finding appropriate alternative substances or technologies, or recovery after their use. Denmark is aiming at phasing out HFCs within the refrigerating industries before 2006.

87. Several Parties also reported efforts to develop voluntary arrangements with aluminium producers to reduce PFC emissions (e.g. AUS, DEU, ICE, NOR) and with electrical equipment manufacturers concerning SF_6 emissions (DEU, GBR). Air quality and integrated pollution control laws regulate PFC emissions in New Zealand and the United Kingdom. PFC regulations are being considered in Iceland. The Netherlands has technical requirements for refrigeration

equipment to limit HFC leakage. Switzerland reports restrictions on the use of HFCs and PFCs as aerosol propellants and extinguishing agents in fire protection equipment, and in Denmark the use of HFC-134a as a propellant in aerosol sprays and the use of HFCs as fire fighting agents have been prohibited since 1977.

F. Measures targeting precursor gases (CO, NO_x and NMVOCs)

88. A broad range of policies and measures affect emissions of the precursor gases. For most European Parties emissions of precursor gases are regulated by EU directives, and reduction of volatile organic compound (VOC) and NO_x emissions is subject to protocols to the Convention on Long-range Transboundary Air Pollution. International emission standards are widely used by Parties to meet reduction obligations in the transportation and industrial sector.

89. Taxes on NO_x, CO, non-methane volatile organic compounds (NMVOCs) and SO_2, or emissions-oriented vehicle taxes are an important instrument for many Parties (e.g., CHE, DEU, EST, FIN, NOR, SWE). Several European Parties (e.g. DEU, ESP, EST, FRA, NOR) control emissions produced by storage and distribution of oil products.

90. Reduction of emissions produced by facilities in the petrochemical and power generation sector, and in the paper pulp, cement and steel industries is governed by national regulations (e.g. CHE, DEU, DNK, EST, FRA, GBR, JPN, NLD, POR) and voluntary agreements (CHE, DNK, NLD).

91. The use of fluidized bed combustion technology in biomass utilization for CHP plants in Finland and the use of geothermal heat in Lithuania were expected to reduce NO_x and sulphur emissions.

92. Measures to control NMVOC emissions originating from the application of solvents include programmes, national regulations and limits in the use and promotion of water-based paints (e.g., CZE, FRA, ICE, NLD). In Norway, NMVOC emissions from loading of oil offshore and onshore are reduced by on-shore recovery systems.

V. PROJECTIONS AND EFFECTS OF POLICIES AND MEASURES

93. Thirty-three Annex I Parties provided information on projections of GHG emissions in their second national communications[7]. Although the degree of completeness and extent of coverage varied amongst Parties, in general the information provided was more complete and transparent than in the first national communications. On the basis of the information reported, a general description of the projected trend in emissions up to 2020 and overall effect of measures is given in this document, while the detailed numerical data and description of the projections for 2000 to 2020 are provided in tables C.1 to C.8 in document FCCC/CP/1998/11/Add.2.

A. Methods and approaches used

Scenarios and uncertainty

94. Thirty-two Parties provided "with measures" projections for CO_2 emissions. Twenty-two Parties provided more than one scenario, among them the "without measures" projections requested by the UNFCCC guidelines. Several Parties provided up to five policy scenarios, some of them subdivided into different trends. In some cases, such as Belgium, the Netherlands and Switzerland, one of these scenarios corresponded to "implemented measures" and the others, with more substantial emission reductions, to measures "under consideration". Some of the "with measures" projections involved policies which were not, in fact, implemented or with a low likelihood of being implemented perhaps because their implementation had to be viewed in the context of common international or regional policies.

95. For nine out of the 11 Parties (CAN, DNK, ESP, ICE, IRE, JPN, LTU, NOR, SWE) which reported only one scenario for CO_2 emissions, it was difficult to deduce the effects of the reported measures; Australia and the United Kingdom, however, explained these effects in a clear quantitative manner. Reporting Parties provided only one scenario for all the other greenhouse gases, with the exception of eight Parties (BLG, FRA, ITA, LAT, LUX, NLD, SLO, UKR), which provided more than one scenario for CH_4 and N_2O projections.

96. Although the uncertainty of projections was mentioned by reporting Parties, the discussion was limited and reporting on uncertainty did not improve substantially from the first to the second national communications. A few Parties reflected uncertainty by providing a range of projection scenarios, in particular Parties with economies in transition. Canada, Slovakia and the United States presented a sensitivity analysis of how the results would be affected by changes in some key assumptions. Canada also presented detailed information on how the assumptions, expert assessment and sectoral models feed into the evaluation of the main model for the estimation of emissions. Iceland presented the uncertainty related to all GHG projections in a sectoral table which attributes to each entry a quantative level of confidence.

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[7] Monaco did not provide projections in its second national communication and Slovenia provided only an inventory excerpt from its first national communication.

Models and assumptions

97. Parties used different approaches to estimate their projected emissions reflecting variations in preferences for models, historical choice of the model in question, economic structure, experience and data availability. Macroeconomic "top-down" models played a dominant role for energy related CO_2 projections, but equilibrium "bottom-up" models were also used. Some Parties (AUS, BEL, CAN, DNK, SLO, UKR, USA) combined different types of models (econometric, macroeconomic, "engineering", etc.) to take advantage of their respective strengths. Some Parties either did not mention which models were used or provided only a brief explanation. Generally, the models were not well described. It is not clear from the information provided whether agriculture, forestry and waste projections are based on economic models, trend extrapolations or expert judgement.

98. Reporting on assumptions improved substantially compared with the first national communications. The revised UNFCCC guidelines contributed to this improvement in reporting, although some Parties did not use the tabular formats to present key information in a structured way. Assumptions related to gross domestic product growth, demographic growth, energy prices, structural changes in energy demand and supply, and policy choices differed considerably among Parties, reflecting the differing national circumstances and time span of the projections. Economic growth was considered to be a driving force for Parties and in some of them structural changes in energy supply were expected to play an important role. Notable, as well, were the differences among Parties in estimated population growth and resulting difference in emission trends. In general, the description of the assumptions and approaches used to project the emissions of gases other than CO_2 also improved. Nevertheless, they were less well documented than the CO_2 emissions projections, reflecting a higher degree of uncertainty in measuring emissions from non-energy sources and the smaller contribution of these gases to total GHG emissions.

99. The assumptions used in the projections of the reporting Parties with economies in transition differ to some extent from those for Annex II Parties, owing to radical changes in their economic systems. A number of the communications noted the difficulty in fully assessing the extent of reduction in emissions due to the large uncertainty surrounding the transition process and resulting economic growth. For example, as stressed by Slovakia and the Ukraine in their second national communications, a simple extrapolation of historical data on energy consumption is not sufficient to model future emission projections. In addition, most of the EITs assume substantial changes in industrial production and anticipate shifts from (heavy) industry to the service sector. Estonia emphasized the importance external political and economic events have on economic development, with key assumptions in its scenarios being close integration with Western political and economic structures and stronger/weaker relations with the Russian Federation and other countries of the Commonwealth of Independent States.

100. The description of the projections of CO_2 emissions or removals in the land-use change and forestry sector were not as well described as for other sectors. However, a number of Parties (AUS, BEL, CHE, DNK, EST, FRA, IRE, JPN, LAT, NOR, NZL, SLO, UKR, USA) provided

some information as to the assumptions used, often commenting on the large degree of uncertainty and the difficulty in assessing future emissions and removals of this sector. The methods of estimating CO_2 removals varied substantially among Parties, but this methodological problem is more related to the choice of methods for estimating GHG emission inventories in this sector rather than to their projections *per se*, which are based on the future application of these methods.

101. Projections of HFC, PFC and SF_6 emissions were requested by the UNFCCC guidelines for the first time. Less than half of the Parties provided this information (AUS, CAN, DEU, FIN, GBR, ICE, ITA, NLD, NOR, NZL, RUS, SWE, USA). The projections of these gases, as with the inventories, lacked a clear indication (with a few exceptions) of whether the projections were based on actual or potential emissions. Furthermore, the projections of HFCs and PFCs often were not provided in a disaggregated manner by gas species, which is important because of the significant differences in the GWPs of the various species.

Adjustments

102. Six Parties (BEL, CHE, DNK, FRA, NLD, SWE) adjusted upwards their 1990 CO_2 emissions baseline figures used for projections to account for climatic anomalies in that year and also with the aim of evaluating how policies and measures affect emissions irrespective of the climatic fluctuations. In addition to the adjusted figure, Belgium presented an unadjusted figure. Denmark adjusted its projections to account for electricity trade. The differences between their 1990 inventory data and the adjusted figures used for projections ranged from less than 1 per cent (Sweden) to 15 per cent higher (Denmark). All these Parties provided transparent information on the approaches used.

103. A number of Parties commented on assumptions about the structure and future patterns of energy supply (e.g. nuclear capacity, market competition) as related to projected emissions. For example, Denmark commented on how long-term developments in power production (increasing shares of cogeneration and wind energy) would also result in increasing electricity export. Switzerland stated that the projections are made on the assumption that the present domestic nuclear power capacity remains in existence, and electricity purchasing agreements with France are renewed. Sweden noted that one of the alternatives to building new power plant in Sweden, which is entailed by the planned closing-down of one nuclear reactor before 2000, could be to import electricity from the Nordic electricity market. France mentioned that its longer term projections (2020) were dependent on the future composition of electricity production units and effects of competition among European electric utilities. Bulgaria indicated that possible future electricity export could lead to additional emissions of 6,000 - 9,000 Gg of CO_2 annually and noted that in its base year the amount of electricity imported, if produced internally, would have resulted in a level of CO_2 emissions 6.5 per cent higher.

B. Projections for 2000-2020

104. All reporting Parties provided projections for the emissions of the three main GHGs for 2000, except Estonia, Greece, Hungary and Poland, which provided information only for CO_2 and Japan which provided projections for CH_4 and N_2O for 2000 and CO_2 projections only for 2010. Belgium provided projections up to 2005 and all but six Parties (AUT, BEL, EST, GRE, HUN, POL) reported projections for the three main GHGs for 2010. In addition 17 Parties gave projections of some gases for 2020, a few Parties provided projections beyond 2020, and 23 Parties provided some sectoral projections. Fifteen Parties presented projections for PFC, HFC and SF_6 emissions, though the degree of detail varied. Twenty-three Parties provided projections on the *land-use change and forestry* sector.

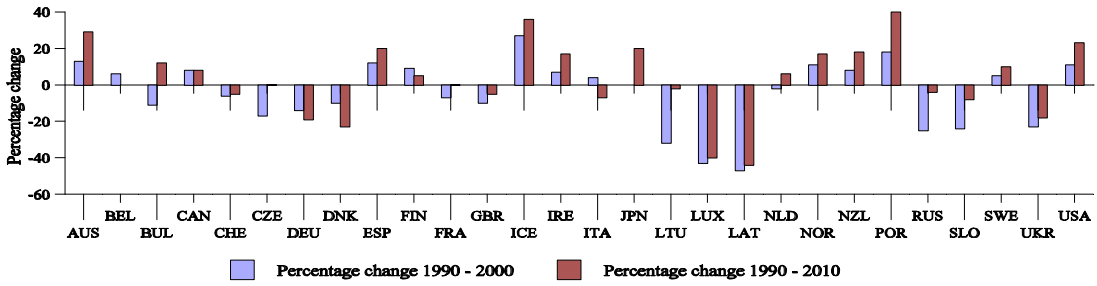
105. All reporting Parties presented figures for projected CO_2 emissions in 2000 that differed from those given in their first national communications. Twenty-two Parties revised their projected CO_2 emissions downwards, while the remaining eight reporting Parties (BEL, BLG, DNK, ICE, NOR, NZL, POL, USA) revised them upwards. Projections for CH_4 and N_2O emissions were also changed in almost all cases. Revision of the figures was due to changes in the assumptions used in the previous projections, including differences from what had been anticipated (e.g. economic activity), or modifications in the methods. As the base year emissions for projection calculations were virtually always revised as well, in line with assumptions and methods, the revision downward or upward of the 2000 figures would not necessarily indicate a revision in the expected decrease or increase of emissions with respect to 1990. However, for many of the Parties where a comparison of rates of growth/decline between the earlier and new projections was possible, a slower increase or greater decrease in emissions with respect to 1990 was discernible. The majority of Parties documented changes and/or provided adequate information as to the assumptions and methods used to allow for some understanding of the differences from earlier projections.

106. The information provided in second national communications on projections for 2000 and the trend in emissions since 1990 would suggest that for a number of Annex II Parties additional measures will be needed to achieve the aim of returning their emissions of greenhouse gases to1990 levels by 2000. A return to 1990 levels seems more likely for CH_4 and N_2O, emissions of which have decreased since 1990 and/or been projected to decrease in most of the reporting Parties. In the case of emissions of other greenhouse gases, HFCs, PFCs and SF_6, emissions of HFCs and SF_6 are expected to increase significantly and those of PFCs are expected to increase in the long term. For the majority of Parties, combined GHG emissions expressed in CO_2 equivalent are projected to continue increasing beyond 2000 and in some cases the rate of growth in emissions is projected to increase further after 2000. As longer-term projections of greenhouse gases are expected to follow similar trends, it is likely that additional efforts will be needed in order to modify longer-term trends.

107. When all projected GHG emissions (excluding *land-use change and forestry*) are aggregated using IPCC 1995 GWPs, 13 of the reporting Parties (AUS, BEL, CAN, ESP, FIN, ICE, IRE, ITA, NOR, NZL, POR, SWE, USA) projected an increase for 2000 as compared with

base year levels (see figure 14). Fourteen Parties (BLG, CHE, CZE, DEU, DNK, FRA, GBR, LTU, LAT, LUX, NLD, RUS, SLO, UKR) projected a decrease. Projections for 2010 exhibit similar results, with 12 Parties projecting emissions equal to or lower than base year levels. For 2020, only four (DEU, FIN, LUX, LAT) of the 14 Parties reporting projections projected a decrease in emissions, while the other 10 Parties projected an increase, six of them (AUS, CAN, ICE, NZL, SWE, USA) projecting an increase of more than 25 per cent.

Figure 14: Percentage change in aggregate GHG emissions, 1990 to 2000 and 2010 (excluding land-use change and forestry)



Note: Austria, Estonia, Greece, Hungary, Monaco, Poland and Slovenia did not present projections for all three main GHGs (CO_2, CH_4 and N_2O), and therefore they were not included here. Belgium provided projections for all GHGs until 2005, and Japan for 2010 only. The Czech Republic and France projected total GHG emissions to be at 1990 levels in 2010.

108. Fourteen Parties (AUS, BEL, CAN, ESP, FIN, GRE, ICE, IRE, ITA, NOR, NZL, POR, SWE, USA) accounting for 48 per cent of the 1990 CO_2 emissions from Annex I Parties, projected an increase in their emissions to 2000, ranging from 3 (SWE) to 35 (POR) per cent above 1990 levels. Eighteen Parties (AUT, BUL, CHE, CZE, DEU, DNK, EST, FRA, GBR, HUN, LTU, LTV, LUX, NLD, POL, RUS, SLO, UKR) projected stabilization or a decrease in CO_2 emissions for 2000 compared to the base year levels. Their contribution to the 1990 CO_2 emissions from Annex I Parties amounted to 45 per cent. Of the 17 Parties which reported long-term projections up to 2020, 11 Parties indicated a further growth in their CO_2 emissions above the 2000 level and six Parties projected decreases in the longer-term.

109. Twenty-nine Parties provided CH_4 projections for 2000. Twenty-four of them (excepting AUS, AUT, CAN, ESP, IRE) accounting for 85 per cent of the aggregate Annex I CH_4 inventory figures for 1990, projected stabilization or decreases in CH_4 emissions compared to their base years. All reporting Parties except five (AUT, EST, GRE, HUN, POL) provided N_2O projections for 2000. Sixteen of these Parties, accounting for 78 per cent of the 1990 aggregate inventory figures for Annex I Parties, projected stabilization or decrease in N_2O emissions compared to their base years. Long-term projections for both CH_4 and N_2O have trends similar to those for 2000.

110. Less than half of the reporting Parties provided projections for HFCs, PFCs and SF_6. The Russian Federation and the United States presented projections only in CO_2 equivalent for all these gases combined, and Australia included PFCs in its sectoral projections for industrial

processes. Parties that made projections for HFCs for 2000 expect a considerable growth, while six (DEU, GBR, ICE, ITA, NOR, NZL) out of 10 Parties that provided information on PFCs projected a decrease for 2000 as a result of reductions in emissions from the aluminium industry. PFC projections show a decreasing trend. Only two Parties (CAN, NOR), however, projected a decrease in SF_6 emissions for 2000, mainly as a consequence of improved production practices in the magnesium industry, while the other seven projected an increase.

111. In most cases, for 2010, emissions of HFCs, PFCs and SF_6 are projected to increase and their importance relative to other gases is expected to grow. Long-term projections for HFCs and PFCs were provided by 11 Parties and for SF_6 by 10. All of these Parties expected a considerable growth in emissions of HFCs as a consequence of the phase-out of chlorofluorocarbons (CFCs), and the scheduled phase-out of hydrochlorofluorocarbons (HCFCs) under the Montreal Protocol, since HFCs are used as substitutes for these substances. Sharp projected increases in HFC emissions are also explained by the fact that this transition took place mainly after 1992 and the levels of these emissions in the base year were very low.

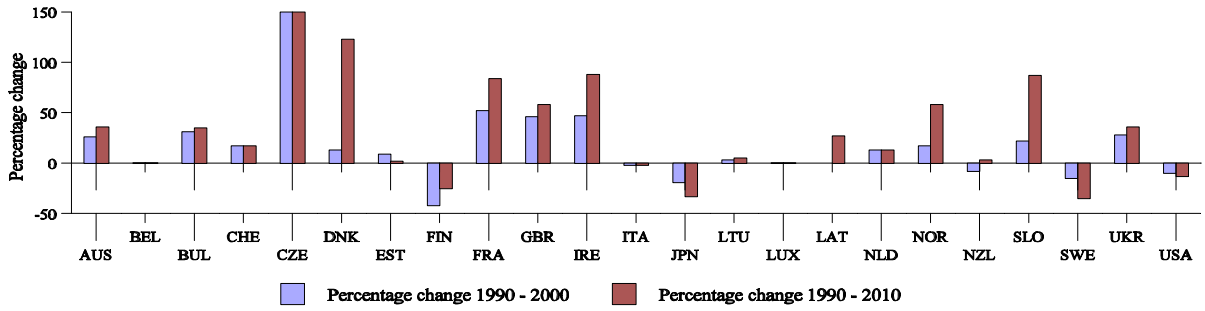
112. Twenty Parties (AUS, BLG, CAN, CHE, CZE, DEU, DNK, FRA, GBR, ICE, IRE, JPN, LTV, LTU, LUX, NOR, NZL, SLO, SWE, UKR) presented sectoral projections for the three main GHGs although not necessarily on the basis of the tables requested by the UNFCCC guidelines. Finland, the Netherlands and the Russian Federation presented sectoral projections for CH_4 and N_2O. Spain and the United States did not present sectoral projections for CH_4 and N_2O, but did disaggregate projections for CO_2 fuel combustion emissions. Eight Parties (EST, FIN, GRE, HUN, NLD, POL, POR, RUS) did not disaggregate their CO_2 emissions at all.

113. For those Parties which provided disaggregated projections for CO_2 from fuel combustion, an increase in emissions from transport was projected for 2000 and, except for Denmark and Luxembourg, up to 2010 and 2020 where reported, confirming the trend in emissions from this sector for 1990-1995. Likewise, all Parties reporting projections for N_2O emissions from transport, except the Ukraine, projected an increase. In the longer term, CO_2 emissions from the energy and transformation sector are projected to grow for 17 Parties. Several Parties (CZE, DEU, DNK, ESP, GBR, LAT, SLO) projected a stabilization or decrease in the longer term.

114. Australia, Denmark, Ireland, Italy, Japan, New Zealand and Slovakia projected an increase in CH_4 emissions in the form of *fugitive fuel* emissions; Australia, Bulgaria, Canada, Ireland, Japan, Norway and Sweden increases from *agriculture/enteric fermentation;* and Australia, Bulgaria, Canada, the Czech Republic, Italy, the Russian Federation and Slovakia from *waste*. All the other Parties providing sectoral projections projected a decrease or stabilization in CH_4 emissions for those sectors. N_2O emissions, with the exception of those from *transport* and other energy sectors, were projected to have a decreasing trend. Only four Parties (BLG, JPN, NLD, SWE) projected an increase in their emissions from *industrial processes* and only five (CAN, ITA, NOR, SLO, SWE) in emissions from *agricultural soils*. However, longer-term trends varied, as in some case emissions were projected to begin increasing for some of these sectors after 2000 -2005.

115. Twenty-three Parties reported CO_2 projections in the *land-use change and forestry* sector for 2000 (see figure 15). For 22 Parties this sector was projected to remain a net sink in 2000. For all reporting Parties the projections of CO_2 removals in this category were mostly linked to forestry activities and for 15 Parties net CO_2 removals in 2000 were projected to increase. However, the United Kingdom projected, in addition to forestry activities, CO_2 emissions from other land-use change activities which offset its forestry removals. Australia, although it did not provide specific projection estimates from other land-use activities, commented on the recent trend in emissions from land clearing (30 per cent decrease since 1990) and ongoing work to improve its methods for calculation of these emissions. Belgium and Switzerland projected removals to remain stable up to 2020 and Sweden indicated that its removals could be decreasing up to 2000 and afterwards. In the long term (2010-2020) 11 Parties (AUS, BLG, DNK, EST, FRA, IRE, NLD, NZL, NOR, SLO, UKR) projected an increasing net CO_2 removal. Finland presented a range with decreases for 2000 and both increases and decreases for 2020 described as plausible options.

Figure 15: Percentage change in net removals or emissions from land-use change and forestry, 1990 to 2000 and 2010



Note: Positive values in percentage denote more removals or less emissions in 2000 and 2010 as compared to 1990. Austria, Canada, Germany, Greece, Hungary, Iceland, Monaco, Poland, Portugal, Russian Federation, Slovenia and Spain, did not present projections in the land-use change and forestry category. Belgium and Luxembourg reported the same values for 1990, 2000 and 2010.

C. Estimated effects of policies and measures

116. The estimation of effects of policies and measures was identified by Parties as one of the most problematic components of the second national communications. It is also difficult to explain the effects of policies and measures in the context of wider emission trends. The figures presented in the tables may not indicate the complete extent of the effects of policies and measures as they are a compilation of the varied information on such effects and do not necessarily encompass the overall effects for each Party.

117. Twenty-four Parties provided information on the effect of measures in terms of GHG emission reduction. In some cases, Parties gave a comparison between "with" and "without" measures scenarios and it was not possible to determine the effect of individual measures. In some cases it was argued (e.g. Sweden) that the counterfactual or "without" measures scenario is highly uncertain. Also, for those Parties having liberalized their energy markets, it was not always possible to know what plants may otherwise be constructed by a state utility. Some

Parties conduct integrated analysis to show the effect of factors such as temperature change, population, GDP growth, structural change, price effects, etc. in working out in broad terms the residual effect of policies and measures on GHG emissions. Even where Parties were able to estimate the effects of measures this was sometimes in terms of energy or CO_2 emissions saved, with the latter highly dependent on assumptions about the fuel displaced by a reduction in energy consumption. A few Parties were able to estimate the effect of particular measures. However, there was generally little information on the methodologies employed.

Effects of policies and measures by gas

118. Twenty four Parties provided information on effects of policies and measures related to CO_2 (AUS, AUT, BEL, BUL, CAN, CHE, CZE, DEU, FIN, FRA, GBR, GRE, HUN, ITA, LUX, LAT, NLD, NZL, POR, RUS, SLO, SWE, UKR, USA). The reductions in CO_2 were consistently the most significant component of overall GHG reductions. As a proportion of overall GHG reductions, CO_2 is expected to account for between 40 and 100 per cent of overall reductions - in GHG equivalents - at least until 2020.

119. Although not required by the guidelines, six Parties (CAN, FRA, GBR, LAT, SLO, SWE) detailed the effects of their policies and measures on CO_2 emissions by policy instrument, drawing conclusions on the basis of policy instruments was difficult, where taxation was the only policy instrument for which the effects could be identified on a consistent basis. In Sweden, increased taxes are projected to be responsible for 95 per cent of the CO_2 emission reductions in 2000 resulting from policies and measures, while in Latvia and the United Kingdom it is estimated that these will account for 30 and 10 per cent of the CO_2 emission reductions, respectively. In addition, information on the effects of measures to enhance CO_2 removals by sinks were provided by about a quarter of the Parties.

120. Information on the effects of policies and measures on estimates of CH_4 emissions was provided by 13 Parties (AUS, BUL, CAN, DEU, FRA, GBR, ICE, LUX, LAT, NOR, RUS, SLO, USA). In virtually all cases, anticipated reductions by the year 2000 were between 10 and 30 per cent of overall GHG reductions. The data suggest that policies and measures directed at CH_4 emissions will remain a significant component of strategies to reduce overall emissions.

121. Ten Parties provided information on the effects of policies and measures on N_2O emissions (AUS, BUL, CAN, DEU, FRA, GBR, LUX, LAT, SLO, USA). Seven of these Parties (BUL, CAN, DEU, FRA, GBR, SLO, USA) expect that their policies and measures regarding N_2O emissions in 2000 will account for between 7 and 45 per cent of overall GHG reductions. Virtually no reductions were expected by three other Parties (AUS, LUX, LAT). By the year 2000, however, most of the possible emission reductions of N_2O will be completed, except in the cases of France, Canada, and Slovakia, where N_2O emission reductions are predicted to contribute between 15 and 30 per cent of overall emission reductions through 2020. The trend of a rapid reduction of N_2O emissions and then a generally constant pattern reflects the aim to reduce the production of nitric and adipic acids prior to 2000, which will result in a general reduction of N_2O emissions.

122. Three Parties provided information on the effects of policies and measures on other GHG emissions (AUS, GBR, USA). Australia provided an estimate of the effects of policies and measures for PFCs. The United Kingdom included PFC and HFC emission reduction estimates for 2000, 2005, 2010 and 2020. The United States included, in carbon equivalents, a combined estimate for emission reductions of PFCs, HFCs and SF_6 for 2000, 2010, and 2020. Only the United States provided information on projections that suggested that reductions in other GHGs would be a significant component in an overall strategy, encompassing about one quarter of overall reductions. Germany included data on the impact of policies and measures on NMVOC emissions for 2005 and 2020.

123. Table 1 provides an indication of the estimated effects of policies and measures for CO_2, CH_4, N_2O and other GHGs over time.

Effects of measures by sector

124. The guidelines request Parties to estimate the effects of policies and measures by sector. Almost all Parties that provided information on the estimated effects of policies and measures on CO_2 and CH_4 emissions did so on a sectoral basis. Similarly, Parties that reported on the estimated effects of policies and measures on N_2O emissions provided sectoral information, although for several Parties emission reductions are expected from only one sector.

125. The estimated effects of policies and measures on CO_2 emissions are the most significant component of effects of measures. Sixteen Parties (AUS, BEL, CAN, CHE, DEU, FIN, FRA, GBR, GRE, HUN, ITA, LUX, LAT, SLO, SWE, USA) provided sectoral information on the effects of policies and measures on CO_2 emissions, as is displayed in table 2.

126. The contribution to CO_2 reductions in the sectors of energy and transformation industries; residential, commercial and institutional; industry; and transport differs between Parties. For the year in which the most recent estimates are available, seven Parties (FIN, GBR, GRE, HUN, ITA, LAT, SLO) indicate that the majority of emission reductions will occur in the energy and transformation industries. The majority of emission reductions are estimated to occur in the residential, commercial and institutional sector for four Parties (BEL, DEU, SWE, USA), generally through increased energy efficiency. Two Parties (AUS and LUX) provided information suggesting that the majority of their CO_2 emissions will come from effects of policies and measures focused on the industrial sector. The residential, commercial, and institutional, and industrial sectors were the most significant for Canada, which did not disaggregate these sectors. Two other Parties (CHE, FRA) suggest that measures applying to the transport sector will provide the majority of their emission reductions due to effects of measures.

Table 1: Estimated contribution of reductions in emissions of individual gases to total GHG emissions reduction, 2000, 2005, 2010 and 2020*

(Percentage)

	2000				2005				2010				2020			
	CO_2	CH_4	N_2O	Other	CO_2	CH_4	N_2O	Other	CO_2	CH_4	N_2O	Other	CO_2	CH_4	N_2O	Other
AUS[a]	69	30	0	1	69	30	1	0	67	32	1	0	63	35	1	0
BUL	72	19	9		75	17	8		75	18	8		77	15	8	
CAN[b]	49	24	27						61	23	16		74	16	10	
DEU	60	16	24		66	18	16									
FRA	44	10	45						53	15	31		56	14	30	
GBR[c]	78	12	11		77	14	9		78	14	8		75	17	8	
ITA					73	22	5		77	19	4					
LUX	100	0	0		100	0	0		100	0	0		100	0	0	
LAT		100	0		95	5	0		96	2	2		100		0	
SLO	43	33	24		49	31	20		49	34	16					
USA	43	21	7	27					58	14	3	25	65	11	2	22

1995 IPCC global warming potential used : CO_2 = 1, CH_4 = 21, N_2O = 310.

[a] Estimate of the effects of other GHG emissions includes only PFCs.

[b] Canada has not calculated emission reductions from energy end-use sectors for 2005.

[c] The United Kingdom did provide an estimate of the effects of actions to reduce PFC and HFC emissions, but without disaggregation.

127. Estimated effects of policies and measures also differ across time in some cases, although there seems to be no common trend among Parties. Three Parties (BEL, GRE, HUN) provided information for one year and so no analysis could be made. For eight other Parties (CHE, FIN, DEU, FRA, ITA, LUX, LAT, SWE) estimates of effects of measures remained reasonably constant. For two Parties (AUS, USA), the energy and transformation industries sector became increasingly important, combined, in the case of the United States, with an increasing significance in the residential, commercial, institutional and industrial sectors. These sectors also become increasingly significant for Canada - from 53 per cent in 2000 to 69 per cent in 2020. The information provided by the United Kingdom suggests a general decline in effects of measures of over 10 per cent in the energy and transformation industries and a gradual rise in the other sectors between 2000 and 2020. Slovakia is the only Party to expect a dramatic rise in the effects of measures in the transport sector across time - from 9 per cent in 2000 to 34 per cent in 2010.

Overall effect of measures

128. For almost all reporting Parties, the effects of policies and measures on emissions of CO_2 and CH_4 are estimated to increase over time. Reductions of N_2O, however, are estimated to remain constant, except for France. As shown in table 3, Parties expect that the effects of policies and measures will generally increase over time. However, the general trend is towards increasing emissions despite these efforts. The estimated reductions tend to be offset by other factors (e.g. increasing population or economic activity), which outweigh any discernible impact of policies and measures. Table 3 provides estimated reductions in emissions of the three main GHGs due to effects of policies and measures for 2000, 2005, 2010, and 2020 and gives a sense of the overall effect of measures.

Table 2: Sectoral contribution to the estimated effects of policies and measures to reduce CO_2 emissions in 2000, 2005, 2010 and 2020

(Percentage)

	Energy and transformation				Residential, commercial, Institutional				Industry				Transport			
	2000	**2005**	**2010**	**2020**	**2000**	**2005**	**2010**	**2020**	**2000**	**2005**	**2010**	**2020**	**2000**	**2005**	**2010**	**2020**
AUS	21	54	58	65	19	6	6	5	46	37	35	29	14	3	2	1
BEL[a]	2				49				10				39			
CAN[b]	35		30	19	0-54		0-56	0-69	0-54		0-56	0-69	10		12	12
CHE[c]			2		18		8	11			6	5	82		83	84
DEU[d]	36	38			42	38			8	13			12	10		
FIN[b]	67		71		0-33		0-29		0-33		0-29		0-33		0-29	
(FIN)			-67				-33				-33				-33	
FRA	12		17	17-31	30		27	21-25	20		18	14-17	38		38	34-40
GBR	72	63	66	61	19	25	22	24	19	25	22	24	8	13	12	14
GRE	59				16				16				9			
HUN[b]	61				0-32				0-32				8			
ITA		31	24			19	20			17	23			33	33	
LUX	<0	<0	<0	1	1	2	3	4	93	89	89	81	0	2	3	6
LAT[b]			78	70			0	0			0	0			1	1
SLO	83	63	56		6	9	9		2	1	1		9	28	34	
SWE[e]	39	35	42		42	48	42						20	17	16	
USA[f]	6		8	14	50		62	59	23		13	13	26		18	17

[a] The effects of measures in agriculture and tertiary sectors have been included under the heading residential/commercial/institutional.

[b] A sectoral breakdown for the effects of measures was not possible for all sectors therefore a range is provided where information could not be disaggregated.

[c] Emission reductions from the transport sector include reductions in emissions associated with the use of international bunker fuels.

[d] Figures calculated by the secretariat on the basis of data contained in the policy scenarios for climate protection presented in the second national communication.

[e] The figures do not include the effect of all measures that cut across several sectors, including the programme for more efficient energy use and research and development activities. This presents a problem for the year 2000, since these measures account for 34 per cent of total expected CO_2 emission reductions in that year. In subsequent years, the contribution of these measures to expected emission reductions falls sharply (2010 - 10 per cent, 2020 - 8 per cent).

Table 3: Estimated reductions in CO_2, CH_4 and N_2O emissions in 2000, 2005, 2010 and 2020 as a result of policies and measures

(Gigagrams)

	CO_2				CH_4				N_2O			
	2000	2005	2010	2020	2000	2005	2010	2020	2000	2005	2010	2020
AUS	20 600	31 900	37 000	43 200	429	675	835	1156	0.48	0.76	1.32	2.71
AUT	6 200	7 500	8 200									
BEL	4 100											
BUL	12 984	14 788	17 785	25 786	164	161	201	284	5	5	6	9
CAN	18 600		39 100	78 100	437	618	698	795	33.8	33.8	33.8	33.8
CHE	1 700		4 700	5 600								
CZE	5 000											
DEU	66 500	116 500	171 000	283 000	845	1 486	1 661	1 856	88	89	90	90
(DEU)		(85 400)										
DNK												
ESP	26 089											
EST												
FIN	6 000		7 000									
(FIN)	(6 000)		(15 000)									
FRA	19 086		48 038	76 274	210		664	873	62.7		91.2	131.9
GBR	129 200	146 800	183 500	179 800	937	1 274	1 586	1 956	57	58	58	58
GRE	9 600											
HUN	11 200											
ICE					1.5							
IRE												
ITA		42 800	84 300			624	967			9.7	14.5	
JPN												
LTU					33	37	41					
LUX	4 125	4 312	4 318	4 704	0	0	0	0	0	0	0	0
LAT	0	4 051	5 318	6 637	9	10	5	-8	0	0	0.3	0.1
MON												
NLD	23 500	29 000	34 000	49 000								
NZL	1 500		3 300	5 900								
NOR					27	32	72	72				
(NOR)					-32	92	-132	-132				
POR	4 500	7 300	13 200									
RUS	33 000 - 50 000	176 000 - 204 000			2.7	2.7						
SLO	2 200	3 700	4 400		78.7	111.6	142.8		3.8	4.8	4.6	
SWE	17 500	21 500	23 700									
UKR	310 241	310 241	310 241		2 833	2 833	2 833		12.3	12.3	12.3	
USA	116 000		348 300	530 700	2 708		4 089	4 229	62.7		62.7	62.7

Explanatory Notes to table 3

Australia: The estimates of the effects of measures refer to the total policies and measures responsible for the most significant reductions in greenhouse gases which were presented by gas and sector of economic activity, including reductions in the agriculture and land-use change and forestry sector. An estimate of the effects of measures to reduce PFCs was also provided in the communication in CO_2 equivalent. (2000: 273 Gg; 2005: 176 Gg; 2010: 200 Gg; 2020: 262 Gg.).

Austria: The effects of policies and measures on CO_2 emissions are the difference between a "current measures" projection and a "without measures" projection. The "current measures" projection assumes that no additional measures will be taken in the future but currently implemented measures will continue to be effective. It is indicated, however, that the "current measures" projection assumes that none of the measures in chapter 5 of the second national communication have been implemented, although chapter 5 indicates that some of these are currently in place. Two "additional measures" projections that demonstrate greater emission reductions are also presented, but it is not clear what measures have been included in these scenarios or the extent to which they have been implemented. Accordingly, they are not been presented here.

Belgium: The effects of policies and measures on CO_2 emissions are the difference between a "without measures" projection and "with measures" projection. A "without measures" projection is only provided for the year 2000, and that is therefore the only year presented here. The "with measures" projection includes non-fiscal measures that are in the process of implementation or have already been implemented, as well as fiscal measures undertaken between 1990 and 1994 that have had an impact on CO_2 emissions. These measures are clearly identified. Belgium also provides an "envisaged measures" scenario and a "long-term measures" scenario that produce greater emission reductions, but they are not presented here.

Bulgaria: The estimates of effects of policies and measures are the difference between the baseline ("likely-to-be") scenario and the mitigation scenario. This difference provided an estimate of the effect of measures incorporated in the mitigation scenario, which assumes mitigation measures applied to their full potential. However, it is noted in the second national communication that given past "experience, the currency board restrictions and political situation, one could consider the baseline scenario as a likely-to-be scenario" and "only significant foreign investment could move the country's energy sector towards the mitigation scenario".

Canada: The effects of policies and measures on emissions are the difference between a "without measures" projection and a "with measures" projection.

Czech Republic: The Czech Republic provides various projections in its national communication. Since they differ in assumptions about GDP growth, economic restructuring, and the implementation of policies and measures, it was not possible to evaluate the effects of policies and measures from this information alone. Accordingly, an estimate of the effects of policies and measures on CO_2 emissions in the year 2000 has been derived from an estimate provided of the effects of four measures that are already in place.

Denmark: Denmark did not provide an estimate of the effects of policies and measures in its second national communication.

Estonia: Estonia did not provide an estimate of the effects of policies and measures in its second national communication.

Finland: Finland provided an estimate of the impact of implemented policies and measures on CO_2 emissions as a range for the year 2010 (the upper range being presented in parentheses in the table). This range reflects uncertainties about the ultimate impact of action to liberalize electricity markets and investments in research, development and demonstration for new technologies. The effects of policies and measures in the year 2010 appear to reflect a CO_2 tax that is assumed to be applied internationally from the year 2000.

France: The effects of policies and measures on emissions are the difference between a "without measures" projection and a "with measures" projection.

Germany: Estimates of the effects of policies and measures on CO_2 emissions are presented on the basis of two different studies. In each case, the estimate is the difference between a "without measures" scenario (numbers in parentheses) and a "with measures" scenario that takes agreed climate protection measures into account wherever possible. The second study only considers energy-related carbon dioxide emissions. Estimates of the effects of policies and measures on CH_4 and N_2O emissions are the difference between "with measures" and "without measures" projections.

Greece: The estimates of the effects of policies and measures are the expected reduction in emissions as compared to the business-as-usual scenario.

Hungary: Estimates presented are an "illustrative example" on the basis of the sectoral targets of possible energy savings in the implementation of the medium term, minimum program me of the National Energy Saving Programme, and the results are not necessarily applicable in the scenario developments presented in the second national communication.

Iceland: Iceland did not provide an estimate of the overall effects of policies and measures on future greenhouse gas emission levels. The number presented in the table is the effect of one measure taken to reduce CH_4 emissions from landfills.

Ireland: Ireland presented the effects of a number of individual measures on CO_2 emissions in a non-integrated manner. The dates vary for different measures and some effects are presented cumulatively while others are presented on a per annum basis. Accordingly, it was not possible to include these data in the table.

Italy: Italy provided a "without measures" scenario and three "intervention" scenarios, each with increasing implementation of measures. The estimates of the effects of policies and measures presented in this table are the difference between the "without measures" scenario and the middle intervention scenario ("EU aims" scenario).

Japan: Japan did not provide an estimate of the overall effects of policies and measures. The figures presented in the table are the effects of one measure to recover methane from sewage treatment.

Latvia: The effects of policies and measures are the difference between the reference scenario (which is an "efficient scenario" rather than a business-as-usual scenario) and the "with measures" scenario. The increase in CH_4 emissions in 2020 over that of the reference scenario is due to

the use of natural gas instead of coal in the "with measures" scenario, but does not take into account the reduced emissions that could be brought about by replacing/maintenance of distribution networks.

Lithuania: Information on the effects of policies and measures for the energy sector were provided in terajoules and tons of oil equivalent, rather than CO_2 emissions. Accordingly, it was not possible to include these data in the table.

Luxembourg: The effects of policies and measures on emissions are the difference between a "without measures" projection and a "with measures" projection.

Monaco: Monaco did not provide an estimate of the effect of policies and measures in its second national communication.

Netherlands: The estimate of the effects of policies and measures on CO_2 emissions is the difference between the "trend" scenario and the "without measures" scenario. The "trend" scenario does not include the effects of the most recent additions to existing policy in the Third White Paper on Energy Policy (December 1995) and the CO_2 Reduction Plan (September 1996). A "favourable" scenario has also been presented that includes some estimates of these more recent policies, but it is not presented here because it also includes a number of EU initiatives (such as an energy tax) that have not yet been agreed to.

New Zealand: The estimates of the effects of policies and measures on CO_2 emissions are the difference between a "with measures" scenario and a "business as usual" scenario. The "with measures" scenario captures some of the effects of energy market reforms, implemented greenhouse gas mitigation policies, and changes in consumer behaviour. It is noted that not all changes in consumer behaviour and technology development may be the product of policy. Accordingly, the national communication states that these estimates should be treated with caution. Three different GDP growth scenarios are provided and these data are taken from the medium growth scenario. "With measures" projections are provided for other energy-related greenhouse gases, but the effects of policies and measures are not explicitly identified.

Norway: Norway did not provide a comprehensive estimate of the effects of policies and measures in its national communication. It did, however, provide a low and high estimate (in parentheses) of the effects of its policies and measures on CH_4 emissions from landfills. These estimates are the difference between an "already implemented measures" scenario and a scenario that includes the effects of new policies and measures. A range of estimates is provided and these are included in the table.

Poland: Poland did not provide an estimate of the effect of policies and measures in its second national communication.

Portugal: Two projection scenarios for CO_2 were provided: a "Directorate General for Energy" scenario, encompassing "acceptable measures, without prejudicing economic development", and a "national commitment" scenario with more restrictive measures in line with the national commitment. The estimates of effects of policies and measures are the difference between these two scenarios.

Russian Federation: Estimates of the effects of policies and measures on CO_2 emissions are for energy-related emissions. The figure presented in the table for CH_4 is not an overall effect of policies and measures, only the effect of one measure to reduce emissions from a coal mine for the period 1998-2008.

Slovakia: Estimates of the effects of policies and measures on CO_2 emissions are the difference between scenarios 1 and 3 in the national communication. Scenario 1 is a baseline scenario, and scenario 3 includes current and proposed legislation. The same is true for CH_4 and N_2O emissions, although in these cases scenario 3 often represents the medium figure of a range of possible impacts associated with the implementation of current and proposed policies and measures.

Spain: The estimate of effects of policies and measures is not of the overall effect, but only the expected reduction in CO_2 emissions as a result of the 10-year Energy Conservation and Efficiency Plan (1991-2000).

Sweden: Estimates of the effects of policies and measures on CO_2 emissions were calculated from the difference between the "with measures" scenario and a reference scenario that was constructed by taking out key policies and measures included in the "with measures" scenario. It is noted in the national communication that this calculation contains a large measure of uncertainty and must be interpreted with great caution because it compares two projections that are both uncertain.

Switzerland: Estimates were based on bottom-up energy forecast models and draw a distinction between implemented measures and measures under consideration. The estimate presented is based on the assumption that the present structure of electricity supply will not change significantly in the near future.

Ukraine: The effects of policies and measures are based on two groups of mitigation measures: policy instruments and technological options. Assessments of mitigation options were given at the sectoral and/or individual policy level and estimates were given as average annual reductions through 2015.

United Kingdom: The estimates of the effects of policies and measures on CO_2, CH_4, and N_2O emissions were clearly presented in the national communication. They appear to be based on policies and measures that have been adopted and implemented. It is noted that the estimates are subject to increasing uncertainty as one moves further into the future.

United States: The estimates of the effects of policies and measures on CO_2, CH_4, and N_2O emissions were clearly presented in the national communication and appear to be based on policies and measures that have been adopted and implemented. There is discussion as to why these estimates differ from estimates made in the first national communication.

VI. FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

129. According to paragraphs 42 to 44 of the UNFCCC guidelines, Annex II Parties are to provide separately detailed information on the activities undertaken in 1994, 1995 and, if available, in 1996 to give effect to each of their different commitments under Article 4.3, 4.4, and 4.5 of the Convention.

130. Of the 24 Annex II Parties, Greece and Luxembourg[8] have not reported information on activities related to the provision of financial resources and transfer of technology. Some Parties, for example, Australia, Canada ,Germany, Japan, the Netherlands, and the United Kingdom, provided relatively detailed information as requested by the UNFCCC guidelines. Other Parties, such as France and the United States, though not following the tabular format requested by the guidelines, reported extensive information on their activities.

131. More information was reported in the second national communications than in the first national communications, although the degree of detail and format still varied widely. Information centred on financial contributions to multilateral institutions, and for bilateral and regional cooperation. Although requested by the UNFCCC guidelines, little information was provided on private sector activities and projects related to transfer of technology, and most Parties did not make a distinction between hard and soft technology.

132. Owing to information gaps and differences in the format of reporting, it is difficult to make a comprehensive comparison and draw conclusions on the flow of financial resources and transfer of technology. However, an attempt is made to summarize the information reported by Parties in sections A-G below. Section H makes observations on difficulties encountered by some Parties in following the UNFCCC guidelines, which could be taken up in any discussion on revision of the guidelines.

A. Financial contributions to multilateral institutions and programmes

133. All Annex II Parties, except Greece, Luxembourg and Portugal reported their total contribution to the Global Environment Facility (GEF) for a multi-year period or at least for one of the years 1994-1996. The figures of contributions to the GEF were consistent with those published by the GEF secretariat (see table 4). For other multilateral institutions, information focuses on contributions to the United Nations Development Programme, United Nations Environment Programme, the UNFCCC, and the World Bank (see table 5).

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[8] Belgium referred to its activities on finance and transfer of technology only in its executive summary.

B. Bilateral activities

134. All Annex II Parties, except Greece and Luxembourg, provided information on their bilateral financial contributions related to the implementation of the Convention. Based on information reported, the regions receiving the largest share of bilateral financial resources are Asia and the Pacific and Africa; the countries that have received the most assistance are Bangladesh, Brazil, China, Egypt, India, Indonesia, Kenya, Pakistan, the Russian Federation, and the United Republic of Tanzania.

135. The national communications suggest that the energy and forestry sectors are the two main areas in which bilateral assistance is provided, both in developing countries and in economies in transition. In the energy sector, bilateral assistance is targeted at the improvement of energy efficiency, planning and management, as well as market reform. Promotion of the use of renewable energy sources is also widely supported. Projects in the forestry sector seek to facilitate sustainable land-use, improve soil and forest management, create protected areas and increase afforestation (see table 6 and box 2).

136. Some Parties also indicated that their bilateral assistance included the provision of technical assistance to developing countries to strengthen their institutional and human capacity. For example, Germany supported selected developing countries by an "immediate-aid measures" project, which included assistance in preparing national strategies and national reports. The Netherlands developed the Climate Study Programme in 1996 to assist non-Annex I Parties in formulating their own national climate policy. Japan conducted research for developing counties in the Asia-Pacific region on the impact of global warming. The United States country study programme involved 55 countries, with the aim of building human and institutional capacities.

C. New and additional financial resources

137. The guidelines request Parties to indicate what new and additional financial resources have been provided and "how they have determined resources as being new and additional".

138. Only five Parties[9] provided information on this issue, but the criteria for determining new and additional resources differed. Austria singled out part of its contribution to several multilateral institutions and identified all its bilateral financial contribution as new and additional. Finland indicated that it considered its contribution to the GEF as "new and additional". Germany listed part of its funding for the GEF as a new and additional contribution. Japan listed one project as "measures concerning new and additional financial resources". Sweden identified all its multilateral and bilateral financial contribution as new and

[9] Austria, Finland, Germany, Japan and Sweden; Sweden provided this information during the in-depth review country visit. Only Austria, Finland and Sweden provided information in the tabular format.

additional.

D. Adaptation

139. Sixteen Parties referred to bilateral projects and programmes that will help countries to adapt to climate change.[10] The projects mainly aim at improvement of coastal zone management, preservation of ecosystems on the edge of deserts, improvement of water use management in dry areas, and development of meteorological networks and famine early warning systems. It was also noted that much of the bilateral assistance directed toward sustainable forestry management would also facilitate adaptation to climate change. Two Parties, Norway and the United Kingdom, specifically noted that they had chosen to support projects directed at adaptation to climate change through their contributions to the GEF.

E. Transfer of technology

140. Seven Parties included a separate section on transfer of technology in their national communications and the other Parties reported relevant activities in their description of multilateral and bilateral cooperation[11]. The energy sector has received the largest amount of funds, followed by the forestry and agriculture sectors (table 7).

141. Regarding hard and soft technology, the UNFCCC guidelines provide a general description of the term "soft" and "hard" technology and request Parties to report separately, to the extent possible, their activities for the financing of access by developing countries to these categories of technology. Australia made a clear distinction in its list of projects on transfer of technology between "hard" and "soft" technology. Some Parties, such as the Netherlands, noted that transfer of "soft" technology through capacity building, training and research is an integral part of assisting the technology transfer process. Information reported in other parts of national communications such as that on education, training and public awareness, is also relevant to this activity.

F. Private sector

142. The guidelines provide that Parties shall clearly distinguish between activities of the public sector and those of the private sector and indicate in what way activities by the private sector help meet the commitments of Parties under Article 4.3, 4.4 and 4.5 of the Convention.

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[10] Austria, Canada, European Community, Finland, France, Germany, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

[11] Austria, Canada, Finland, Germany, Japan, Netherlands and Switzerland.

143. The United States provided a substantive description of activities undertaken by the private sector to transfer technologies that will help developing country Parties to mitigate or adapt to climate change. Some Parties described their policies or programmes related to the private sector. For example, Switzerland indicated the role of governments "as a catalyst between private investors and potential target countries for the transfer of capital and know-how". Norway stated that its official development assistance (ODA) fund is specifically designed to promote private sector participation in technology transfer. Australia, Canada and Germany encouraged private industry to participate in activities implemented jointly (AIJ) programmes.

144. Among the initiatives reported by Parties, three main categories can be identified: financial support for the development and commercialization of private sector technologies to mitigate climate change; facilitation of information sharing and personal contacts between private sector technology producers and potential users of these technologies; and support and technical assistance for members of the private sector seeking to make their technologies available to non-Annex II Parties.

G. Cooperation with Eastern European countries

145. Some Parties, particularly those that are members of the European Community, reported on activities to assist countries with economies in transition. The majority of these activities are related to capacity building and technology transfer, focusing mainly on efforts to increase energy efficiency in the transportation and residential sectors, the conversion of power plants to use more efficient technologies and fuels, promotion of renewable energy sources and improvement of nuclear safety.

H. Issues related to reporting

Use of tables

146. The guidelines specifically request some information, such as financial data, and explicitly require Parties to report this information in four standard tables related to multilateral, bilateral and new and addition financial contributions, while a reference may be made to a table on transfer of technology. No Party filled out all five tables (see table 8). For the table relating to financial contributions to multilateral institutions, which was used by half of the reporting Parties, only Australia, Canada and Switzerland completed information on all items in relation to multilateral institutions, scientific programmes, technology programmes and training programmes. The table least frequently completed concerns new and additional financial resources - it was filled in by only three Parties, Austria, Finland, and Sweden.

Determination of proportion of financial assistance related to the Convention

147. Most Parties reported their activities concerning support to sustainable development, whether or not they related to implementation of the Convention. For example, information on ODA, though not requested by the UNFCCC guidelines, was widely reported because, as noted by Norway, the programmes on energy efficiency "constitute a significant element of ODA". Parties also expressed difficulty in isolating climate change mitigation from their overall contribution to environmental protection. Germany stated that "it is impossible to separate out from this funding those payments that relate directly to the aims of the FCCC." The European Community indicated that "it is difficult to isolate the environment or energy component from the various integrated development projects."

New and additional financial resources

148. Most Parties did not report any information on this issue. One reason is that the yardstick for determining what new and additional resources are, has not been established. Canada pointed out that the "issue of what constitutes new and additional contributions is unclear". Several Parties, such as Denmark and the Netherlands, observed that for technical reasons, it is not possible to single out new and additional financial contributions.

Table 4: Contributions to the GEF from reporting Parties (for all focal areas)

Pilot phase		GEF I	(1994-1997)	GEF II
	Millions US$	Millions SDR[1]	Millions US$	Millions SDR
Australia	22.1	20.80	29.20	23.47
Austria	36.0	14.30	20.00	13.53
Belgium				24.92
Canada	18.3	61.80	86.50	64.30
Denmark	23.4	25.10	35.10	20.90
Finland	20.6	15.50	21.70	16.07
France	149.5	102.30	143.20	105.54
Germany	149.0	171.30	239.80	160.32
Greece		3.60	5.00	4.00
Ireland		1.70	2.40	4.00
Italy	68.2	81.90	114.70	60.00
Japan	95.0	296.00	414.30	300.67
Luxembourg				4
Netherlands	52.8	51.00	71.40	53.05
New Zealand		4.00	5.60	4.00
Norway	28.6	21.90	30.70	22.83
Portugal	6.5	4.00	5.60	4.00
Republic of Korea				4.00
Spain	14.7	12.40	17.30	12.03
Sweden	25.5	41.60	58.20	42.12
Switzerland	57.2	32.00	44.80	31.97
United Kingdom	62.4	96.00	134.50	101.23
United States	150.0	306.90	429.70	313.35
Total	***993.2***	***1,364.10***	***1,909.70***	***1,390.30***

Source: GEF Secretariat

:es over the period

1 February 1993 to 31 October 1993 (1 SDR = US$ 1.401)

Table 5: Financial contributions to multilateral institutions and programmes 1994-1996 (millions of US dollars).

	AUS			AUT			CAN[a]			CHE			DNK			FIN			GBR			ICE[b]			IRE			JPN			NLD			NZL			SWE[b]		
	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96
Multilateral institutions																																							
1. World Bank	89.3	86.7					286.0	341.7		42.2	50.4		83.7	91.2	99.5	2.4	52.8	13.3	319.8	341.9	310.0							208.5	203.3	207.1				0.2	0.2	0.3	113.3	125.3	137.4
2. International Finance Corporation							7.1	7.2		4.0	4.4		2.9	2.5	2.2				16.9	17.1	16.6						1.1	1.0	4.9	4.9				0.1		0.3	1.9	2.6	2.9
3. African Development Bank										37.4	20.2		31.1[c]	19.8	26.6	11.2		20.0	35.6	15.7	31.0							2.0	1.9	1.9							97.3	0.0	26.5
4. Asian Development Bank	31.0	64.7					63.2	3.4		9.2	14.4					1.9[d]	5.0	0.4	31.9	26.7	56.3							102.3	108.0	107.0				1.5	3.3	3.9	8.0	3.0	12.5
5. European Bank for Reconstruction and Development	7.7	2.3								17.0	18.3		45.0	39.8	23.2				61.9	65.1	21.1	0.7	0.7	0.2				17.0	17.5	20.0									
6. Inter-American Development Bank							10.0	18.3		1.7	7.1								11.3	10.9	11.8							20.1	23.3	23.3							0.6	2.7	
7.United Nations Development Programme	14.1	14.6		13.4	13.0	12.4				42.7	53.9		95.8	95.8	104.2	5.2	12.6	13.9	44.1	45.0	39.5		0.7	0.2				1.0	1.0					2.4	2.6	3.1	82.2	74.6	75.0
8. United Nations Environment Programme	0.9	0.9					0.6	0.6	0.2	6.2	5.0		1.9	2.2	2.2	3.3	5.9	3.7	7.0	7.0	7.0							9.0	5.0										
9. United Nations Framework Convention on Climate Change						0.1	0.2	0.3	0.2				0.9	0.1	0.1											0.02	0.03				0.2	0.1	0.1						
10. Others	132.5	77.0					1.0	4.4		53.3	85.8		1.5	1.5	3.3	5.3	52.0	50.1	3.0	3.1	4.0	0.1	0.1	0.1			7.1	0.2	0.2	0.2	9.5	12.1	12.0	8.7	8.3	8.2	164.2	333.6	236.9
Multilateral scientific programmes																																							
Total[f]	1.6	1.8					1.8	2.0	1.6	23.6	25.5					1.2	1.5	0.8													0.7	0.7	2.5	1.1			11.0	11.8	11.5
Multilateral technology programmes																																							
Total[e]	2.5	1.6		0.7	0.9	0.2				7.5	6.6																												
Multilateral training programmes																																							
Total[e]	0.1	0.1								1.0	3.6											0.4	0.4	0.5									0.2	1.1	1.1	1.3			

a. Canada's financial year is 1April to 31March

b. Iceland provided this information in addition to its national communication August 1997.

c. Sweden reported that the figures in this table are new and additional resources

d. These figures include contributions to three regional banks; African Development Bank, Asian Development Bank, and Inter-American Development Bank

e. These figures include contributions to both Asian Development Bank and Inter-American Development Bank

f. The figures for the scientific, technology, and training programmes are the total amounts provided by Parties in national communications

This refers to Table 9a requested by the guidelines.

Note: Domestic currencies presented in the communications converted to US dollars based on the exchange rate in the OECD publication "Main Economic Indicators 1996"

The secretariat has rounded the numbers to one decimal point

Table 6: Bilateral financial contributions related to the implementation of the Convention, 1994-1996 (millions of US dollars).

	Mitigation																		Adaptation			Other		
Donor country	**Energy**			**Transport**			**Forestry**			**Agriculture**			**Waste management**			**Industry**								
	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96	94	95	96
AUS[a]	6.1	1.0					4.0	5.8		2.8	2.7			0.1						0.6		2.0	4.0	
AUT[b]				6.3	6.4	6.2	10.1	4.2	3.1															
CAN[c]	3.5	3.3	3.4					0.9	2.0			0.4												0.1
DEU	112.9	209.8		15.1	2.8		69.4	105.6		53.0	25.3					6.5	15.1		9.7			0.7	1.3	
FIN	16.6	3.5	3.5				8.7	9.5	8.4															
GBR	87.8	70.8	113.3				34.5	40.2	50.2	39.3	50.4	66.7												
JPN[d]	17.8						79.4			22.6			55.7											
NLD[e]	12.8	18.5	27.4																0.3	0.1	0.4			
NZL	0.04	0.4			0.3			3.4	3.9											0.8	0.5			
SWE[f]	130.0	43.5	157.0	0.4	1.5	1.2	13.0	8.4	81.0	3.9	2.9	6.1	0.01	0.5		1.3	2.0	3.0	4.3	4.6	4.1	1.0	4.4	4.6

[a] The Australian financial year is the period 1 July to 30 June.

[b] Austria reported that the amounts in its table are new and additional resources.

[c] The Canadian financial year is the period 1 April to 31 March.

[d] These amounts contain fiscal 1995 figures for grant cooperation and technology cooperation.

[e] These figures are the contribution to the area of mitigation.

[f] Sweden reported that the figures in its table are new and additional resources.

Note: This refers to table 10a requested by the guidelines. Domestic currencies presented in the communications converted to US dollars based on the exchange rate in the OECD publication "Main Economic Indicators".

Box 2. Textual information on bilateral financial contributions provided by the Parties

1. Denmark indicated that environment-related development activities in developing countries include sustainable utilization of land and natural resources and the protection of water catchment areas. Other measures cover the development of environmental expertise and administrative capacity, reducing air and water pollution, forest management, renewable energy, and making energy production and waste treatment more efficient.

2. The European Community indicated that it approached bilateral assistance as supporting particular programmes on the basis of identified priorities and regions. A major part of the assistance is targeted to Eastern European countries.

3. France indicated that it had established a French Global Environmental Facility (FGEF) in 1996, with a programming capability of 202 million French francs, 51 per cent of the fund being related to projects on mitigation of greenhouse gases. The priority region is Africa.

4. Iceland indicated that it is supporting geothermal energy projects in China, Lithuania, Romania, and Slovakia and that future work will focus on the areas of soil erosion and land reclamation.

5. Ireland indicated that it has a number of projects related to afforestation and land-use management in Africa, as well as projects to improve the operating efficiency and environmental performance of electrical systems in the Middle East and Africa.

6. Norway reported that it had established a governmental climate change fund to support AIJ projects.

7. Portugal indicated that several bilateral actions had been taken in the areas of education and training and support for the preparation of legislation on the environment.

8. Spain indicated that its bilateral financial contribution amounted to 5.066 million pesetas through the Spanish Agency for International Cooperation.

9. Switzerland indicated that its total bilateral financial contribution for 1994 and 1995 was CHF 10.4 million and CHF 26.8 million, respectively.

10. The United States described 19 regional projects that are currently under way and have received or will receive US$ 541 million in funding over their lifetime. An additional 39 bilateral projects targeted at individual countries are also described, and have received or will receive US$ 1.045 billion in funding over their lifetime.

Table 7: Projects or programmes that promote, facilitate and/or finance transfer of or access to "hard" and "soft" technologies.

	Project	Recipient country/region	Sector	Funding	Period
AUS	1. Henan/Yima coal gasification	China	Energy	$23,261,807	1994-1996
	2. Huangshi coal gas Hebei Province	China	Energy	$2,280,326	1995-1998
	3. ASEAN - Australia Economic Cooperation Programme Energy Biomass Residue	ASEAN region	Energy	$2,331,000	1994-1998
	4. Municipal solar infrastructure	Philippines	Energy	$10,256,400	1997-1999
CAN	1. Energy efficiency in buildings	China	Energy	$6,022,497	1996-2001
	2. BIOGAS II: Network-building of Indian NGOs in their effort to introduce and extend biogas technology	India	Energy	$3,086,324	1990-1996
DEU	1. Long-term programme in the conventional energy sector	Southern Africa	Capacity building	$58,113	1995-1996
	2. Power station equipment and the energy sector	China	Energy	$8,846,090	1987-1999
	3. Tangier Wind Park	Morocco	Energy	$5,488,450	36 months
	4. Industrial energy efficiency	India	Industry	$3,938,770	1995-1999
	5. Conservation of the Brazilian rain forests	Brazil	Forest	$201,458,400	1992-
	6. Environmentally compatible automotive technology	Costa Rica, Guatemala, Honduras,Columbia Niger, United Republic of Tanzania	Transport		1992-
	7. Implementation of the Convention	China, Indonesi	Energy	$6,457,000	1992-
JPN	1.Non-gramt cooperation in environmental areas (yen loans)	Eligible aid recipients DAC list	Energy, forestry, water and sewage	$1,756,503,856	Annually
	2. Technology cooperation in environmental areas (grant)	Eligible aid recipients DAC list	Capacity building	$669,511,568	Annually
	3. Support from the Global Environment Fund for the establishment and activities of an East Asian Regional Network to respond to climate change and air pollution	NGOs in East Asian countries	Support for NGO activities	$51,414	1995-1996
	4. Small Coal-Fired Boiler Efficiency Improvement in the City of Dalian, China	China	Energy		1996-2000
	5. Model programme for coke dry quenching facilities	China	Energy		1997-2000
	6. Restore heat efficiency by improving the operation of existing thermoelectric plants	Thailand	Energy		1991-2000
	7. Creation of experimental forest in Kalimantan, Timur	Indonesia	Forest		
SWE	1. Capacity development and institutional support to National Environment Management Council	United Republic of Tanzania	Environment and natural resources		1986-
	2. Capacity building and increased environmental awareness	Asia region and global	Energy, climate and atmosphere	$4,020,600	1992-
	3. Transfer of technology and construction of a full scale pilot bio filter	Latvia	Industry and environmental protection	$123,834	1994-
	4. Air Pollution Management and Technology International Training Programme	International	Environmental protection		

Note: This refers to table 11 requested by the guidelines. Domestic currencies presented in the communications are converted to US dollars based on the exchange rate in the OECD publication titled "Main Economic Indicators 1996".

Table 8: Status of reporting of information in tabular formats.

	Financial resources												Transfer of technology
	Table 9 a Financial contributions to multilateral institutions and programmes			Table 9 b New and additional financial contributions to multilateral institutions and programmes			Table 10 a Bilateral financial contributions related to the implementation of the Convention			Table 10 b New and additional bilateral financial contributions related to the implementation of the Convention			Table 11 Projects or programmes that promote, facilitate and/or finance transfer of technologies
Party	94	95	96	94	95	96	94	95	96	94	95	96	94/95/96
AUS	✔	✔	✔	-	-	-	✔	✔	✔	-	-	-	✔
AUT	✔	✔	✔	✔	✔	✔	-	-	-	✔	✔	✔	-
BEL	-	-	-	-	-	-	-	-	-	-	-	-	-
CAN	✔	✔	✔	-	-	-	✔	✔	✔	-	-	-	✔
CHE	✔	✔	-	-	-	-	✔	✔	-	-	-	-	-
DEU	-	-	-	-	-	-	✔	✔	-	-	-	-	✔
DNK	✔	✔	✔	-	-	-	-	-	-	-	-	-	-
ESP	-	-	-	-	-	-	-	-	-	-	-	-	-
EU	-	-	-	-	-	-	-	-	-	-	-	-	-
FIN	✔	✔	✔	✔	✔	✔	✔	✔	✔	-	-	-	-
FRA	-	-	-	-	-	-	-	-	-	-	-	-	-
GBR	✔	✔	✔	-	-	-	✔	✔	✔	-	-	-	-
GRE	-	-	-	-	-	-	-	-	-	-	-	-	-
ICE	✔	✔	✔	-	-	-	-	-	-	-	-	-	-
IRE	-	✔	✔	-	-	-	-	-	-	-	-	-	-
ITA	-	-	-	-	-	-	-	-	-	-	-	-	-
JPN	✔	✔	✔	-	-	-	✔	-	-	-	-	-	✔
LUX	-	-	-	-	-	-	-	-	-	-	-	-	-
NLD	✔	✔	✔	-	-	-	✔	✔	✔	-	-	-	-
NOR	-	-	-	-	-	-	-	-	-	-	-	-	-
NZL	✔	✔	✔	-	-	-	✔	✔	-	-	-	-	-
POR	-	-	-	-	-	-	-	-	-	-	-	-	-
SWE	-	-	-	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
USA	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: ✔ = **provided**

S = **not provided**

VII. IMPLEMENTATION OF OTHER COMMITMENTS

150. In the period between the first and second national communications, the areas of research and systematic observation including on impacts and vulnerability and adaptation as well as education, training and public awareness programmes, were further developed by all Parties. Parties reported additional information in all these areas. In addition, further measures are being implemented. Research includes monitoring the changing composition of the atmosphere, modelling, determining the overall impacts of and vulnerability to climate change, and laying the groundwork for future adaptation measures. Finally, Parties reported consideration of more measures to adapt to the changing environment and to encourage the public to modify their behaviour through national campaigns.

A. Research and systematic observation

151. All Parties reported on research and systematic observation activities in varying depth, coverage and level of detail. In most countries, research and systematic observation is carried out in government and recognized scientific establishments, including universities.

152. Some Parties indicated that observation and monitoring systems for understanding climate change were important international activities. Coordinated by the International Council of Scientific Unions (ICSU), many Parties participate in three global observing systems - the Global Climate Observing System (GCOS); the Global Ocean Observing System (GOOS); and the Global Terrestrial Observing System (GTOS). The group of programmes that relate to the analysis of data include the International Geosphere-Biosphere Programme (IGBP), the World Climate Research Programme (WCRP) and, recently, the International Human Dimensions Programme (IHDP). Many countries mentioned data collection and archiving activities, including involvement with international (world) data centres. The goal of monitoring and research is primarily to reduce uncertainties about climate change and its impacts, as well as gaining an understanding of the range of possible response options.

153. National programmes focus on specific solutions to the problems raised by climate change. These include improving technologies, particularly in the energy sector including new and renewable energy systems and improvements in energy efficiency. Other research is focused on understanding the impact of climate change, as well as possible adaptation strategies. Parties conduct research in a diverse range of areas - including agriculture, forestry, water resources and ecosystems - with the aim of understanding the likely impacts of climate change and protecting vulnerable areas of each country.

154. A few Parties, including Japan, the Netherlands, Switzerland and the United States, referred to programmes designed to augment research capacity and capabilities in developing countries. The support provided included funding, establishing international and bilateral

scientific exchanges, and supporting joint research projects. Although, as implied in the national communication section on technology transfer, research is being conducted in the private sector, these activities were rarely reported. Private research seems to focus on the energy sector, particularly renewable energy and energy efficiency for both residential and commercial purposes, and on revamping transportation systems.

B. Expected impacts of climate change, vulnerability assessment, and adaptation

155. All Parties, except for Hungary and Latvia, reported, in various degrees of detail, on the vulnerability of ecosystems, economic sectors and society, and the related expected impact of climate change. The communications generally treated the expected impacts of climate change and the assessment of vulnerability to climate change as a single issue.

156. Parties included information based on national climate change scenarios that were derived from general circulation models and used as a basis for assessing potential impacts and vulnerability. The uncertainties regarding the scenarios were noted, particularly the difficulties in using global models to predict regional and national change. Parties also stressed the difficulty in, and importance of, estimating changes in temperature and precipitation.

157. While Parties were concerned about the impacts of climate change on sensitive regions (e.g. coastal zones and mountains) and on ecologically sensitive activities (e.g. agriculture, silviculture, pisciculture and water use), they were uncertain as to its severity and nature. The main areas which Parties indicated were vulnerable to climate change included coasts (owing to sea level rise), agriculture, fresh water systems, forestry, fisheries, and the biodiversity of ecosystems. The results of these impacts on their respective communities included, among others, changes to, and impacts on, society, human health, water supply for drinking and hydroelectric power, insurance and tourism.

158. Some Parties predicted that climate change might improve their agricultural production, while others expected a negative impact or were uncertain as to its results. The northern temperate regions anticipate positive impacts of climate change because of the increased crop production resulting from the longer growing season (e.g. Denmark). Possible adverse effects on agriculture listed by Parties included increases in storms and drought; lower soil moisture retention levels; greater levels of infestation by weeds and pests; spread of infectious diseases and a decrease in biodiversity. Some impacts could alter the ranges of common crops and modify unmanaged ecosystems. Parties indicated that the impacts of climate change will be primarily negative and could well affect many aspects of their communities (see table 9).

Table 9: Areas of impacts and vulnerability

	IMPACTS AND VULNERABILITY						
Party	**Sea level rise**	**Agriculture**	**Fisheries**	**Hydrology**	**Forestry**	**Biodiversity**	**Other**
Australia	-	**?**		-	-	-	**hh, i, t**
Austria		-		-	-	**?**	**hh, i, t**
Belgium							**hh, i**
Bulgaria		+			+	**?**	
Canada	-	**?**	-	-	-		**hh, i**
Czech Republic		**?**		-	-		
Denmark	-	+	-	-		-	**hh, i**
Estonia		**?**		**?**	**?**	**?**	
Finland		+		**?**	**?**		
France	-	-		-	-		
Germany	-	**?**		-	-	-	
Greece	-						
Iceland	-	-	**?**		-		**electric power**
Ireland	-	+	**?**	-	**?**		
Japan	-	+	-	**?**		-	**hh**
Latvia	-						
Lithuania	-	-		**?**	**?**	-	
Netherlands	-	+		-			
New Zealand	-	+		-	-		
Norway	-	**?**	-	-	**?**	**?**	
Poland	-	+		**?**	-	-	
Portugal	-	-		-			
Russian Federation	-	-		-	**?**		
Slovakia				-	-		
Spain	-	-	-	-		-	
Sweden	-	-	-	-	**?**		
Switzerland		-		-	-	-	**hh, i, t**
Ukraine	-	**?**		-	**?**		
United Kingdom	-	**?**	-	-	-	-	**hh**
United States	-	**?**	**?**	-	**?**	-	**hh, i**

Notes: + effect positive **hh** human health
- effect negative **i** insurance
? effect uncertain **t** tourism

A reported effect within any of these three sectors is recorded; blanks signify an absence of information.

159. Parties stressed that the uncertainties with regard to the magnitude, timing, and regional distribution of climate change impacts have rendered the planning of adaptation strategies and measures difficult. Most Parties describe adaptation activities in terms of future programmes and ongoing research.

160. Adaptation activities include both research on the impacts of climate change and the development of concrete policies and programmes which are designed to meet these challenges. Research tends to be conducted in areas such as agriculture, forestry and biodiversity. Approximately half of the communications mentioned possible adaptation measures to be considered in the future - the programmes outlined by Parties began with research followed by targeted and focused adaptation measures. Future programmes include both areas in which research is currently being conducted, and additional areas for concern. Possible new areas include consideration of urban management, additional aspects of coastal areas, preserving genetic material for agriculture and in support of biodiverse ecosystems, and improved forestry and wildlife management systems.

161. A few Parties are also undertaking specific programmes to adapt to climate change. Parties vulnerable to sea level rise are responding to this threat by developing coastal defence mechanisms. Other specific programs include water management and erosion control. Most adaptation measures, however, are still at the research stage.

C. Education, training and public awareness

162. Information is emerging as a significant policy tool. All Parties reported on information dissemination and education - both to the public and to specific sections of the national community. Parties typically implement public awareness campaigns to inform individuals about the facts of, and threats posed by, climate change. The types of outreach used include preparation and dissemination of published materials, electronic publications, Web sites, lectures, seminars, radio and television spots, and other forms of communication.

163. Information is imparted to the public both to inform individuals generally about climate-change issues and to inform the public as consumers of goods and services to encourage climate friendly consumption. Typical examples in which people receive information as consumers focus on activities - such as purchasing energy-efficient appliances, recycling, and car-pooling - which, while often having other positive effects, also serve to limit greenhouse gas emissions. Often, these sorts of campaigns are publicized through pamphlets and brochures and through public awareness events such as Energy Awareness Week (Ireland), Environment Month (Japan), Think Environment (Portugal) and Open your mouth, don’t close your eyes! (Switzerland).

164. Another focus for such activities, as in the cases of Greece, Latvia, and Slovakia for example, is educating both school and university students. These activities involve the preparation of suggested curricula, creation of texts and teaching tools, the establishment of outdoor nature programmes, and other forms of instruction. These programmes aim at making school children and university students conscious of the nature of, and risk imposed by, climate change in the hope of influencing future behaviour.

165. Other programmes focus on even narrower audiences and their related expected outcomes. Typically, these activities are aimed at either specific industries or policy makers. These programmes, such as one developed by Germany for heavy industry, aim to inform industry on the implications of their work practices on greenhouse gas emissions and encourage best practice. Similarly, many Parties conduct training programmes, which are also directed towards a targeted audience with the aim of imparting specific technical and vocational skills. The aim is to increase knowledge in specific areas and encourage climate-friendly practices. Examples include instructing architects in designing structures that conserve energy and teaching janitors and building supervisors about efficient heating and cooling practices. Local governments are also often targeted by some programmes as recipients of both focused education and specialized training. The purpose behind both the educational programmes and specialized training is to achieve changes in specific behaviour and policies among targeted audiences which will have a direct impact on greenhouse gas emissions.

166. Some Parties emphasize the importance of education, training and public awareness campaigns in their policies and measures. In general, Parties that made this link, such as Australia, the United Kingdom and the United States, discussed specific programmes relating to energy efficiency, transport practices and energy conservation. The approach of linking specific policies and measures with public awareness campaigns highlights aspects of Parties' policies and measures, increases the acceptance and understanding of the measure within the country and may make it more likely for the measure to be successful.

VIII. REPORTING ISSUES

A. Date of submission

167. Annex I Parties were requested by the COP at its second session to submit their second national communications by 15 April 1997; second national communications from Parties with economies in transition were required to be submitted no later than 15 April 1998 (table 10). Nine Parties submitted their second national communication on time, while 10 Parties submitted their communications within three months of the due date, and four more within six months. The remaining Parties submitted their communications six months to over a year after the due date and five Parties have not submitted their second national communications. The delay in reporting hinders the process of compilation and synthesis, in particular, evaluation of

inventories and compilation of information related to policies and measures and finance and technology flows.

Table 10: Submission of second national communications

Delay in submission	Annex I Parties	
	Annex II (15 April 1997)	Economies in transition (15 April 1998)
In time	Finland, Germany, Netherlands, Norway, United Kingdom	Czech Republic, Estonia, Hungary, Slovakia
1 month	Canada, Monaco[a], Sweden, Switzerland	Poland
1-3 months	France, Ireland, New Zealand	Bulgaria, Latvia
3-6 months	Austria, Belgium, Iceland, United States	
6-12 months	Australia, Denmark, Greece, Japan, Portugal, Spain	
>12 months	European Community	
Not submitted[b]	Italy, Luxembourg	Lithuania, Romania, Russian Federation

(a) Monaco notified the Depositary of its intention to be bound by subparagraphs (a) and (b) of Article 4.2 of the Convention on 24 November 1992.

(b) Ukraine has not submitted its second national communication since its first national communication was submitted in February 1998 as due.

B. Data issues

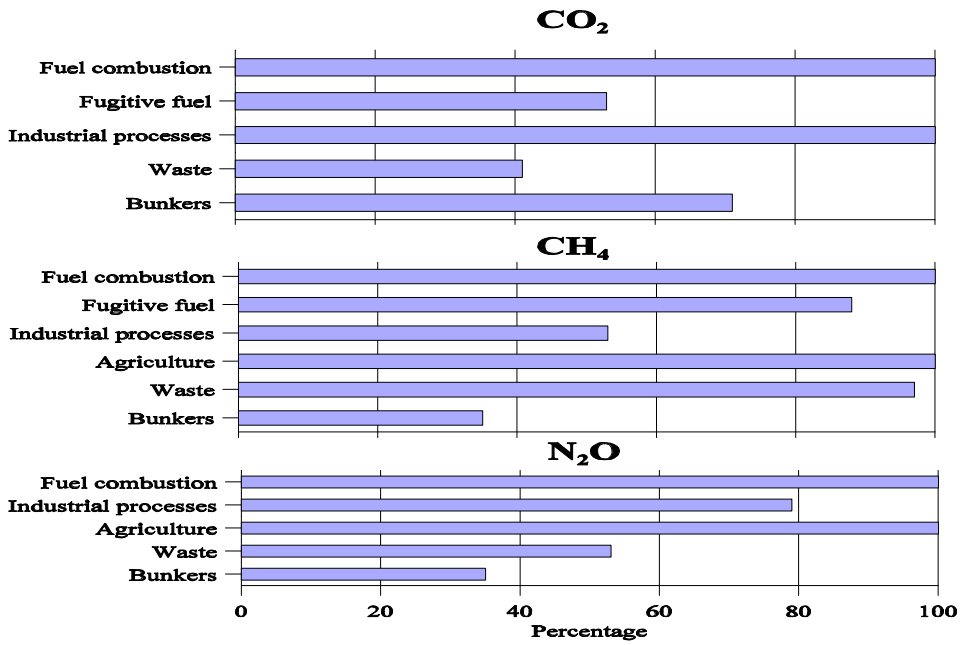
168. While reporting in the second national communications was generally more complete than in the first national communications, reporting still varied widely between Parties. Table 11 provides information on the degree of reporting of key elements by Parties. The elaboration of specific formats for reporting electronically would also facilitate the corroboration of the data provided.

169. Many issues remain which hamper reporting of GHG inventories in a transparent, complete and consistent way. All Parties, for example, recalculated their emission estimates for 1990, but only some provided information on the underlying causes of the recalculation. For those which provided such information, the quality of information varied widely. In addition, there was little reporting of HFC, PFC and SF_6 emissions, and although the number of Parties doing so increased, reporting was not consistent. Detailed treatment of Parties' inventories can be found in documents FCCC/SBSTA/1998/7 and FCCC/SBSTA/1998/8.

170. These problems suggest a possible lack of clarity in the UNFCCC guidelines, as well as a lack of conformity in reporting by Parties. Because of the close linkage existing between these two factors it is difficult to assess the influence of each on the reporting of data. The result, however, was that not enough information was provided to allow for reconstruction of inventories even for the most significant sectors. Supporting documents could potentially lead to more consistent and transparent inventories. Clear guidance on what information might be needed for subsequent national communications needs to be provided. This may include information relevant for meeting emission limitation or reduction objectives.

171. The degree of completeness of reporting emissions for the most important sources in Parties' GHG inventories, varied widely. Figure 16 provides an indication of the completeness of reporting for Annex I Parties as a whole for the major sources for CO_2, CH_4 and N_2O. Although at an aggregate sectoral level the reporting for Annex I Parties is complete for fuel combustion and agriculture, and partially complete for other sources, the level of disaggregated reporting within some sources was limited. It is recognized that some Parties may not have had data on certain sources of emissions at the disaggregated level and that the data were made less comparable by the lack of reporting as to whether emissions were "not estimated", "not occurring" or "estimated elsewhere", but there was still a relatively large degree of incompleteness at the subsectoral level, and to some degree even at the sectoral level for sources other than fuel combustion and agriculture.

Figure 16: Degree of completeness of reporting by Annex I Parties of GHG estimates for the major sources and main gases (percentage of Parties reporting)



172. All Parties, except Bulgaria and Hungary, which submitted a new GHG inventory in their second national communications recalculated their base year inventories in relation to estimates provided in the first national communications. Guidance on information required with respect to the recalculation of base and subsequent years in GHG inventories needs to be provided.

173. A strategy on reporting which recognizes a priority of needs and establishs a hierarchy of required details for data and information might be a possible solution. It would make the data more manageable and could ensure transparency of the most significant sources and years. Given that in each country only particular GHG emissions within a small number of specific source categories are responsible for the bulk of aggregate GHG emissions, emphasis could be placed on providing detailed information for the most significant categories for each Party. Typically these categories include CO_2 emissions from fuel combustion and industrial processes, CH_4 emissions from enteric fermentation and solid waste and N_2O emissions from agricultural soils and fuel combustion (mainly transport). In addition, inventories for particular years (for example, base year and years at the beginning and end of a given period of inventory data) will likely prove more significant and could be the focus for more detailed data and information.

174. Specific information required by the UNFCCC guidelines such as underlying assumptions in projections and estimates of the effects of measures were often not provided or differed in terms of units used and were not fully documented (see table 11). Difficulties noted by Parties included estimating the effects of individual policies and measures and the interaction and synergies across measures, and projections over the long term, in particular for economies in transition. It was not always clear to what degree the projection scenarios included implemented measures or measures under consideration. The assessments of the effects of measures were often based on estimates of the economic or technical potential for greenhouse gas reduction rather than on the effects of the measure itself. The development of agreed definitions and comparable methodologies for evaluating the effectiveness of measures to limit greenhouse gas emissions and enhance the removals of these gases, as suggested in Article 7 (2) (d) of the Convention, needs further consideration by Parties. A first step could be historical analysis of activity data.

Table 11: Degree of reporting of key elements on policies and measures and projections

	Policies and measures[a]			Projections[b]					
Party	**Status of imple-mentation**	**Estimate of effects of measures**	**Monitoring: intermediate indicator of progress**	**with measures scenario**	**CO_2, CH_4, N_2O**				**HFCs, PFCs, SF_6**
					2000	**2005**	**2010**	**2020**	
AUS	✓	✓	✓	✓	✓	✓	✓	✓	PFCs
AUT	✓	✓	✓	✓	CO_2, CH_4	CO_2	CO_2	-	-
BEL				✓	✓	✓	CO_2	CO_2	-
BUL	-	✓	-	✓	✓	✓	✓	✓	-
CAN	✓	✓	✓	✓	✓	✓	✓	✓	✓
CHE	✓	✓	✓	✓	✓	✓	✓	-	-
CZE				✓	✓	✓	✓	-	-
DEU	✓	✓	✓	✓	✓	✓	✓	✓	✓
DNK				✓	✓	✓	✓	CO_2	-
ESP				✓	✓	-	✓	-	-
EST	-	-	-	✓	CO_2	CO_2	CO_2	CO_2	-
FIN	✓	✓	-	✓	✓	✓	✓	✓	✓
FRA	✓	✓	✓	✓	✓	-	✓	✓	-
GBR	✓	✓	✓	✓	✓	✓	✓	✓	✓
GRE	✓	✓	-	✓	CO_2	CO_2	CO_2	-	-
HUN	✓	-	-	✓	CO_2	-	-	-	-
IRE	-	✓	-	-	✓	✓	✓	-	-
ICE				✓	✓	✓	✓	✓	HFCs, PFCs
ITA	-	✓	-	✓	✓	✓	✓	-	✓
JPN				-	CH_4, N_2O	CH_4, N_2O	✓	-	-
LUX				✓	✓	✓	✓	✓	-
LTU	-	✓	-	✓	✓	-	✓	-	-
LAT	✓	✓	-	✓	✓	✓	✓	✓	-
MON									-
NLD	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOR				✓	✓	✓	✓	✓	✓
NZL	✓	✓	✓	✓	✓	✓	✓	✓	✓
POL	✓	-	-	-	CO_2	CO_2	CO_2	-	-
POR	✓	✓	✓	✓	✓	✓	✓	-	-
RUS	-	✓	-	✓	✓	✓	✓	-	✓
SLO	✓	✓	✓	✓	✓	✓	✓	-	-
SWE				✓	✓	✓	✓	CO_2	✓
UKR	-	✓	-	✓	✓	✓	✓	-	-
USA	-	✓	-	✓	✓	✓	✓	✓	✓

Notes: **Policies and measures**: ✓ = provided, but not necessarily for all policies and measures reported by the Party.

Projections: ✓ = projections provided for CO_2, CH_4, N_2O and HFCs, PFCs, SF_6. Austria, Estonia, Hungary and Poland only provided a graphical presentation of projected emissions; Finland and the Netherlands provided graphical presentations of projected emissions of CO_2, and Portugal of CH_4 and N_2O.

(a) Reporting of information requested in the policies and measures summary table (table 1 of the UNFCCC guidelines).

(b) Reporting of projection estimates as requested by the UNFCCC guidelines. Reporting of sectoral projections was less complete than the elements shown in the table.

C. Flexibility in accordance with Article 4.6

175. In accordance with Article 4.6 of the Convention, Parties with economies in transition may seek a certain degree of flexibility with respect to the implementation of their commitments. In this regard, the COP, at its second session, decided to allow flexibility in the choice of a base year other than 1990 to Bulgaria (1988), Hungary (1985-1987), Poland (1988) and Romania (1989), and further requested that Parties wishing to invoke Article 4.6 of the Convention do so by explicitly indicating the nature of this flexibility in their national communications, stating clearly the special consideration they are seeking and providing an adequate explanation of their circumstances (decision 9/CP.2).

176. Four Parties with economies in transition invoked this flexibility in their second national communications. Bulgaria and Poland noted their flexibility as to the choice of base year, and the Czech Republic, Poland and the Ukraine with respect to their inability to present projections fully in accordance with the UNFCCC guidelines, due to large uncertainties in formulating projection scenarios.

177. Poland used the UNFCCC guidelines developed for the first national communications, and submitted the second national communication by 15 April 1998. Poland also invoked flexibility with regard to presentation of inventory data on a two-year, instead of an annual basis.

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